THE UNCONVENTIONAL PETROLEUM POTENTIAL
OF EP 93 AND EPA’s 130 & 131 AND PELA 77
PEDIRKA BASIN
ONSHORE NORTHERN TERRITORY AND SOUTH AUSTRALIA
AUSTRALIA

(Appended is “Appraisal of GTL Development Options for Potential CBM Resources of the Pedirka Basin”.

Jake De Boer, GHD Engineering Pty Ltd and David Holt, Holt Campbell Payton Pty Ltd)

R.A MEANEY
MULREADY CONSULTING SERVICES PTY LTD.
09th March 2007

The Directors
Central Petroleum Limited
Suite 3
Level 4 Southshore Centre
85 The Esplanade
South Perth WA
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Dear Sirs,

At your request I have prepared the following Independent Geologist’s Report for consideration by the board of Central Petroleum Limited in respect of farm-in opportunities in your Pedirka Basin acreage, with the emphasis on non-conventional hydrocarbon accumulations.

Jack N. Mulready
Director/Principal
Mulready Consulting Services Pty Ltd
EXECUTIVE SUMMARY

1. Central Petroleum Limited, in their own right, have acquired EP 93 in the Northern Territory and also they have the sole rights to EPA’s (Applications) 130 and 131 in the Northern Territory and PELA (Application) 77 in South Australia.

2. The above mentioned tenements cover most of the potentially prospective, but under explored, Pedirka Basin of central Australia, as well as the overlying and underlying sedimentary sequences.

3. Studies by the company and the relevant state Departments of Minerals and Energy have highlighted the conventional hydrocarbon prospectivity of these tenements.

4. Work by the company, which has been confirmed by this report, has identified substantial prospectivity for the presence of, and the potential to, develop non-conventional hydrocarbons in the company’s four tenements.

5. Central’s Pedirka Basin acreage is known to contain extensive Permian and Triassic coal measures and carbonaceous shales, correlatives of which are known to have sourced the gas accumulations in the Cooper Basin and the oil accumulations of the overlying Eromanga Basin, adjacent and overlying basins respectively. These coals have considerable potential for coal bed methane drainage. These source beds, which contain Type 2 or oil prone macerals, could also have sourced conventional hydrocarbon accumulations.

6. The acreage also contains section within the underlying Amadeus Basin Sequence for “basin centred gas accumulations” in the tight and dirty Horn Valley Siltstone.

7. Given the knowledge of the central Australian petroleum systems the overlying Mesozoic aged Eromanga Basin has potential for oil accumulations as a consequence of late generated gas displacing oil updip.

8. Central have plans for the establishment of one or more large scale gas to liquids (GTL) synthesis plants, probably located in Alice Springs for strategic reasons, given the proving up of appropriate reserves. Future potential for coal to liquids processing also exists.

9. Such plants would use the latest variant of the Fischer-Tropsch reaction to produce liquids, which could include ultra-clean dieseline, jet fuel and naphtha.
10. Given the company’s extensive acreage in the Pedirka Basin, and in central Australia in general, should the company’s plans come to fruition, then they should become the dominant player in a large scale gas and or coal to liquids industrial process in central Australia.

11. It is known that markets, both locally and internationally, exist for clean liquid petroleum products, which could include ultra-clean diesel, jet fuel and naphtha. These markets are substantial and are under-supplied. Other by products of the hydrogenation process also have a ready market in the chemical industry.

12. Markets for the disposal of sales gas may also exist in southern and eastern Australia if gas sales prices rise to sufficient levels.

13. It is considered appropriate that conventional and non-conventional exploration be conducted simultaneously, as far is as possible, in the initial stages of exploration in the permit areas. This should be a natural occurrence.

15. Besides an exploration program, additional analytical studies will be required to accurately estimate the likely potential resources present in the company’s acreage.

16. It is estimated that an Original Gas in Place (OGIP) Prospective Resource of approximately 67.4 TCF of coal bed methane could be present in Central’s Pedirka Basin acreage. Of this some 44.6 TCF is believed to be hosted in the Permian aged Purni Formation of the Pedirka Basin sequence and some 22.8 TCF is thought to be present in the Triassic aged Peera Peera Formation of the overlying Simpson Desert Basin sequence.

17. It is thought that the total estimated recoverable prospective hydrocarbon resource in the “low”, “best” and “high” deterministic cases are 25, 34 and 51 TCF, assuming recoveries of 35%, 50% and 75%, respectively.

18. Indeterminate potential also exists in the Poolowanna Formation of the Eromanga Basin sequence, probably not as widespread.

19. This report does not include the recent addition of Traditional Oil’s EPA 105, 106 and 107 permit applications which straddle the Pedirka/Amadeus Basin boundaries but are thought to include some 8,000 km² of Permian and possible Triassic coal horizons.
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1.0 RATIONALE OF REPORT

This Report was commissioned by Central Petroleum Limited, ABN 72 083 254 308 in November 2007.

This preliminary study reports upon the potential for the discovery and commercial production and marketing of unconventional petroleum accumulations in undiscovered prospective resources at “high, low and best” deterministic levels in accordance with the SPE guidelines preferred by the ASX. The study also comments on the potential for the utilization of gas to liquids (GTL) technology and processes in central Australia, detailed in an appended report, prepared by consulting engineers Holt Campbell and Payton Pty Ltd (Holt Campbell Payton). This report does not attempt to produce profit forecasts for Central Petroleum Limited and should not be relied upon as a basis for investment in Central Petroleum Limited.

This report is intended only for those persons who may have an interest in examining the potential for the commercial development of GTL plants in central Australia as joint venture or farmin partners.

The authors are competent persons with appropriate qualifications and relevant experience and the assumptions used and the conclusions reached in this report are considered by them to be based on reasonable grounds and appropriate for the scope of the assignment.

The report has drawn upon a number of sources including the statement of potentially recoverable hydrocarbons in the Amadeus and Pedirka Basins provided by the Independent Geologists, Mulready Consulting Services Pty Ltd, who have consented to the use of data drawn from their Independent Geological Report included in the Central Petroleum prospectus dated 12th September 2005, Pre-feasibility Study for a 10,000 bbl/day FT GTL Plant in Central Australia with notes on 50,000
bbl/day and 140,000 bbl/day options by Holt Campbell Payton, March 2006 and March 2007, who have also consented to the use of their reports. Public domain data available from the Northern Territory and South Australia Geological Surveys, and other sources last reviewed in February 2007 was also utilized.

Estimations of plant costs and other costs such as gas production are likely to escalate over time, new and improved technology is likely to be developed and no forecasts of oil prices other than accepted investment community generalizations can be made, nor is attempted. The conclusions reached in this report are based on market conditions and technical knowledge at the time of writing and as such may not be relied upon as a guide to future developments, nor do the authors take any responsibility for commercial decisions that may be made on the basis of this report.

This is a scoping study aimed at defining potentially recoverable, but undiscovered, prospective resources and viable uses of gas resources that may be discovered in central Australia in Central Petroleum Limited's acreage.

At the time of presentation of this report, Central Petroleum Limited does not own nor control any drilled petroleum resources in central Australia nor has any drilling yet been undertaken by Central Petroleum Limited.
2.0 INTRODUCTION

2.1 General

Central Petroleum Limited has requested Mulready Consulting Services Pty Ltd to provide an independent report on the potential for non-conventional hydrocarbon accumulations in its Pedirka Basin holdings.

Central Petroleum Pty. Ltd (Central) is a recently formed public company with the objective of exploring for, developing, producing and commercializing hydrocarbon accumulations, both conventional and non-conventional, i.e. coal bed methane (CBM), underground coal gasification (UCG), and tight gas reservoirs in their under-explored central Australian Basin acreage of the Northern Territory (NT) and South Australia (SA) and in overlying and underlying basins. Central also is examining potential for the value adding to production such as gas to liquids (GTL) and possibly coal to liquids (CTL) transformations to produce a range of liquid petroleum products such as dieselene, jet fuel and naphtha. The Pedirka Basin is of particular interest in...
non-conventional gas resources (CBM and basin centred gas accumulations), CTL as well as conventional hydrocarbon reservoir types.

Although there is significant potential for both conventional and unconventional hydrocarbon resources, for CBM alone, undiscovered recoverable Prospective Resources (SPE definition) are as tabulated below.

<table>
<thead>
<tr>
<th>BASIN</th>
<th>LOW ESTIMATE</th>
<th>BEST ESTIMATE</th>
<th>HIGH ESTIMATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pedirka (Permian)</td>
<td>15.6 TCF</td>
<td>22.3 TCF</td>
<td>33.5 TCF</td>
</tr>
<tr>
<td>Simpson Desert (Triassic)</td>
<td>8.00 TCF</td>
<td>11.4 TCF</td>
<td>17.1 TCF</td>
</tr>
<tr>
<td>TOTAL</td>
<td>23.6 TCF</td>
<td>33.7 TCF</td>
<td>50.6 TCF</td>
</tr>
</tbody>
</table>

**Table 1 CBM Possible Recoverable Resources - Trillions of Cubic Feet of gas (TCF)**

The calorific value of these resources is anticipated to be relatively high compared to many other CBM resources due to the oil prone nature of the coal source rocks, which are known to contain fresh water Type 1 and Type 2 macerals. These rocks have high exinite to vitrinite ratios compared to source rocks in other basins, such as the Cooper Basin, hence these source rocks are considered to be oil prone.

Although there is generally a paucity of information, an indicative “factory gate” delivered cost inclusive of exploration, development and production is thought to be approximately A$ 2.00 per thousand cubic feet of gas (mmSCFG) for a centrally located GTL plant in the Pedirka Basin. This price is expected to be higher, due to piping costs, at A$2.20/mmSCFG for a GTL plant located in Alice Springs. These indicative costings are highly volume dependent but would probably support a very large scale GTL plant at oil prices prevailing above US$ 30, according to Holt Campbell Payton, Consulting Engineers of Perth. Such volumes, of course, could also be available to service gas markets on the eastern seaboard subject to prevailing market conditions. Markets for the sale of sales gas do exist in southern and eastern Australia.

According to Holt Campbell Payton, typically a GTL plant will require about 10 thousand standard cubic feet of gas (mmSCF) to synthesize one barrel of oil. Hence the “high” indicative possible resource anticipated in the Pedirka Basin, 50.6 TCFG, could produce some 5,060 million barrels of liquids. This could conceivably sustain a GTL plant producing 140,000 barrels of liquid GTL products per day for about 99 years. It is assumed, reasonably, that each well would average 0.25 million cubic feet of gas per day (MMCFD), hence some 560 producing wells would be required to feed a GTL plant of this capacity. This is a considerable capital outlay and which would entail a major drilling campaign. If Central’s program is successful, then with a large scale development drilling program the cost per well would fall markedly due to the
reduced mobilization costs. For such a large scale drilling program Central could further reduce their costs by purchasing a drilling rigs and sub contracting the manning of them to an established drilling contractor. Similarly, for a 140,000 bbl/day output plant, the best estimate of 33.7 TCF would sustain a 66 year operation and the low case of 23.6 TCF, a 46 year plant life.

2.2 Strategy

As part of its strategy, commencing in 1998 when oil prices were US$ 12/bbl, the Company has acquired four contiguous and very prospective tenements in the onshore Pedirka Basin of Central Australia. The company’s permits are located in far southeastern NT and far northern SA, as shown in Figures 1, 2 & 4, the company’s acreage holdings and infrastructure maps, respectively. The company also has other extensive interests in this area.

Figure 2 Infrastructure Map current and possible developments

In the short term, Central aims to develop early cash flow via the discovery and production of conventional oil targets, for example, the Blamore and Avalon Prospects in EP 93 which are reported by RPS Energy to have prospective recoverable resources at “best” estimate of c.60 MMbbls and the Guinevere and Madigan leads reported by Robsearch to have potential for “best” recoverable prospective resources of 275 MMbbls. However the company has examined the potential for GTL for a range of plant sizes from 2,500-10,000-50,000 bbl/day plant options located at Alice Springs and fed by conventional gas reservoirs.
In the Pedirka Basin, the search is for both conventionally and unconventionally reservoired gas for larger scale GTL plants; part of Central’s longer term strategy.

Additional reserve based asset acquisition, to grow the company, will also be considered by the company.

Whilst the Pedirka Basin is not yet productive of hydrocarbons, significant indications of hydrocarbons and minor recoveries had been made in wells drilled for conventionally reservoired hydrocarbons, in this sparsely explored basin, for example at Colson 1 and Poolowanna 1, the locations of which are shown on Figure 3, a schematic cross section.

![Pedirka Basin Cross Section](image)

**Figure 3 Schematic cross section of Pedirka Basin**

To date no effort has been made to search for or to develop non-conventional hydrocarbon accumulations in this area, although similar aged sedimentary section sustains commercial production of non-conventional hydrocarbons in Queensland (QLD) and New South Wales (NSW). Rocks of a similar age, genesis and lithology are productive of conventional hydrocarbons in SA, QLD and NSW. Rocks of an older age, which underlie the Permian section of the Pedirka Basin sequence sustain oil and gas production in the Mereenie and Palm Valley Fields, respectively, of the Amadeus Basin in the Alice Springs area of the NT.

Markets for hydrocarbons, either conventionally or non-conventionally reservoired, exist. Eastern and southern Australia face a looming shortfall in
gas supply. Oil, or other liquid petroleum products such as diesel, jet fuel and naphtha, whether of a natural or synthetic genesis, are readily saleable, particularly with the current high oil prices of over US$ 45/bbl. These prices are expected to prevail in the foreseeable future.

Central has prepared, or have had other consultants prepare, reports on the conventional hydrocarbon prospectivity of their permits, as such this will not be discussed in depth in this report. Central have plans for a initial 6 well drilling programme, in their Pedirka Basin and Amadeus Basin permits, to target prospective recoverable resources of 3.4 TCF of gas, 105 BCF of Helium and 300 MMBBLS of oil.

In addition to the chances of discovering and producing conventional hydrocarbons from the Pedirka Basin, Central is also drawn to the basin by the large potential coal resource known to be present. Intersections of extensive coal intervals have been encountered in some oil exploration wells drilled in the basin and ubiquitous coal horizons are identified on seismic data acquired in the basin. The company is investigating little utilized, but known and proven, techniques of producing gas and oil from the extensive coal measures and possibly carbonaceous shales present in their acreage. These processes include:-

- Coal bed methane drainage
- Gas to liquids synthesis

At a later date, if applicable, the company will consider other options, if appropriate, including:-

- Coal to liquids processing
- Underground coal gasification
- Coal mining for hydrogenation
- Fracture stimulation of tight, gas saturated intervals

Whilst there is no infrastructure present in the area at this time to transport any produced hydrocarbons from the area of Central's permits, the magnitude of the potential hydrocarbon resource and expected production rates could sustain the construction of high pressure gas pipelines or dual phase gas and liquids pipelines to new facilities. In the short term, to ensure a speedy cash flow, any liquids produced, from either conventional or small scale development of non-conventional sources, could be trucked to the Alice Springs to Darwin rail line and thence direct to port facilities at Darwin for export or domestic consumption.

The existing adjacent infrastructure including rail links to Darwin and existing oil and gas pipelines present is shown in Figure 2, an infrastructure map.

Large volumes of gas, if discovered or synthesized, could be sold directly, subject to prevailing market conditions. This to would involve the construction of a new a high pressure gas pipeline to existing facilities in the Cooper Basin and
subsequent transmission into the national gas pipeline grid which interconnects South Australia with Queensland, New South Wales, the Australian Capital Territory, Victoria and Tasmania. Similarly, this gas could be transported by a potential pipeline to connect with the Alice Springs to Darwin pipeline for local sale in the “Top End“ or for compression and export. These pipelines are also shown in Figure 2.

Markets, either national or export, appear to exist for any hydrocarbons produced from the Pedirka Basin acreage, whatever their genesis.

### 2.3 Prospectivity

The results of the study to prepare this report have established that the onshore Pedirka Basin fulfils all the requirements for the hosting of hydrocarbon accumulations, namely :

- **The presence of rich, mature, source rocks, with some liquids generating potential**
- **The presence of reservoir quality rocks and carrier beds**
- **The presence of sealing units**
- **The presence of traps, both of a structural and stratigraphic genesis**
- **The presence of thick and widespread coal beds for methane adsorption, at appropriate depths**

The source rocks mentioned above could source either conventional or non-conventional hydrocarbons. They could have generated oil and or wet gas, and with deeper burial, dry gas.

It is the author’s view that, to the present, the lack of commercial exploration success and production from the area of Central’s permits has been due to the lack of seismic coverage and the sparsity of drilling, and in some cases the lack of drilling, as well as the perceived distance from existing facilities. Another factor is that dating back to 1963 when Santos and Total were in a joint venture over the area, commercial gas was discovered at Gidgealpa in the Permian section and the exploration focus of the two companies shifted exclusively to the Cooper Basin sequence. The oil price slump in 1986, followed by the stock market crash of October 1987 also made fundraising for juniors engaged in exploration very difficult for many years. Finally, the lack of infrastructure before the rail link to port facilities at Darwin was completed in 2004 coupled with low oil prices up until recently meant that the monetisation of gas in particular (via GTL) but oil as well would have been difficult.

However, the size of Central’s intended targets, and the proposed associated exploration and development projects will counteract these previous constraints, if successful. The intention to produce synthetic crude oil and then refined liquid products from either gas or coal is particularly innovative.
and may ensure the development of a large, known, but un-utilized, coal, and possibly methane resource. It also must be remembered that globally, oil consumption is increasing, with Western countries importing increasing volumes of more oil.

3.0 TENEMENTS

Central applied for, and was awarded Exploration Permit Petroleum (EP) 93, located in southeast NT for a 5 year term effective from 1st November 2004. A six month extension of the Year One commitments was granted to 1st May 2005 and a suspension, due to force majeure, of current commitments has been applied for. Negotiations continue with the Central Land Council over the Company’s preferred access route, via part of the Colson Track. The tenure of the permit is renewable, with a 50% relinquishment of area at the end of each 5 year period. This granting also includes the rights to any coal bed methane as well as conventionally reservoired gaseous and liquid hydrocarbons. If any commercial discovery is made, the operating company, and any Joint Venture partners are automatically granted a 21 year Production License over the discovered field. This Production License is renewable for the life of the field. In the event of a non-commercial discovery the company can apply for a Retention Lease over the field. This Lease is of 5 years duration and is renewable. The permit covers 117 graticular blocks or approximately 9000 square kilometres. The right to explore for and to mine and develop coal is held by the holders of the superimposed coal exploration tenements but it is believed that the Company’s rights to develop any CBM will prevail over any, most unlikely efforts, to mine coal for export, due to the huge distances required for the transport to suitable ports, and the depth of burial of this relatively low value commodity. This issue will ultimately have to be resolved by negotiation.

The company was also awarded sole rights to negotiate over EPA’s 130 and 131, also located in the NT, with similar terms. The former extends over 200 graticular blocks or some 16,000 square kilometres. The latter covers 29 graticular blocks or some 2,000 square kilometres In a similar vein Central applied for Petroleum Exploration Lease Application77 (PELA 77) in the north of SA, again with similar terms This tenement covers 75 graticular blocks, or approximately 6,000 square kilometres.

The initial exploration targets were conventionally reservoired hydrocarbons, in this prospective, but under-explored, basin. However these permits are also prospective for unconventional hydrocarbon exploration, due to the presence of extensive coal measures. Correlatives of these coal measures are known to be “gassy” and productive of coal bed methane in similar aged section in other basins of eastern Australia. Hence the company has decided to explore for both conventional and non-conventional resources simultaneously. It is expected that oil prospects will be the initial targets. This report will only address non-conventional hydrocarbons.

A thick siltstone, the Horn Valley Siltstone, which, where drilled to date in the Amadeus Basin has been gas saturated, is also postulated to be present
over a wide, area under, the Permian Pedirka Basin, and due to its affinity with “basin centered gas accumulations”, it may be a good candidate for fracture stimulation and gas production. Central plans to evaluate this unit also, during the drilling of wells aimed at overlying targets.

4.0 METHODOLOGY

The basis of this report was an open file study of much of the data available on the onshore Pedirka Basin (Permian) in both the Northern Territory and South Australian sectors of the basin, although reference was made to the underlying Amadeus Basin (Devonian and older) and overlying Simpson Desert (Triassic) and Eromanga (Jurassic) Basins. Some internal reports provided by Central were also utilized and one of these by Holt Campbell Payton was relied upon for comments on GTL and CTL fundamentals, as were presentations from Syntroleum of Tulsa, Oklahoma, Rentech Inc. and the Japan Oil and Gas National Corporation. The reader is referred to these reports. Knowledge in the possession of the author of coal bed methane drainage in NSW and QLD was also included as was his knowledge of conventional exploration in NSW, QLD, NT and SA. Publications on coal bed methane exploration, development and production were also referred to.

5.0 THE COMPANY

As indicated by the name, Central is a company focused on the hydrocarbon potential of central Australia. It is a new public company with extensive acreage holdings in the sedimentary basins of central Australia. Currently Central operates over 200,000 square kilometres of ground in granted permits and applications, hence it has a strong acreage position. It has objectives to produce both conventional and non-conventional hydrocarbons from these prospective but under-explored basins. The company has innovative plans to develop and produce hydrocarbons from a potentially large, long known but un-utilized coal resource.

Given the company’s extensive acreage holdings, if their programs are successful, they will control much of central Australia’s future hydrocarbon production, particularly in the Pedirka Basin. The company has innovative and far-sighted plans to develop a potentially huge, non-conventional hydrocarbon resource in a time of energy shortage. Their plans for the synthesis of liquid hydrocarbons from coal and or gas are particularly enterprising, as liquid hydrocarbons command a premium over the sale of gas, and the nation and the Western world is in short supply of oil. Zero to low sulphur ultra-clean dieseline, a planned product of the Company’s GTL strategy, is expected to command an increasing premium over conventional mineral oil diesel as it is progressively more extensively being used for blending to meet environmental regulations. Diesel powered motor cars have increased their market share in recent years and this trend is likely to continue.
6.0 PREVIOUS EXPLORATION

The area held by Central in the area of the Pedirka Basin is virtually unexplored, in an exhaustive and definitive manner. Some early rudimentary exploration, aimed at Cambrian targets, was conducted by the Delhi-Santos consortium in the early 1960’s. At a similar time Beach Petroleum explored in the NT sector. After the discovery of gas by Delhi in the Permian section of the Cooper Basin at Gidgealpa 3 in 1963 some exploration aimed at Permian targets occurred in the area. Following the recovery of 38 degree API gravity oil, from a terrestrial source, from the Poolowanna Formation at Poolowanna 1 in 1977 (Western Mining Company) attention was directed towards the Mesozoic section in the area of Central’s permits. This exploration was regional in nature and not really focused on specific plays or targets. Little exploration has occurred in recent years in the area covered by the company’s Pedirka Basin acreage.

Recent work by the Departments of Mines and Energy in the NT and in SA have upgraded the petroleum potential of the area markedly. This work has established the presence of mature source rocks, with oil generative potential, in the area of question, the presence of traps, and confirmed the accepted belief in the presence of excellent reservoir units.-Seals are known to be present within the blocks. No work, other than Central’s, has been done on the non-conventional prospectivity of the tenements. This prospectivity appears to be high.

7.0 GEOLOGY

The Pedirka Basin is one of a number of intra-cratonic sedimentary basins located in central Australia. Minor recoveries of, and indications of, hydrocarbons have been made in several of the few wells drilled into this prospective but under-explored and remotely located basin. These wells seem to be inappropriately sited to definitively evaluate traps, in particular, and the basin in general.

The area encompassed by Central’s permits contains several sedimentary sequences, which are productive of conventional hydrocarbons in basins immediately adjacent. Namely the Paleozoic aged Amadeus Basin, to the northwest in the NT, where gas and oil are produced from Ordovician section in the Palm Valley and Mereenie Fields, respectively. These sediments are expected to be present in EP 93, and in EPA’s 130 and 131 in the NT and in PELA 77 in SA.

Hydrocarbons are also produced from the Permo-Triassic aged Cooper Basin of SA and QLD, to the east, where the giant Moomba, Gidgealpa and Dullingari Gas Fields, amongst others, are located. The Cooper Basin is Australia’s largest onshore gas province, and it also contains the nation’s biggest onshore oil field, at Tirrawarra. Correlatives of the producing and source intervals are known to be present in Central’s permits.
The Mesozoic aged Eromanga Basin of SA and QLD, also to the east, contains most of Australia’s onshore oil fields. Correlatives of producing and source intervals of the lower Eromanga Basin sequence are present in Central’s permits. Oil, of a waxy nature, probably indicating sourcing from underlying Permian or Triassic coals, or carbonaceous shales has been recovered from wells in the Poolowanna Trough of the Simpson Desert Basin to the east of the company’s acreage.

Further east in QLD, but not adjacent, much gas and some oil has also been produced from the Permo-Triassic aged Bowen Basin. The Permo-Triassic Gunnedah Basin of northwestern NSW also produces gas. A correlative of the Eromanga Basin, the Surat Basin, sustains oil and gas production in QLD. This basin hosts Australia’s first commercial oil field, discovered in 1961 at Moonie.

All of the Paleozoic, Permian, Triassic and Lower Mesozoic intervals, or their lateral equivalents, which source the above-mentioned hydrocarbon accumulations are known to be present in the tenements which Central hold. It is known that the Permian coals are the source of the oil and gas reservoired in the Cooper and Bowen basins and the gas in the Gunnedah Basin. Further more it is widely believed that they are also the source of the oil produced from the overlying Mesozoic Eromanga and Surat Basins. Oil has also been recovered and produced from some Triassic intervals, particularly in SA, and it is thought that the Triassic section also contains mature source rocks. Hence, Central’s acreage is essentially surrounded by, and contains, rich, mature and generative source rocks, a fundamental requirement for hydrocarbon generation and entrapment, either conventional or non-conventional.

7.1 Regional Geology

Central’s Pedirka basin acreage is located in northern SA, north of the settlement of Oodnadatta and in southeastern NT and it straddles the state-territory border. Its location is shown on Figures 1, 2 and 4, along with the underlying and overlying basins. The Pedirka Basin of central Australia, is located in both the NT and SA, and it covers an area of approximately 73,000 square kilometres, of which Central holds some 33,000 square kilometres or 45% of the basin.

The area of Central’s permits contains 4 distinct sedimentary sequences, the oldest being the Paleozoic sediments of the Amadeus Basin sequence which overly metamorphic and granitic basement. This sequence is unconformably overlain by sediments of the Carboniferous-Permian Pedirka Basin sequence, which is rich in coals and carbonaceous shales. Central’s acreage contains the basin’s two main depocentres, the Eringa and Madigan’s Troughs in the north and east of the company’s acreage. The Simpson Desert Basin contains a large thickness of Triassic section, its main depocentre is known as the Poolowanna Trough. It too contains coal and
carbonaceous shales. This source-rich basin is unconformably overlain by the oil productive Eromanga Basin.

7.2 Tectonic Setting

The Pedirka Basin sequence had its genesis in Carbonaceous-Early Permian time when sedimentation occurred in a downwarp over the pre-existing sediments of the Proterozoic-Early Carboniferous Amadeus Basin.

Sedimentation in the Amadeus Basin was controlled and constrained by basement blocks of metamorphic and igneous composition, the Arunta Block to the north and the Musgrave block to the south. The western margin of the basin is a shallow basement ridge separating the Amadeus Basin from the Canning Basin of Western Australia.

Figure 4 Large scale map of Central’s Pedirka Basin acreage showing tectonic elements.
The basin’s eastern margin is not well understood but appears to be truncated. Two pulses of marine deposition occurred, these were followed by a later pulse of continental sedimentation. Several episodes of structuring occurred, involving uplift and erosion and then sinking and marine transgression. The previously mentioned basement blocks acted as immobile bulwarks against which the sediments of the Amadeus Basin were deformed and structured, due to north-south compression.

Subsequently subsidence occurred in the deeper eastern end of the basin and the lacustrine, fluvial, and often glacially derived sediments of the Pedirka Basin were deposited unconformably on the Amadeus Basin section. Much coal was deposited in this cycle. A hiatus then occurred before the Triassic aged Simpson Desert Basin sequence was deposited, unconformably, on the Pedirka Basin sequence. These sediments are of lacustrine, flood plain and fluvial origin, with some glacial influence. This cycle is dominated by carbonaceous shale with significant coal. The depocentre of this basin, the Poolowanna Trough is eastwards of the Pedirka Basin depocentres, the Eringa and Madigan’s Troughs and eastwards of Central’s acreage.

Uplift and erosion occurred as a result of the widespread Triassic structuring event. This was followed by the cyclic sedimentation of the Eromanga Basin sequence, of fluvial and flood plain origin. The Poolowanna Formation, the basal unit is a good source rock, containing much coal and carbonaceous shale, which are known to be mature and to contain oil prone macerals. A marine transgression occurred in Cretaceous time when the Wallumbilla Formation was deposited. This unit is a regional top seal to the Eromanga Basin sequence. The basin complex has had, for most of its life, an intra-cratonic setting. In eastern and central Australia this has resulted in the deposition of considerable amounts of coal and or carbonaceous shale, good source rocks, along with many good fluvialite sandstone reservoir units.

### 7.3 Stratigraphy

Included as Figure 5 is a combined stratigraphic column for the basin complex. There are known source and sealing intervals in each basin sequence along with good quality conventional reservoirs units. As this report is concerned with the unconventional hydrocarbon potential of the basin complex, the conventional reservoirs will only be discussed in passing. They are fully discussed in other reports in the possession of Central and in the papers listed in the list of references.
Figure 5  Combined Stratigraphic Column

For unconventional hydrocarbon exploration the intervals of major stratigraphic interest are :-
The Horn Valley Siltstone of the Amadeus Basin Sequence
The Purni Formation of the Pedirka Basin Sequence
The Peera Peera Formation of the Simpson Desert Basin Sequence

The Horn Valley Siltstone, where drilled in the Amadeus Basin, is of Lower Ordovician age and was laid down in a marine environment and is composed of organic rich siltstones and black shales, underlain by a dolomitic and or glauconitic limestone sequence. It is commonly pyritic, highly fossiliferous with graptolites and other invertebrates and is commonly gas saturated.

The Early Permian aged Purni Formation is composed of interbedded grey shale and carbonaceous siltstone, fine to coarse grained sandstone along with coal and conglomerate. It was deposited in a flood plain, lacustrine and fluvial environment. The unit is known to be 350 metres thick in the Mokari 1 well, east of the company’s acreage.

The Peera Peera Formation is of Triassic age and is composed of grey and black shales, coal and thin fluvial sandstones. It was laid down in a flood plain, lacustrine and fluvial environment.

The Eromanga Basin sequence, in its classic producing areas to the east of Central's acreage, consists of cyclic, interbedded and juxtaposed shale and silty units over lain and under lain by excellent reservoir units of fluvial sandstones. The finer grained units, whilst they do contain some organic matter, are not as rich source rocks as those of the underlying Triassic and Permian intervals of coals and carbonaceous shales, except for the Poolowanna Formation. It is generally accepted that the bulk of the hydrocarbons reservoired in the Eromanga Basin have been expelled from the underlying Cooper Basin, that is the Triassic and Permian units. However there is a chance of hydrocarbons being trapped in the Poolowanna Formation, either conventionally by intra-formational seals or even non-conventionally. At this stage there is insufficient information to attempt to quantify a possible magnitude of resources in this unit. However care should be taken whilst drilling through this unit to deeper targets, as it may be hydrocarbon bearing.

On the western flank of the Eromanga Basin, in the area of Central's permits, the section becomes progressively more sandy and most of the sequence merges into the Alge buckina Sandstone, which is overlain by the Cadna Owie Formation, which in turn is overlain by the marine shales of the Wallumbilla Formation, hence the Eromanga Basin sequence still has a regional top seal in the area of the company’s acreage. As a consequence If any hydrocarbons are present, above the Poolowanna Formation, they should have been noted in oil exploration wells or water bores, beneath the Wallumbilla Formation sealing unit.

However it should be noted that several shallow mineral holes, CUR 3 and CUR 5, drilled just east of the outcropping Musgrave Block, west of Central's acreage, encountered organic shales at an early mature stage in a unit
equivalent to the Jurassic aged Birkhead Formation of the Eromanga Basin sequence. It is thought that it is unlikely that this unit will be laterally widespread and a major source contributor to the Eromanga Basin sequence. Given the lack of well control and the many sandy intersections in the few wells in the area it is not possible to estimate the size of any possible resource either conventional or non-conventional in the upper Mesozoic section of Central’s acreage.

8.0 PETROLEUM GEOLOGY

To have a hydrocarbon accumulation the following conditions must be met:-

• The presence of organically rich and un-oxidized source rocks, usually shales or coals

• The burial of these source rocks to depths whereby the organic material begins to expel hydrocarbons, oil first and then, with deeper burial, dry gas

• The presence of porous and permeable carrier and reservoir beds to allow the migration of generated hydrocarbons from the hydrocarbon generating kitchens near the basin depocentres to shallower sites of entrapment, which can be reached with the drill bit.

• The presence of sealing units overlying the carrier and reservoir beds which inhibit the upward migration of hydrocarbons, which results from the principle of floatation in which less dense materials float on those which are denser. Water is denser than oil, which in turn is denser than gas. These traps can be of either a structural or stratigraphic genesis.

• Natural gas, mainly methane, can also be trapped, by adsorption, against the faces of cleats within coals, forming unconventional accumulations

• In the case of dirty and tight source beds hydrocarbons can sometimes be trapped unconventionally in “basin centred accumulations” in these source intervals

All of these conditions are known to be present in Central’s permits.
Once trapped, conventional hydrocarbon accumulations can be destroyed by later earth movements, which can breach traps, igneous events, which can oxidize entrapped hydrocarbons and deeper burial, which can reduce porosity and subsequently hydrocarbon storage.

For non-conventional accumulations compressive events can close cleats reducing both permeability and the macro-porosity of the coals. Igneous intrusions can fuse the cleats, having the same effect.

8.1 Source Rocks

There are many intervals of known source rocks in the Amadeus, Pedirka, Simpson Desert and Eromanga Basin sequences. The source intervals range in age from Ordovician to Jurassic, and they, or lateral correlatives, are known to have generated hydrocarbons, both oil and gas.

Amadeus Basin Source Rocks

The oldest of these is the Horn Valley Siltstone, of the Ordovician aged Larapinta Group of the Amadeus Basin sequence. This unit is known to have sourced the oil and gas hosted in, and produced from, the Pacoota and Stairway Sandstone reservoirs in the Mereenie and Palm Valley Fields, respectively, to the northwest of Central’s Pedirka Basin acreage.

The unit, which is of 120 metres maximum thickness in the central part of the basin, near the previously mentioned fields, is believed to be of a similar thickness in Central’s acreage. The Horn Valley Siltstone is a very rich source rock of marine origin averaging up to 10% total organic matter and is known to be mature for oil and gas generation over a very wide area. Many wells drilled within the Amadeus Basin have, either discovered, recovered or encountered indications of hydrocarbons from this unit. However it should be noted that at Mc Dills 1 the unit was composed of barren red beds. Most wells in the Pedirka Basin were not drilled deep enough to intersect this unit.

If Gussow’s Theorem has been, or is, operational then the undrilled southeastern margin of the basin, located within Central’s Pedirka Basin acreage, may host undiscovered oil accumulations. This theorem, which appears to have been verified empirically by oil accumulations on the northern basin margin, states that early generated oil is trapped first then displaced by later generated dry gas. The mechanism of the theorem is that the gas, which is less dense than oil will enter the trap and rise to a crestal position and in doing so will spill already reservoired oil from the base of the trap, up-dip and towards the basin margin. Given the wide lateral extent and the thickness of this unit it could have generated a substantial oil, and later gas, charge.

Other units of the sequence have exhibited both oil and gas generative potential, namely gas potential from some of the Proterozoic intervals and oil potential from the Chandler Limestone and, Tempe Formation of the Middle-Lower Cambrian Pertaoorta Group, as well as the Pertatataka and Areyonga
Formations and the Gillen Member of the Proterozoic Bitter Springs Formation.

The Amadeus Basin sequence is likely to be oil prone rather than gas, given its marine genesis. This is confirmed empirically in the Amadeus Basin by production and the many oil shows and minor recoveries. Further deep drilling will be required to evaluate the prospectivity or otherwise of the older Palaeozoic sequence within Central’s permit areas.

**Pedirka Basin Source Rocks**

The overlying Pedirka Basin, like all other Carboniferous-Permian basins of eastern and central Australia, is coal rich, and, although source rock analysis from the 14 wells drilled to date shows a much higher exinite to vitrinite ratio than source rocks of the Cooper Basin, (ie more oil prone) it is considered likely to have generated more gas than oil. However some oil will have been generated as the organic matter in the source rocks, whether coals or carbonaceous shales, is rich in the Type 2 macerals, which are oil prone. Indications of oil have been encountered in exploration drilling in rocks of the Pedirka Basin sequence.

The prime source rock interval in the Pedirka Basin sequence is the Early Permian Purni Formation. This unit, which contains much coal, is of intra-craticogenesis, and is naturally of a terrestrial origin, hence it is expected to be gas prone, but oil prone macerals have been identified within it. The Purni Formation, which is widespread across both depocentres of the Pedirka Basin, the Eringa and Madigan’s Troughs, is one of Central’s main targets for coal bed methane exploration. It is known to be up to 350 metres thick, from well intersections, which are located on large highs or on the flanks of the depocentres. The unit is likely to be deeper and thicker in the NT, as the Eringa Trough plunges northwards. Also it is expected to be much thicker in the basin depocentres, a later expected target area for Central’s proposed exploration drilling. However the cut-off depth for economic development of coal bed methane (approximately 1,250m) may preclude much of these thicker units from consideration.

**Simpson Desert Basin Source-Rocks**

In the Simpson Desert Basin the prime source rock is the Triassic aged Peera Peera Formation. This unit is composed of grey and black carbonaceous shales, coal and thin fluvialite sandstones. It too is known to contain much mature source rock and some oil prone macerals, although it is more gas and condensate prone. The depocentre, the Poolowanna Trough, is located east of Central’s acreage, however the unit is present in the company’s tenements. The Simpson Desert Basin sequence is believed to be approximately 1,000 metres thick in the basin depocentre to the east of Central’s permit areas.
8.2 Maturity

All of the quantitative data that is available on maturity from the area of the company’s acreage indicates that the source rocks are mature for hydrocarbon generation, both oil and gas. This is supported by the empirical evidence of gas shows and oil fluorescence in inappropriately sited oil exploration wells. Recent geochemical analyses conducted for the Geological Surveys of SA and the NT have also confirmed that the Pedirka and Simpson Desert Basin and lower Eromanga basin sequences contain rich and mature hydrocarbon source rocks. The reader is referred to the listed references. Hence the area has generated oil and gas.

These studies indicate that the oil generative window commences at about 1250 metres in both the Pedirka and Simpson Desert Basin sequences. It should be noted that vitrinite reflectance suppression has been observed so that the actual window is probably shallower. The hot dry gas window will be more deeply buried. The Horn Valley Siltstone of the more deeply buried Amadeus Basin sequence is known to be now in the dry gas window. The source rocks of the Early Jurassic Poolowanna Formation (=Basal Jurassic of Queensland) are also early mature for oil generation in the Poolowanna Trough, and perhaps in Central’s acreage. However it should be noted that this interval, basal Eromanga Basin unit, is not a blanket unit and is often absent from basement ‘highs and accordingly may not be laterally extensive in Central’s acreage.

Hence the company’s Pedirka Basin acreage contains a multitude of known mature source rocks. Recognized reservoir units are known to juxtaposed with these potentially generating intervals. Large structural traps have been identified within the area. All of this bodes well for the existence of large conventional accumulations of hydrocarbons.

In the case of non-conventional accumulations at depths less than the oil window the chance of biogenic methane and / or thermogenic methane also exists, as at early maturity levels wet gas can be generated. It is known that shallowly buried members of the Jurassic aged Walloon Coal Measures of the Surat Basin sequence host coal bed methane. During earlier oil exploration programs several seismic shot hole drilling rigs were burnt out in QLD as a result of shallow gas flows from this unit. Hence the coals do not have to be within the gas window to host methane.

The fact that the potential source rocks are rich in oil prone macerals is fortuitous as the gas adsorbed to the coal, will contain higher homologues than methane and should produce more synthetic crude during synthesis than methane alone would.
8.3 Reservoirs

Many good quality conventional reservoirs are known to be present in the Pedirka, Simpson Desert and Eromanga Basin sequences. The chance of discovering conventional hydrocarbons in these units is high. The area of Central’s permits is virtually unexplored, no modern and focused exploration has been conducted in the area apart perhaps than that of the Sydney Oil Company in the mid 1980’s which was centred on the Madigan Trough area. Studies by officers of the South Australian and Northern Territory Department of Mines and Energy have identified potentially active petroleum systems in all three basin sequences, in conventional reservoirs. These petroleum systems are analogues of proven systems in adjacent basins, in laterally equivalent units. This is detailed in the listed references.

Central’ are also intent on unconventional exploration in the area of their permits, and as such are also focused on non-conventional reservoirs. These include

- **The Horn Valley Siltstone (Ordovician Amadeus Basin)**
- **The Purni Formation (Permian Pedirka Basin)**
- **The Peera Peera Formation (Triassic Simpson Basin)**

As discussed above the Horn Valley Siltstone is a very rich, proven source interval, which has sourced the commercial oil and gas production in the NT sector of the Amadeus Basin. In many wells high gas readings have been encountered whilst drilling through it, typically the readings “were off scale”. A good gas show was tested at Tent Hill 1, however due to poor conventional reservoir quality, the subsequent flow rate was not commercial.

Due to its silty composition and compaction along with the ubiquitous gas shows over a wide area it is considered to be a good candidate for fracture stimulation, as the rocks are competent and should be able to be fractured, to enhance flow rates. The gas saturated section seems to extend, through the entire section, hence a large volume of gas could be entrapped in this unit. The chance of encountering oil cannot be discounted. It should also be noted that the eastern end of the basin is deeper and the dip into the basin from this direction is gentler and that the mechanism of Gussow’s Theorem may not have been as active in this area, as in the north, and may not have displaced all of the early reservoired oil.

An unusual feature of both “basin centred gas accumulations” and coal bed methane is that separate and distinct source and reservoir units are not necessarily required. In the former case, hydrocarbons, generally gas, are held in the source beds by either hydrostatic and or capillary pressure. This results
from the tight and dirty nature of the interval. Whereas for coals, the generated methane is adsorbed to the faces of the cleats and is held there by hydrostatic pressure and to a lesser extent, by capillary pressure.

In the case of conventionally reservoired hydrocarbons, the hydrocarbons are expelled from the source beds to porous and permeable reservoir rocks and held there by overlying fine grained, impervious sealing units. However it should also be noted that under conventional trapping geometry, either structural or stratigraphic, that coals and tight, dirty units (i.e. unconventional reservoirs) can possess a gas cap in the traditional sense, in crestal or structurally high locations. Wells located in such locations generally flow at higher rates and often without water.

As a consequence of the above for unconventional exploration, the source, seal and reservoir units are one and the same. Hence the prime reservoirs in Central’s proposed exploration programs for unconventional hydrocarbons are:

- The Horn Valley Siltstone Formation
- The Purni Formation
- The Peera Peera Formation

Conventional and good quality reservoirs have been identified in the sedimentary sequences of all the basins present in Central’s acreage. They are legitimate targets for exploration in their own right.

8.4 Sealing Units

As discussed above, non-conventional hydrocarbon accumulations are hosted in the source beds and are trapped by unusual mechanisms. In the case of “basin centred gas” by hydrostatic and or capillary pressure and for methane within coal beds, by adsorption to the faces of the cleats in the coals. The entrapped methane is held there by hydrostatic pressure and to a lesser extent by capillary pressure.

Hence for non-conventional hydrocarbon accumulations the source, reservoir and sealing units are one and the same, namely the source beds. As a consequence of this the prime sealing units are:

- The Horn Valley Siltstone
- The Purni Formation
- The Peera Peera Formation

Conventional seals of a regional and intra-formational nature are known to be present in all sedimentary sequences present in Central’s acreage.
8.5 Traps

Conventional hydrocarbon traps of both a structural and stratigraphic nature have been identified on seismic data from Central’s tenements. As discussed above, conventional traps are not necessarily a prerequisite for non-conventional accumulations. However empirical evidence shows that where wells have been drilled for unconventional hydrocarbons, invariably the better performing wells are sited on conventional traps superimposed on larger non-conventional accumulations. Hence all exploration should initially be aimed at large uplifted structural targets.

9.0 COAL BED METHANE DRAINAGE

The coal bed methane exploration, development and production industry, which is relatively recent, has arisen incidentally. It has been driven by safety aspects in underground coal mines, namely the extraction of explosive methane from coal beds prior to mining. Like most facets of the hydrocarbon production industry it had it’s genesis in the United States of America (USA)

Almost invariably CBM extraction takes place in areas that have been drilled during coal exploration and delineation per se, or for petroleum exploration programs, in areas either served by or close to existing infrastructure, which means close to markets.

The industry is now well established in the USA, Australia, France and China, amongst other countries. Initially the gas extracted from the coal beds was wastefully flared off, but it was soon realized that the extracted gas had economic value. To maximize the flow rates and to commercially utilize this resource, hydraulic fracturing of the coal beds was conducted, in the first instance, by Standard Oil of Indiana in 1954 in Walker County, Alabama in the Black Warrior Basin of southeastern USA. This trial was not commercially successful and the project was abandoned.

The next effort, which led to commercial success, began in 1973 in the Appalachian Basin of eastern USA in the states of Virginia, West Virginia, Pennsylvania and Ohio and in Illinois in the Illinois Basin.

Following this success widespread exploration for, development of and production of methane occurred in the Appalachian and Black Warrior Basins as well as the San Juan Basin of New Mexico and the Green River, Wind River and Powder River Basins of Wyoming and Montana. Coal bed methane drainage is now a well-established industry in the USA. Exploration for coal bed methane, which is just sales gas in conventional terms, is now carried out in its own right rather than an adjunct to mine drainage.

The coal bed methane drainage industry in Australia is also established, exclusively in the coal bearing basins of eastern Australia. This bias towards the eastern basins only results from data available from mining, coal delineation drilling and oil exploration drilling. The many underground explosions and
associated fatalities in the Permian coal seams of the Sydney Basin of southern and central NSW and in the Bowen Basin of Queensland drove coal bed methane drainage in Australia.

The Permian coals of eastern Australia are known to consist of volatile or “gassy” coals. Extensive laboratory analysis by the USA based company, Enron, has established that the coals of the similar aged Permo-Triassic Galilee Basin of central Queensland, whilst lower in gas saturation than those of many US basins, are very extensive and are valid coal bed methane drainage targets. Whilst not as well known, the Triassic coals of the Ipswich Basin of southern Queensland are also volatile, as evidenced by the many underground explosions on the Ipswich coal fields. Many of the current coal bed methane projects in Queensland are not associated with mine drainage.

The Permian coals of the Cooper Basin are known to similar to those of the Bowen basin, and by analogy, to those of the adjacent, similar aged coals of the Pedirka Basin, albeit that the latter are more oil prone but only to a matter of degree. It is expected that the Triassic coals of the Madigan’s Trough of the Pedirka Basin and those of the Simpson Desert Basin, to the east, will be volatile in similar fashion to those of the Ipswich Basin. As a consequence it appears that the Permian and Triassic coals known to be present in Central’s permits and sub-cropping at depths less than 1,250m are good targets for coal bed methane extraction, as they are expected to be volatile and “gasy”. Furthermore, empirically, the elevated gas readings and oil recoveries in oil exploration wells indicate that these coals have generated hydrocarbons. Hence methane could still be contained within these coals in spite of some expulsion of hydrocarbons to other conventional reservoirs, nearby.

Methane is stored in coals by adsorption of the gas to the faces of cleats (=fractures) and in micro pores within the coal. The former is known as macro porosity whilst the latter is designated as micro porosity. The coals are generally saturated with formation water, which must be pumped off the coals, to reduce the pressure to enable the gas to flow to the well bore. The cleats act as channels to allow the gas to flow through the coals to the area of reduced pressure in the well bore, for collection and production. Hence the coals behave as conventional reservoirs in that they possess pores for gas storage and they have permeability, or connectedness of pores, to allow fluid transmission.

If cleating (=permeability ) is limited, it can be enhanced by hydraulic fracturing, whereby additional fracturing is mechanically induced in the coals to increase permeability and production rates. Care needs to be taken with this procedure, because if water bearing sands are nearby and if these induced fractures extend into the water bearing sands, water will flow preferentially and will "drown" the coals and kill off gas flow, as has happened in the Galilee Basin of Queensland.

Often coal intervals contain interbedded porous and permeable sandstone units which act as conventional reservoirs, which produce the gas, preferentially, often at rates that would be commercial in conventional wells, particularly in crestal locations on structural traps.
To the best of the author’s knowledge the most productive coal bed methane wells are those sited on the crest of large tensional structures, with extensive cleating. Here the coal is acting like a conventional reservoir in that the gas has risen to the top of the structure and displaced the connate water of the coals. This is the case in the Fairview, Durham Ranch and Peat/Scotia coal bed methane fields of the Bowen Basin of Queensland. In the crestal wells of these fields gas flow rates of approximately 1,000,000 CFD have been recorded. These rates, which would be commercial in conventional wells, have been obtained without associated water. Wells drilled off the crest, down the flanks, of these structures have much lower flow rates and produce much water, and often have to be hydraulically fractured.

With the present shortfall of spare electrical power and a looming shortfall of gas for domestic and industrial usage in South Australia, Victoria and New South Wales, in both the summer and winter, any coal bed methane production should have a ready market, either for on site power generation or for pipeline transmission via Santos’ Limited’s main Cooper Basin trunklines to existing power stations. Other potential markets, including liquifaction, also exist.

A vast undiscovered possible, and potentially recoverable, coal bed methane resource is thought to be present within Central's Pedirka Basin acreage. Further delineation of this possible resource can only be done by exploration drilling. Laboratory analytical determination needs to be carried out on the coals present, particularly on gas saturation to accurately estimate the magnitude of the possible resource and to conduct an economic feasibility study.

The gas saturation value is critical as it will tell the number of development wells necessary to be drilled to produce the possible resource. Also important is the quality of the connate water, which will have to be disposed of. Another major factor is the depth to the reservoir horizon, which determines the economics of development. Here we have assumed a cut-off depth of 1,250m. All these factors will impinge on the economic viability of any development project.

Other methods of utilizing coal bed methane gas, or even gas produced from conventional reservoirs exist. The primary one of these is gas to liquids conversion, and this procedure is discussed below.

Central hold the rights, through their petroleum licences and applications and any associated production leases, subsequently to be granted, to the development and production of any gas either conventional or non-conventional that is discovered in their tenements.

10.0 GAS TO LIQUID (GTL) AND COAL TO LIQUID (CTL) CONVERSION

This section of the report was written with substantial input from the report of David Holt of Holt Campbell Payton Pty Ltd and Jake De Boer of GHD Engineering Pty Ltd.

Central has undertaken several studies of the viability of gas to liquids conversion (GTL) and its many variants for a proposed Fischer Tropsch GTL
A plant with capacity ranging from 2,500-10,000-50,000 plus bbls/day located at Alice Springs and drawing upon prospective resources in conventional reservoirs in their acreage. Both GTL and coal to liquids (CTL) for are considered here for the Pedirka Basin acreage.

The gas to liquids process is well understood and well established and in use in many locations around the world, particularly in South Africa, Qatar and Malaysia, amongst others. The preferred process is a refinement of the well-known Fischer-Tropsch process, which was developed in Germany and provided much of Germany’s transport fuel during World War 2. The process is essentially the indirect conversion of coal or natural gas to liquid hydrocarbons which is a two-step process that involves firstly gasifying the feedstock to form “synthesis gas” and then converting the synthesis gas to liquid products. Current interest in the process has stemmed from a combination of anticipated higher crude oil pricing coupled with increased environmental requirements for clean burning (low sulphur and low aromatic) transportation fuels, which are a hallmark of Fischer-Tropsch fuels. Methanol synthesis shows many common features with Fischer-Tropsch synthesis and has enhanced the commercial experience of the technology elements.

An alternative approach for CTL has been the direct process commonly known as the Bergius process, which was also developed in Germany before World War 2. Here coal is hydrogenated to an oil, similar in composition to a light crude oil. This hydrogen is preferably made with methane reforming.

Current preference is for the indirect route, with various projects underway in China and other countries.

While most grades of coal and natural gas of varying composition can be used in the process, the lower grades of input fuel result in a lower liquid fuel output versus input. As coal (typically 0.8 Hydrogen /1 Carbon) is more hydrogen deficient compared to the Fischer-Tropsch product (2. Hydrogen /1 Carbon) or methane (4 Hydrogen /1 Carbon) the net result is higher carbon losses (as CO2) compared to methane as a GTL feedstock. Initial preference is thus to use the hydrogen rich CBM as feedstock in preference to the coal in the coal seams themselves, which offers substantial benefits for a lower capital cost as well as lower emission project.

Arrow Energy Limited with Alcan South Pacific have announced the results of a feasibility study to examine potential for a GTL plant drawing upon coal bed methane resources (CBM) in Queensland to provide a liquid fuel for Alcan’s Gove aluminium refinery. The proposed plant is to be of 20,000 bbls/day output and the results indicated favourable profitability and operating economics.

The Brisbane-based company has said the joint study evaluated the GTL project against the current and alternative energy options available for Alcan’s Australian operations. This demonstrates the potential for the scaling up of CBM from a niche to large scale gas supplier.

Syntroleum, an international GTL technology company, have signed a Memorandum of Understanding with Linc Energy Limited to examine potential
for GTL production from Linc’s proposed underground coal gasification (UCG) project at Chinchilla in Queensland. This could be seen as variant to above ground coal gasification, and suitable to some coal resources.

Fischer-Tropsch diesel is recognized as a clean diesel. This diesel is saleable in existing markets, is compatible with all existing infrastructure, has virtually no sulphur (below 10 ppm) nor aromatic components, is biodegradable and is non toxic. It also has a long “shelf life”, approximately 8 years, compared with refinery diesel, which is typically 6 months. Tests (Shell, DOE, Syntroleum and others) have demonstrated (with engine optimization) that it has better performance than conventional or refinery diesel. The favourable high cetane number and other characteristics allow a typical premium of US$ 5-7 per barrel over petroleum diesel. The combustion of the Fischer-Tropsch diesel results in reduction of engine pollutants. Politically Australia is diesel short compared to petrol, and this constrains the ability to increase market penetration, with substantially (30%) more fuel efficient diesel cars.

As commented before, a GTL plant would require less than half the capital investment of a CTL plant, and consequently GTL from gas delivered to a plant will be more economic in general than from a CTL plant. Central does not have the rights to the overlying coal leases and mining of coal may involve commercial arrangements with coal companies, this would add supplementary costs and result in reduced revenue to Central in the case of CTL processing, but for GTL, Central controls the rights to all conventional and non-conventional reservoirs.

Syntroleum, believes that a 20,000 barrel a day GTL plant would be economic at an oil price of US$ 35-40 per barrel, which is lower than current forecast long term oil prices. Such a plant would require an input gas feed of approximately. 250 MMCFD, compared to 200 MMCFD required for Holt Campbell Payton’s preferred process. The outputs of the synthesis are diesel, jet fuel, naphtha, and liquified petroleum gas with ancillary potential for wax and lubricants all valuable commercial products, with ready markets in Australia and abroad. Other more mature GTL technologies such as Sasol’s would yield about 25,000bbl/d from the same amount of feedstock In the case of Syntroleum, the low yield is attributable to reforming with air instead of steam or oxygen as with other processes.

*The reader is referred to the Syntroleum presentation which is in the possession of Central. Other companies have variants of the process and the reports from Rentech and Japan Oil and Gas National Corporation are also referred to.*

Central has commissioned a pre-feasibility study for a GTL plant in central Australia involving 10,000 bbl/day to 50,000 bbl/day plant outputs. Whilst the latter report was prepared for the adjacent Amadeus Basin, it is also relevant for the Pedirka Basin. The study, by Perth-based consulting engineers Holt Campbell Payton, concluded that a 50,000 bbl/day GTL plant requiring some 3.8 TCFG in reserves for a 20 year life cycle would break even at about US$
35 per barrel oil price with feedstock priced at A$ 1.25 /gigajoule, whereas an increase in gas price to A$ 2.50 would raise the break even point to about US$ 40/bbl oil price. This projection is based on the utilization of yet to be discovered resources in Central’s Amadeus Basin tenements. Those tenements, whilst similar to the Pedirka Basin blocks, are not the subject of this report. The reader is referred to the said report.

Higher plant capacities than this have also been studied by Central. The authors of the above mentioned report have also reported on the potential of a 140,000 bbl/day plant located at Alice Springs using gas from unconventional sources from the Pedirka Basin. This report is included as Appendix 1.

11.0. COAL TO GAS PROCESSING

While the CBM appears an attractive early target for GTL, longer term there may also be potential for combining coal gasification with methane gas processing.

The transformation of coal to gas is the front end of the gas to liquids process and is discussed in the above mentioned reports and as such will not be discussed in this report. A complication with this process is that the rights to mine the coal may be held by third parties, with whom Central would have to conclude arrangements. Enhanced coal bed methane extraction techniques whereby either carbon dioxide or nitrogen is pumped into the coal seams displacing methane, which is then collected may be applicable in this area. The process depends on the preferential adsorption of carbon dioxide and nitrogen to the faces of the cleats within the coals. There are also carbon dioxide sequestration benefits in this enhancement process. The need for coal mining as a feedstock to the production of synthetic crude will be determined by the results of exploration drilling. In the view of the author it is unlikely to be required.

12.0 UNDERGROUND GASIFICATION

The technical and political viability of underground gasification of coal (UCG) needs to be determined. It too may involve third parties, which will affect the economics of a potential proposed project. Its need, or not, will also be determined by the results of exploration drilling. UCG requires specific parameters to ensure stable and constrained production. Current technology is described as ‘emerging’, with little commercial precedent.
13.0. FRACTURE STIMULATION

The likely success of fracture stimulation to enhance reservoir performance can only be evaluated after exploration drilling and the coring of reservoirs to produce reservoir models. This applies for the Horn Valley Siltstone tight reservoirs and for the coal bed methane drainage wells. The author’s expectation is that it will be successful. Such fracturing could also access gas in the tight, but gas saturated carbonaceous shales, and hence make a further contribution to production.

14.0 UNTESTED PLAYS

No play has been definitively tested in Central’s Pedirka Basin acreage. The few existing petroleum exploration wells are not definitive crestal tests or have not tested robust fault independent closure. No exploration for coal bed methane has been conducted in the area. No fracture stimulation of tight reservoirs has been attempted in the acreage. In light of the above it is suggested that Central’s exploration program be directed towards the testing of large uplifted structures, this will evaluate both the conventional and non-conventional potential of the acreage simultaneously. Several types of traps should be tested between the basin depocentre and the basin margin. This applies to both the Pedirka and Simpson Desert Basin sequences for coal bed methane. Generally traps in these units are coincidental.

The coals should be fully cored for the evaluation of their suitability for coal bed methane extraction. If the results are positive then blanket development drilling could commence.

15.0. POTENTIAL UNDISCOVERED RESOURCE

A large prospective, but as yet undiscovered, hydrocarbon resource appears to be present in Central’s Pedirka Basin acreage. It is not possible to accurately quantify the possible resource due to the lack of specific definitive data, on coal properties. To date all exploration within the area has been frontier oil exploration and was not focused on non-conventional hydrocarbon resources. The author considers that the chance of discovering conventionally reservoired hydrocarbons within Central’s Pedirka Basin acreage is also high.

Rudimentary well data from the 14 conventional oil exploration wells drilled in the Pedirka Basin to date, along with regional seismic data indicates that thick and widespread coal horizons are present in the Pedirka and Simpson Desert Basin sequences of Central’s acreage. Hence the potential for coal bed methane extraction exists.

Drilling results in the NT indicate that the Horn Valley Siltstone of the Amadeus Basin sequence is gas saturated and widespread. Wireline logs and gas detector instrumentation confirm this high hydrocarbon saturation. Geochemical
analyses indicate that the unit is an extremely rich source rock with oil generative potential, this has been proven empirically by production. Sub-economic gas flows have also been obtained from it, again in the NT. This tight unit is a good candidate for fracture stimulation to enhance gas flow rates should its depth of burial and facies aspect prove suitable.

15.1 Indicative undiscovered target size

![Figure 6 Depth Map to the top of the Permian Purni Formation Coal Measures showing the area of coal above 1,250m in the Northern Territory sector of the Basin.](image)

**Amadeus Basin sequence**

For the Horn Valley Siltstone, more traditional oil industry parameters would be used in a possible resource determination but there is not enough information, from drilling, to attempt to quantify the extent and thus the potential resources of hydrocarbons in this tight, low porosity and low permeability reservoir in Central’s leases. Hence no possible resource determinations will be conducted on the sequence.

**Pedirka Basin sequence**

After reviewing seismic two way time maps, prepared by Brent Jensen-Schmidt, a consultant to the NT Department of Minerals and Energy as part of the NGMA mapping project, to the Top of the Purni Formation, converted to depth with a representative seismic velocity, it is estimated that the Purni Formation of
the Pedirka Basin sequence, subcropping at depths above 1250 metres, extends over some 20,875 square kilometres in Central’s tenements. A depth map for the NT sector of the basin is included as Figure 6. Similar mapping was used for the SA sector of the basin. This mapping was tied back to the few wells present in the area. Well logs were also perused to ascertain the coal thickness. It appears that there is a net coal thickness of 40 metres, in 4.5-7.5 metre seams, in the unit. No gas saturation values have been determined for these coals, however values from the correlative Bowen Basin units in Queensland average about 11 cu. metre/tonne. This latter figure will be used in the possible resource determination for the Purni Formation.

However other correlatives in the similar aged Galilee basin of Queensland have a gas saturation of about 3.5 cu.metre/tonne. Similar values, to the latter, have been determined from the Walloon Coal Measures of the Mesozoic aged Surat Basin sequence, which overlies the Bowen Basin. The gas saturation value depends on the nature of the coal; rank and burial depth, the deeper the coals the higher the gas saturation. The Pedirka Basin coals are more deeply buried and the average value stated above is likely to be appropriate.
**Simpson Desert Basin sequence**

![Map](image)

**Figure 7 Depth to the Top of the Triassic Peera Peera Formation highlighting the area of coal and carbonaceous shale above 1,250m.**

After reviewing two way seismic maps to the Top of the Peera Peera Formation, from the above mentioned consultant, converted to depth with a representative seismic velocity, it is estimated that the Peera Peera Formation of the Simpson Desert Basin sequence, subcropping above 1,250 metres, extends over approximately 21,875 square kilometres in Central’s permits. This map is included as Figure 7. A similar map was used for the SA sector of the basin. Again the seismic was calibrated to wells and well logs. There appears to be a lesser thickness of coal but an increased thickness of carbonaceous shale in this sedimentary sequence, compared to the Permian unit. If fractured successfully these shales will also contribute to the gas flow. It is estimated that the net coal thickness in the Peera Peera Formation is 20 metres. The Triassic coals in the Ipswich Basin have gas saturations ranging from 5.8 cu.metres / tonne to 11.1cu.metres / tonne. These values were measured from cores taken at depths of 300-430 metres and 432-492 metres, respectively, from a well drilled at the Swanbank Power Station in Queensland. An average value of 11.0 cu.metres / tonne has been assumed for this unit.

Using standard conversion factors for long tons to metric tonnes, the amount of coal of unknown composition per metre depth per square kilometre to coal mass, and for cu.metres to cu.ft, and using the above gas saturation values the
calculation for the likely amount of gas contained in these coals has been completed. The values, which are indicative, are detailed below.

The economic cutoff value for coal bed methane extraction of 1,250 metres is also indicative, however coal bed methane drainage from coals at of approximately 1,000 metres were considered to be economic by the large US company Enron in the Galilee Basin, in lower gas saturated coals. The cutoff depth will be dependent on gas saturation and the performance of crestal wells, however an estimate of 1,250 metres appears reasonable.

It is thought that for a plant near to the producing fields that the plant gate price will be in the order of A$ 2.00 per mmCFG however this price will be highly volume dependent.

**Prospective in place resources**

- **Pedirka Basin sequence = 44.6 TCF (coal bed methane)**
- **Simpson Desert Basin sequence = 22.8 TCF (coal bed methane)**
- **Total = 67.5 TCF**

*This figure is considerable and compares favourably with values accepted by Halliburton, a specialist service company, for some other significant methane producing basins. That company estimates that the in place methane resource in the San Juan Basin of New Mexico, the most gas saturated basin in the USA, is between 68 and 84 TCF. They believe that the Appalachian Basin of the eastern USA holds an in place resource of 66 TCF and that the Northern Bowen Basin of eastern Australia has an in place methane resource of 136 TCF.*

It is expected that half of this indicative possible resource may is recoverable. Although the amount of the potential resource ultimately recovered will depend on gas saturation, flow rates, the number of and the spacing of drainage wells, the success of probable fracture stimulation operations and other factors. Not enough data is available on reservoir and gas saturation values to make comprehensive probabilistic estimates of “low”, “best” and “high” cases. Such estimates have been made on a deterministic basis using possible expected recoveries.
Prospective recoverable resources

High Estimate (75% recovery)
Pedirka Basin sequence = 33.5 TCF
Simpson Desert Basin sequence = 17.1 TCF =
TOTAL = 50.6 TCF

Best Estimate (50% recovery)
Pedirka Basin sequence = 22.3 TCF
Simpson Basin sequence = 11.4 TCF
TOTAL = 33.7 TCF

Low Estimate (35% recovery)
Pedirka Basin sequence = 15.6 TCF
Simpson Desert Basin sequence = 8.0 TCF
TOTAL = 23.6 TCF

16.0 RISKS
All petroleum exploration, whether conventional or non-conventional, contains inherent risk. The main risks in Central's proposed non-conventional program are

- The gas saturation of the coals, which are unknown
- The location of water sands within or near the coals
- The lateral extent of the coals
- The thickness of the coal beds
- That economic flow rates are achieved from development wells
- The success of possible hydraulic fracturing operations

In spite of the above risks there is enough encouragement, in the author's view, to pursue this high potential reward project.
17.0 RECOMMENDATIONS

The prime recommendation of this report is that Central persist with their objective to explore for, develop and produce hydrocarbons of a non-conventional origin from their Pedirka Basin acreage. Their innovative ideas of gas, or coal, synthesis to synthetic crude oil are capable of unlocking a large scale, but un-utilized resource in the basin complex contained within their tenements. Liquid hydrocarbons command a premium over gas and are more readily economically transportable and more readily saleable. Ready local and, probably, export markets exist for liquids in this time of oil shortage and high prices.

The company’s objectives are sound in that they are targeting Permian and Triassic coal rich intervals, correlatives of which are known to have sourced both conventional and non-conventional hydrocarbon production in adjacent basins in eastern and central Australia. It is the author’s experience that wells aimed at non-conventional targets perform better when sited on conventional trapping geometry, the laws of Physics and Chemistry still hold in unconventional accumulations. As a consequence it is further recommended that exploration wells be sited on crestal locations on large tensional structures. This will maximize drainage and reduce the associated dewatering costs, an expensive ancillary requirement for both coal bed methane and basin centred gas production. Down flank production wells, probably less productive, could then be drilled later to develop the field.

An additional recommendation is that wells aimed primarily at the the Pedirka and Simpson Desert Basin sequences be drilled into the underlying Horn Valley Siltstone of the Amadeus Basin sequence; despite its tight and dirty nature. As it appears, by analogy with the same formation drilled in the Amadeus Basin to the west, to be gas saturated over a wide vertical and lateral extent. This very rich source rock appears to be an ideal candidate for fracture stimulation and it is known to be oil prone. This unit should be investigated by coring and conducting fracture stimulation trials.

The Horn Valley Siltstone, under the western portion of the Pedirka Basin and in the Amadeus Basin proper, much of which is also held by Central, may also have potential for conventional gas and or liquids production.

Given the perceived lack of organic material in the Eromanga Basin sequence in Central’s acreage it is recommended that Mesozoic targets only not be drilled at this stage.

The Company should be very watchful whilst drilling through the Poolowanna Formation as this unit is the most prospective in the Mesozoic section.

In the initial stages of exploration the search for conventional and non-conventional hydrocarbons should be combined to quickly prove up a resource, which could confirm economic viability.
A final recommendation is that all early exploration holes be fully cored through the coal units to accurately gauge their thickness and that the subsequent cores be fully analyzed with a particular emphasis on gas saturation, cleating and other fundamental properties.

18.0 CONCLUSIONS

- The major conclusion of this report is that Central Petroleum Pty Ltd’s Pedirka Basin acreage is prospective for hydrocarbons, either reservoired conventionally or non-conventionally.

- The coals of the Pedirka and Simpsons Desert Basin sequences are rich mature source rocks and correlatives of them have sourced many oil and gas accumulations in adjacent basins. The carbonaceous shales of these units are also known to be good, mature source rocks. Similarly, the very rich source rocks of the Horn Valley Siltstone of the underlying Amadeus Basin sequence are known to be the source interval for the Mereenie and Palm Valley Oil and Gas Fields, respectively of the Northern Territory, but the nature of the sequence in Central’s permits is largely unknown. If suitable facies are encountered during drilling then this gas saturated, but tight, unit could be a candidate for fracture stimulation.

- If the Company’s exploration programs are successful the sheer size of target resource should enable the construction of a large scale GTL plant and or a CTL plant. Recent feasibility studies suggest that these processes are economic at the current oil price. However, the economic viability of these processes are volume dependent.

- Ready markets exist for the sale of liquids and to a lesser extent gas, and other chemical by products.

- Central have a very innovative and elegant proposal to utilize a known, but undeveloped, possible resource of large magnitude in a remote location.

- The company has an overwhelming acreage position in the Pedirka Basin area and will dominate production from it if their exploration programs are fruitful.

- The Pedirka and the associated basins in the company’s acreage are virtually unexplored and potential exists for large discoveries of hydrocarbons either of a conventional or non-conventional nature.
DECLARATIONS

Sources of Information

Data on Central’s Pedirka Basin acreage was supplied by Mr. J Heugh, the Managing Director of Central and Mr T Rudge, an employee of the company. It was supplemented discussions by with officers of the SA and NT Department of Minerals and Energy and by public domain data as listed in the Bibliography (see below).

Previous Independent Geological Reports

A prior report on Central Petroleum Limited’s central Australian acreage, with emphasis on the Amadeus Basin Basin was prepared by Mulready Consulting Services for inclusion in Central Petroleum.Limited’s Prospectus  This report is dated 12 September 2005.

Limitations and risk

We have relied on the sources indicated above. A draft of this Report was supplied to Central for comment regarding any errors of fact.

Title

Verification of title was not within the brief of Mulready Consulting Services Pty Ltd in relation to this Report.

Inspection

As is usual for exploration permits we have not undertaken an inspection of the properties dealt with in this Report.

Comment

It is our view that the proposed programme, to explore for and develop unconventional hydrocarbon resources in Central’s central Australian acreage, as outlined in this report, is soundly based on the results of previous exploration, studies by the company and the appropriate state Departments of Minerals and Energy and by recent developments in the synthesis of gas and coal to liquid hydrocarbons. We think the proposed project is sound, appropriate and reasonable.

Limitations and risk

In preparing this Report we have relied on the sources indicated above. A draft of this Report was supplied to Central for comment regarding any errors of fact.
Exploration for and development of hydrocarbons is inherently speculative. There is as yet no direct method for determining the presence of hydrocarbons prior to drilling of an exploration well. There is always the risk that any potential trap may not contain hydrocarbons by virtue of inappropriately located or timed hydrocarbon generation or migration, or due to ineffective seal or later disruption of the trap. In the case of unconventional accumulation there are additional constraint such as the levels of gas saturation of the coals, depths to the coals and the quality of the water which may need to be disposed of, amongst others. A potential trap may also contain non-commercial volumes due to adverse reservoir conditions or inadequate charge of hydrocarbons. In this Report discussion of potential traps, including structures, features and culminations, and of related potential hydrocarbon volumes, should not be taken to imply that a commercial accumulation is known to exist.

Independence

Mulready Consulting Services Pty Ltd is not operating under an Australian financial services license in providing this Report.

$18,500 (GST inclusive) plus any out of pocket expenses is all the remuneration (including commission) or other benefits that any “nominated person” is to receive that might reasonably be expected to be or have been capable of influencing Mulready Consulting Services Pty Ltd in providing this Report.

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- (ii) a related body corporate of Mulready Consulting Services Pty Ltd;
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Neither Mulready Consulting Services Pty Ltd nor any of its directors, employees or Associates has any beneficial interest in Central Petroleum Pty Ltd, nor in any of the permits which are the subject of this Report, nor in any adjacent permits.

Conformity

This report has been prepared to conform to the requirements of the Australian Securities and Investments Commission Policy 75 (Independent expert reports to shareholders) and Practice Note 42 (Independence of Expert’s Reports) and 43 (Valuation Reports and Profit Forecasts) as applicable.

Date of report

This report is dated March 9th 2007.

Consent

Mulready Consulting Services Pty Ltd consent to the issue of this Independent Geologist’s Report in the form and context in which it is included.

Qualifications

Jack N. Mulready graduated from the University of Melbourne with a B.Sc. (Geology) 1963, Dip. Ed.(1966) and B.A. (1999) and from R.M.I.T. with a Fellowship Diploma in Management in 1978. He has over 38 years of experience within the petroleum exploration and production industry in Australia, New Zealand, USA, Indonesia, China and PNG. He is a member of the Petroleum Exploration Society of Australia, the Geological Society of Australia and the American Association of Petroleum Geologists (Certified APPG Geologist No. 5321), and is subject to the code of ethics of these bodies. He has prepared numerous independent geologist’s reports and valuations for a variety of Australian companies in accordance with the requirements of the Australian Stock Exchange.

Jack Mulready
B.Sc., B.A., Dip. Ed., F.Dip. RMIT, MGSA, MPESA,
Certified APPG Geologist #5321.

Roger Meaney, Associate Consultant Petroleum Geologist, graduated from LaTrobe University with a B.Sc. (Honours) in Physics and a Diploma of Education in 1973. He later completed the requirements for a B.Sc. in Geology from the same institution, part time. He has more than 28 years experience in oil and gas exploration. He was employed as a Petroleum Geophysicist by Esso Australia Limited, AAR Limited and Santos Limited and worked in all facets of hydrocarbon exploration. He has extensive technical experience in both the onshore and offshore sectors of the industry in Australia and some in the United
States of America, Canada and Papua New Guinea and in management. Roger also has experience in the coal bed methane drainage industry.

He is a member of the Society of Exploration Geophysicists and of the Petroleum Exploration Society of Australia, and is subject to the code of ethics of these bodies. Roger has completed several independent geologist’s reports for Australian companies in accordance with the requirements of the Australian Stock Exchange.

R.A. Meaney
B.Sc. (Hon), Dip. Ed., MSEG, MPESA

19.0 SELECTED REFERENCES

The reports and publications, listed below, along with internal reports, supplied by Central were used in the compilation of this report, as was knowledge in the possession of the author.


• Pre-Feasibility Study for a 10,000 bbl/day FT GTL plant in central Australia with notes on a 50,000 bbl/day option


• Landsat MSS Interpretation of the Eringa Trough South Australia and Northern Territory. R. Russell. 2000.


• Coalbed Methane Technology, Halliburton Company, Duncan, Oklahoma
• **The Cooper and Eromanga Basins Australia, Edited by B.J.O’Neill, 1989**

• **Handbook of South Australian Geology, Geological Survey of South Australia, 1969**

• **Field Geologist’s Manual, Monograph 9, Australian Institute of Mining and Metallurgy, 1987**

• **Pre-feasibility Study for a 10,000bbl/day FT GTL Plant in Central Australia with Notes on a 50,000bbl/day Option, Technical Note. Holt Campbell Payton Pty Ltd. Report to Central Petroleum Limited**

• **Gas-to Liquids and Coal-to Liquids An Obvious Solution. Dennis L. Yakobsen Rentech Inc.**


• **Jogmec’s GTL Research and Development for Utilization in the Future. Yoshifumi Suehiro, Japan Oil and Gas National Corporation**

• **Sustec-Syntroeum Coal to Liquids Integrating Gasification, Fischer-Tropsch and Refining Technology. Gas-to Liquids and Coal-to Liquids. Ken Roberts, Syntroleum Inc.**

**APPENDIX 1**

This Appended comprehensive report was written by Mr David Holt of Holt Campbell Payton Pty Ltd and Mr Jake De Boer of GHD Engineering Pty Ltd. It deals with the possible synthesis of crude oil, diesel, jet fuel and naphtha from gaseous hydrocarbons sourced from conventional and unconventional reservoirs and the marketing of such products.
19 February 2007

The Directors
Central Petroleum Limited
Suite 3 / Level 4 Southshore Centre
85 The Esplanade
South Perth WA 6151

Dear Sirs,

TECHNICAL NOTE ON LARGE SCALE GTL OPTION FOR POTENTIAL CBM RESOURCE OF CPL's PEDIRKA BASIN ACREAGE

Further to your request we have prepared the following Technical Note entitled "Appraisal of GTL Development Option for Potential CBM Resource of the Pedirka Basin" for consideration by the board of Central Petroleum Limited in respect of CBM development opportunities in your Pedirka Basin acreage.

This Technical Note is intended to provide specialist information on GTL options to support an independent geological study by Mulready Consulting Services Pty Ltd on the potential for non-conventional hydrocarbon accumulations in Central Petroleum's Pedirka Basin holdings.

Yours Faithfully

Dave Holt
Principal Mechanical Engineer
HCP Pty Ltd
APPRAISAL OF GTL DEVELOPMENT OPTION
FOR
POTENTIAL CBM RESOURCE OF THE PEDIRKA BASIN

TECHNICAL NOTE

Document No.
CPL–TN – 04

prepared by HCP Pty Ltd for Central Petroleum Limited
February 2007

SUBJECT: This report presents a brief review of options for large scale commercial development of a potentially huge coal bed methane (CBM) resource in Central Petroleum’s Pedirka Basin acreage in Central Australia. It provides a preliminary appraisal of the technical and economic aspects of production and marketing of synthetic petroleum products utilising current gas-to-liquids (GTL) technology to process coal bed methane.
This report presents a brief review of options for large scale commercial development of a potentially very large coal bed methane (CBM) resource in Central Petroleum's Pedirka Basin acreage in Central Australia. It provides a preliminary appraisal of the technical and economic aspects of production and marketing of synthetic petroleum products utilising current gas-to-liquids (GTL) technology to process coal bed methane. This report does not attempt to produce profit forecasts for Central and should not be relied upon as a basis for investment in a GTL development for Central's potential CBM resource in the Pedirka Basin.

This report is intended to provide specialist information on GTL options to support an independent geological study by Mulready Consulting Services Pty Ltd on the potential for non-conventional hydrocarbon accumulations in Central Petroleum's Pedirka Basin holdings.

The authors are competent persons with considerable experience in assessing coal gasification and GTL technologies, and the assumptions used and the conclusions reached in this report are considered by them to be based on reasonable grounds and appropriate for the scope of the assignment.

The report has drawn upon a number of sources including updated technical and cost related data for the Qatar Shell GTL project that is currently under construction and other public domain data last researched January 2007 to derive an analysis of the potential commercial outcomes of a conceptual 140,000 bbl/day CTL plant located near Alice Springs in Central Australia.

Estimations of plant costs and other costs are likely to escalate over time, new and improved technology is likely to be developed and no forecasts of oil prices can be made nor is attempted except to note the currently accepted outlook of the International Energy Agency.

Disclaimer

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Note about Authors

This report was prepared by Principal Consultants, Dave Holt and Jake DeBoer of Holt Campbell and Payton Pty Ltd, a firm providing feasibility and costing analyses for a number of applications in energy project developments.

Dave Holt – MEngSc, M.E. – is a partner in Perth-based consulting engineering practice (HCP Pty Ltd) who has had a key involvement in several conceptual developments for coal gasification and synfuels. He has over 35 years in project development, project management and engineering in oil and gas and power fields. Relevant experience includes power station work with Collie coal, project management of Woodside’s North Rankin gas recycling (enhanced condensate recovery) project, and recently, owner’s facilities engineer for OMV’s Patricia-Baleen offshore gasfield development in Eastern Victoria.

Jake DeBoer – MSc (Chem Eng.) B.Comm – is a Principal Consultant with over 24 years experience, specialising in synfuels project development, Fischer-Tropsch technology, coal gasification, alternative / renewable energy and implementation strategy and management. He was previously with Sasol Technology based in Johannesburg, South Africa where he had been Manager of New Ventures Assessment and previously Chief Chemical Engineer. Jake moved to Australia in 2003 and was involved with APEL’s Victorian Power and Liquids project through HCP. He is currently with GHD Engineers as Principal Chemical Engineer where he has recently been involved with various coal-to-liquids developments
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INTRODUCTION

This report presents a brief review of options for large scale commercial development of a potentially very large coal bed methane resource in Central Petroleum's Pedirka Basin acreage in Central Australia.

Central has undertaken several studies of the viability of gas to liquids conversion and its many variants for a proposed Fischer Tropsch GTL plant with capacity ranging from 2,500-10,000-50,000 plus bbls/day located at Alice Springs and drawing upon possible undiscovered resources in conventional reservoirs in their acreage. A much larger GTL development is considered here for the Pedirka Basin acreage. It is based on Shell's 140,000 bbl/day GTL plant, presently under construction in Qatar, which is the largest GTL project to date.

Resource Magnitude

According to the Independent Geologist's Report provided by Mulready Consulting Services, the possible original gas in place (OGIP) coal bed methane resource of Central's acreage in the Pedirka basin, is inferred to be 67.7 TCF. The associated anticipated recoverable gas is believed to range between 50TCF and 24 TCF. This represents a significant gas resource by any world-scale standard. It should be noted that the proved, probable and possible gas reserves in the discovered North West Shelf fields, North Rankin, Goodwyn, Perseus and Angel, have an estimated total OGIP of 30 TCF. As such, the Pedirka Basin CBM resource should lend itself to large scale development to bring this nationally important energy resource to market. With present technology, there are several options that could be considered.

MARKETING OPTIONS

LNG

Notwithstanding the large prospective recoverable gas resources potentially available, remoteness from shipping ports would be expected to make this resource relatively unattractive for export as LNG. Although it could be feasible to convey dried gas by pipeline to an LNG plant at a port location (~1500km-Port Darwin) it is unlikely to be competitive with gas from an offshore gas field. A typical LNG facility processing 1400 mmscfd (0.5 TCF per year) would produce approximately 10.2 million tons per annum (tpa) of LNG. As a benchmark, the Woodside LNG plant on the Burrup peninsula in Western Australia presently produces about 12 million tpa of LNG.

Pipeline Gas

The existing pipeline infrastructure from Moomba in the Cooper basin to the markets in the East Coast has a ultimate capacity of about 0.3 TCF/year. The option of installing a pipeline from the Pedirka through to Moomba, a distance of approximately 750km, would ensure continuation of gas supply through this system for many years to come, but would hardly exploit the large gas resource available to meet future energy need and is probably more viable when and if gas prices reach A$5/gigajoule in todays money.

Gas-to-Liquid (GTL)

Synthetic fuels are a new generation of near zero sulphur and aromatics transport fuels made with the Fischer Tropsch process from natural gas (GTL), coal (CTL) or biomass (BTL). The process produces typically 70 percent synthetic diesel and 30 percent naphtha, a premium sulphur-free chemical feedstock which is also an excellent gas turbine fuel. At present, a modest amount of synthetic diesel is made commercially by Shell (Malaysia) and SASOL and PetroSA (South Africa).

A number of large scale plants are now being built or planned and product availability (although representing only a relatively small fraction of total middle distillate products on the world market) is expected to increase significantly from 2010 onwards. The largest plant presently under construction is the Qatar Shell ("Pearl") GTL facility which will process 1400 mmscfd (0.5 TCF per year) of dry gas to produce 140,000 bpd of GTL fuels. A facility such as this (or several such facilities) could effectively convert the CBM resources of the Pedirka basin into clean useful transport fuels over a reasonable timescale.
With GTL technology, the inferred possible recoverable 50.7 TCF CBM resource of the Pedirka basin would be equivalent to a huge oilfield with an inventory of 5.7 billion barrels of ultra-clean premium transport fuel, which because of its high value could be transported via rail link from Alice Springs or other suitable loading facilities on sidings to Port Darwin for export from central Australia. Rail transport costs to Darwin from central Australia are anticipated to be approximately A$3.50/bbl or less in high volume shipments.

_A resource of this magnitude could have strategic significance in both a military and a politico-economical sense for Australia and its allies._

### 3 SYNTHETIC DIESEL MARKET

Demand for GTL fuel is essentially new and is expected to expand quickly, with much opportunity for producers who enter the market early.

**Australian Context**

Last August (2006), the Australian Federal Government announced its intention to promote the development of a synthetic fuels industry to produce liquid transport fuels from coal and gas and "to position Australia as a leader in gas-to-liquids and coal-to-liquids". This followed disclosure that the nation's oil production had fallen a further 10 per cent last financial year.

Fuel supplied in the Australian market is dominated by fuel refined in Australia from local or imported crude. In 2004/05 roughly two-thirds of refinery feedstock was imported, the remainder being supplied from declining local resources. Furthermore, about one quarter of the diesel consumed in Australia was imported as refined product (23 million bbl/year), mainly from Singapore.

**Global Fuels Market**

Diesel and jet fuel are the fastest growing segments of the refined products market. The International Energy Agency reports that the demand for diesel in OECD countries has grown at nearly 3% per year over the last decade and is currently about 13.6 million barrels per day. Much of this growth is attributed to the swing towards high-efficiency diesel motor vehicles in Europe in recent years where around half the new passenger vehicles produced are now diesel engined. According to the Petroleum Economist, global diesel demand is likely to continue to grow at around 3% per year while demand for certain other refined products is likely to flatten and even decline.

The refining industry faces significant challenges both to meet future diesel demand and to produce cleaner diesel. Concerns over air pollution in many jurisdictions have led to a continuing tightening of diesel vehicle emission specifications. Vehicle manufacturers have improved exhaust treatment technology and enhanced engines significantly, but these technology advances have required the introduction of clean diesel fuels. Significant refinery investment is being required to meet the sulphur-free specifications as well as tight specifications for other parameters such as cetane (min 51) and polyaromatic hydrocarbons (max 11%wt).

GTL diesel can make up the supply shortfall in both quantity and quality. With a high cetane number and near zero sulphur and aromatics, GTL diesel is considered an exceptionally clean motor fuel. It can be used either as ultra-clean diesel in itself or as a blend with refinery diesel - which produces a fuel with lower emissions and will meet the clean fuel specifications of tomorrow. Typically, the diesel yield of GTL plants, at 70%, is higher than refineries, at 40%.

**Global Trend Towards Diesel Cars**

Advanced diesel technology offers better fuel efficiency, more power and more durability, as well as quiet, clean, premium vehicles that were previously the domain of petrol cars. Over 40% of new passenger cars in Europe now have diesel engines compared to less than 20% a decade ago. Initially, fuel tax and vehicle sales tax policies drove diesel uptake in Europe, although it is likely that consumer preference for power and comfort is now a significant factor. Well over 60% of new passenger cars, and over 80% of luxury cars, are diesels. This trend has now spread to China and South-east Asian countries and, with the recent introduction of ultra-low sulphur diesel spec fuels is expected to spread rapidly in North America.
A switch from “gasoline” to diesel in North America is expected to put significant strain on global refining capacity since the yield of diesel that can be obtained from crudes is limited to about 40 percent while markets have to be found for the other products.

For Australia, with its abundant but remote gas resources such as the Pedirka basin's CBM, GTL technology offers a new value-adding industry opportunity capitalising on the global trend toward diesel and a pathway to best meet sustainable transport objectives.

4 LARGE SCALE GTL PLANT

A large scale development of the Pedirka basin CBM would be expected to attract interest from major developers of GTL projects such as Shell, Sasol-Chevron, ExxonMobil or Statoil-PetroSA. As such, it is envisaged that the first plant might be similar to the largest GTL facility presently under construction which is the Qatar Shell Pearl GTL project. This plant consists of eight process trains of a design similar to that of the two-train Oryx GTL (34,000 bpd) which recently went into service in Qatar. The sheer size of the undertaking means that it would need to be supported by a substantial industrial infrastructure and associated community such as has grown up around the mining industry at Mt Isa or the offshore petroleum industry at Karratha for example.

In respect of a Central Australian development, there is already a well established community and industrial infrastructure at Alice Springs which can be built upon. It is assumed, therefore, that the plant would be best located at the Brewer industrial area near Alice Springs and that gas would be conveyed by pipeline to that location from a central compression station in the Pedirka gathering system some 260 km away.

Comparing with gas transmission tariffs for the Dampier-Perth pipeline, it is expected that the cost of this transmission would add about A$0.20 per mscf to the indicative “factory gate” delivered cost inclusive of exploration, development and production of A$2.00 per mscf for a centrally located GTL plant in the Pedirka Basin.

We have thus used a “factory gate” cost of A$2.20 per mscf for dry gas delivered to the Brewer location and have converted this to US$1.65 per mscf using an exchange rate of US$0.75/A$.

Qatar Shell GTL

The Qatar Shell (“Pearl”) GTL project is the largest GTL development being undertaken in the world at this time. Along with the recently completed 34,000 bpd Oryx GTL facility in Qatar and the 34,000 bpd Escravos GTL plant under construction in Nigeria, it provides the platform for the growth of an entirely new industry with the GTL fuels, in particular, opening up opportunities for new markets. The scale of the project presents significant challenges.

The project is an integrated upstream/downstream development, involving two offshore platforms and 1,600 mcmcf of natural gas feed into the GTL facility with 120,000 bpd of associated condensate and NGL production. Output from the GTL plant is expected to be 140,000 bpd. For the GTL component alone, this equates to an annual consumption of 580 bcf or 0.6 tcf. Construction is anticipated to occur in two stages, with stage one set to come online around 2010 at 70 kbd. Stage 2 startup is to come one year later.

With an output capacity over four times that of the Oryx plant, Pearl GTL is expected to be the largest construction project in Qatar, occupying an area 1.4km x 1.6km (220 ha) and requiring a peak construction workforce of 15,000. Approximately 1,000 employees will be required to operate the plant initially, reducing to a permanent workforce of 600 some years later when operations have settled down.
Shell has not released the development costs of the plant. However, industry analysts (such as Simmons and Co) estimate that in mid 2006 the cost of the total Pearl GTL project has almost doubled to $12bn, of which $6.3bn pertains to the GTL plant. This indicates a specific capital cost of around US$45,000 per bpd. An indicative breakdown of total capital investment is shown below based on percentages reported by Foster Wheeler.
5 INDICATIVE ECONOMICS OF A LARGE SCALE GTL DEVELOPMENT

Capital Cost

The Qatar Shell GTL project provides a current best estimate of the capital investment that might be needed for a GTL facility of this scale. Using Simmons and Co’s mid-2006 estimate for specific capacity cost of US$45,000 per daily barrel, the capital investment for a similar project, if built in Qatar would thus be expected to be of the order of US$6.3 billion.

A comparative location construction cost study undertaken by Brown & Root for the Northern Territory Government (2001) found that construction costs for Darwin were an estimated 1.3% higher than Qatar for a large scale petrochemical plant and about 2.6% lower than Qatar for an ammonia / phosphate fertiliser complex. It is concluded, therefore, that any difference in construction costs between Darwin and Qatar would be insignificant in present circumstances.

Taking into account that the reduction in complexity of non-cycloic standard of construction for Central Australia compared with Darwin could well offset the logistics issues associated with building a large industrial plant near Alice Springs, it is considered that the capital cost of a 140,000 bpd plant would be about the same as if built in Qatar. Total plant investment cost, excluding Darwin marine terminal, would thus be approximately US$6.3 billion.

Reference GTL Product Selling Price

Average Singapore refining spread has risen US$12-15 per bbl over the last two years and the underlying factors that have caused this, (namely decline of spare refining capacity, increasing use of heavy crudes and tighter sulphur specifications) seem unlikely to disappear in the foreseeable future. With the product slate for a GTL plant being typically diesel, 72%, and naphtha, 28%, the refining differential for the GTL slate as a whole has averaged US$11.5 /bbl over the last two years.

Product freight costs have also increased sharply over the past few years and are currently over US$4/bbl according to Caltex Australia. The cost of importing diesel from Singapore includes the Singapore FOB price plus the freight cost. This would give a US$4/bbl advantage to an Australian producer selling to the local market over that for an export market which would be at Singapore competitive pricing.

Therefore, for this indicative economic appraisal, it is assumed that the product would be sold into the Australian market and that the average wholesale price of GTL fuels would be approximately US$15.5 above the Dubai crude price.

Cost of Production

Estimated cost per barrel for the GTL plant is as follows:

<table>
<thead>
<tr>
<th>Cost Component</th>
<th>Ref. Rate</th>
<th>US$/bbl</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural Gas Feedstock [10.0 mscf/bbl]</td>
<td>A$2.25/mscf</td>
<td>16.5</td>
</tr>
<tr>
<td>Capital (assumed 90% capacity factor)</td>
<td>15%pa of TDC</td>
<td>20.5</td>
</tr>
<tr>
<td>Operating and Maintenance</td>
<td></td>
<td>6.5</td>
</tr>
<tr>
<td>Transport from Plant to Port</td>
<td>2cents(A)/ntkm</td>
<td>2.5</td>
</tr>
<tr>
<td>Total Cost of Production (&amp; Transport)</td>
<td></td>
<td>46.0</td>
</tr>
</tbody>
</table>

A delivered cost of US$46.0/bbl would be the same as the landed cost of similar petroleum products imported from Singapore with Dubai crude at US$30.5/bbl.
The chart below illustrates the effect that the cost of gas and the selling price of crude oil would have on the profitability of operation. It is based on a Total Depreciable Capital (TDC) of US$6,300 million. We have used a typical capital charge rate of 15% pa of TDC as an opportunity cost of capital.

Note: The Capital Charge Rate is the average annual cost of capital over the life of the plant, taking into account loan amortization, financing costs, taxes and depreciation, plus opportunity-cost return on equity. Most studies evaluating energy costs under conventional financing scenarios for power plants simply assume around a 15 percent Capital Charge Rate for capital and multiply this amount by the Total Plant Investment to obtain an annual capital charge, which is divided by annual production to calculate the capital component of production costs. This approach is taken in this study.

At the present time when we are seeing US$60 per bbl crude prices, a net surplus of around US$30 /bbl could be expected. If the cost of feedstock (delivered) was to double to AU$4.50/GJ, the net surplus (at US$60 / bbl crude price) would drop to around US$13 /bbl. In other words, the price of crude above which the operation remains sustainable, increases to US$ 47 /bbl.

6 CONCLUSION

If a 140,000 bpd plant (over 50 million bpa) was to be constructed of a similar size to the Shell Pearl Qatar GTL plant to process Pedirka Basin CBM, such a plant would require some 0.5 tcfg per annum of dry gas and over a 20 year life cycle would consume about 10 tcfg, which appears to be well within the broad scope of the inferred prospective recoverable resources concluded in the Independent Geologist’s Report of 50.8 TCF to 23.7 TCF.
21st June 2007

The Directors
Central Petroleum Limited
Suite 3
Level 4 Southshore Centre
85 The Esplanade
South Perth WA
6151

Dear Sirs,

At your request I have prepared the following Independent Geologist’s Report for consideration by the board of Central Petroleum Limited in respect of farm-in opportunities in your newly acquired Pedirka Basin acreage, with the emphasis on non-conventional hydrocarbon accumulations.

The report covers Exploration Permits (Applications)( EPA’s) 105,106 and 107, all of which are included in an arrangement with Traditional Oil Pty Ltd for purchase thereof by Central. This report should be read as an addendum to the previously submitted report on your existing Pedirka Basin tenements,”The Unconventional Petroleum Potential of EP 93 and EPA’s 130&131 and PELA 77 Pedirka Basin Onshore Northern Territory and South Australia Australia”.

Jack N. Mulready
Director/Principal
Mulready Consulting Services Pty Ltd
THE UNCONVENTIONAL PETROLEUM POTENTIAL OF

EPAs 105, 106 & 107

PEDIRKA BASIN

ONSHORE NORTHERN TERRITORY

AUSTRALIA

21st June 2007

(Addendum to “The Unconventional Petroleum Potential of EP 93 and EPA’s 130 & 131 and PELA 77 Pedirka Basin Onshore Northern Territory and South Australia Australia. Mulready Consulting Services Pty Ltd)

R.A MEANEY

MULREADY CONSULTING SERVICES PTY LTD.
EXECUTIVE SUMMARY

1. Central Petroleum Limited, in their own right, have recently acquired from Traditional Oil Pty Ltd EPA’s (Applications) 105, 106 and 107 in the Northern Territory subject to granting of the Permits and various payments. The company also controls EP 93 and have the sole rights to EPA’s (Applications) 130 and 131 in the Northern Territory and PELA (Application) 77 in South Australia.

2. The newly acquired tenements cover most of the western sector of the potentially prospective, but under explored, Pedirka Basin of central Australia, as well as the overlying and underlying sedimentary sequences. Refer Figure 1b)

3. Studies by the company and the relevant state Departments of Minerals and Energy have highlighted the conventional hydrocarbon prospectivity of these tenements.

4. Work by the company, which has been confirmed by this report, has identified substantial prospectivity for the presence of, and the potential to develop, non-conventional hydrocarbons in the company’s three new tenements, as well in the four other Pedirka Basin tenements that they currently control. The unconventional petroleum potential of these four tenements is detailed in an earlier report.

5. It is estimated that an Original Gas in Place (OGIP) Prospective Resource of approximately 25.4 TCF of coal bed methane could be present in Central’s newly acquired Pedirka Basin acreage in Permit Application areas EPA 105, 106 and 107. Of this some 17.1 TCF is believed to be hosted in the Permian aged Purni Formation of the Pedirka Basin sequence and some 8.3 TCF is thought to be present in the Triassic aged Peera Peera Formation of the overlying Simpson Desert Basin sequence. As detailed in the earlier report on EP 93, EPA’S 130 &131 and PELA 77, the corresponding value for the company’s previously held four tenements is 67.4 TCF. Hence the relevant OGIP values for the Company’s 7 Pedirka Basin permits in prospective resources is 92.8 TCF.

6. It is thought that the total estimated recoverable prospective hydrocarbon resource possibly hosted in EPA’s 105, 106 and 107 in the “low”, “best” and “high” deterministic cases are 9, 13 and 19 TCF assuming recoveries of 35%, 50% and 75%, respectively. The corresponding values for EP 93, EPA’s 130&131 and PELA 77 are 25, 34 and 51 TCF respectively. Hence the relevant values of recoverable prospective resources for all of Central’s 7 Pedirka Basin blocks are 34, 47 and 70 TCF.

7. According to Holt Campbell Payton, typically a GTL plant will require about 10 thousand standard cubic feet of gas (mSCF) to synthesize one barrel of oil. Hence the “high” indicative possible resource anticipated in the company’s newly acquired Pedirka Basin acreage, 19.0 TCFG, could produce some 1,900 million barrels of liquids. This is in addition to the 50.6 TCFG or 5,060 million barrels of liquids which could be present in the company’s other Pedirka Basin permits, as detailed in the earlier report. Consequently Central’s entire Pedirka Basin acreage package could conceivably produce some 70 TCFG or approximately 7,000 million barrels of ancilliary petroleum liquids based on “high” prospective recoverable resources.

8. The entire Pedirka Basin acreage with “low”, “best” and “high” estimates of recoverable prospective resources could conceivably fuel a 140,000 bbl/day GTL plant for 70 years, 100 years and 150 years.
9. Central's Pedirka Basin acreage is known to contain extensive Permian and Triassic coal measures and carbonaceous shales, correlatives of which are known to have sourced the gas accumulations in the Cooper Basin and the oil accumulations of the overlying Eromanga Basin, adjacent and overlying basins respectively. These coals have considerable potential for coal bed methane drainage. These source beds, which contain Type 2 or oil prone macerals, could also have sourced conventional hydrocarbon accumulations.

10. The acreage also contains section within the underlying Amadeus Basin Sequence which may be prospective for “basin centred gas accumulations” in the tight and dirty Horn Valley Siltstone.

11. Given the knowledge of the central Australian petroleum systems the overlying Mesozoic aged Eromanga Basin has potential for oil accumulations as a consequence of late generated gas displacing oil up-dip.

12. Central have plans for the establishment of one or more large scale gas to liquids (GTL) synthesis plants, probably located in Alice Springs for strategic reasons, given the proving up of appropriate reserves. Future potential for coal to liquids processing also exists.

13. Such plants would use the latest variant of the Fischer-Tropsch reaction to produce liquids, which could include ultra-clean dieseline, jet fuel and naphtha.

14. Given the company’s extensive acreage in the Pedirka Basin, and in central Australia in general, should the company’s plans come to fruition, then they should become the dominant player in a large scale gas and or coal to liquids industrial process in central Australia.

15. It is known that markets, both locally and internationally, exist for clean liquid petroleum products, which could include ultra-clean diesel, jet fuel and naphtha. These markets are substantial and are under-supplied. Other by products of the hydrogenation process also have a ready market in the chemical industry.

16. Markets for the disposal of sales gas may also exist in southern and eastern Australia if gas sales prices rise to sufficient levels.

17. It is considered appropriate that conventional and non-conventional exploration be conducted simultaneously, as far as is possible, in the initial stages of exploration in the permit areas. This should be a natural occurrence.

18. Besides an exploration program, additional analytical studies will be required to accurately estimate the likely potential resources present in the company’s acreage.

19. Indeterminate potential also exists in the Poolowanna Formation of the Eromanga Basin sequence, probably not as widespread.

20. This report is directed at the recently acquired acreage from Traditional Oil Pty Ltd, EPA’s 105, 106 and 107 permit applications which straddle the Pedirka/Amadeus Basin boundaries but are thought to include some 8,000 km$^2$ of Permian and probable Triassic coal horizons.
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1.0 RATIONALE OF REPORT

This Report was commissioned by Central Petroleum Limited, ABN 72 083 254 308 in June 2007 and it should be read as an addendum to a previously submitted report on the unconventional petroleum potential of adjacent permits, EP 93, EPA's 130 & 131 and PELA 77.

This preliminary study reports upon the potential for the discovery and commercial production and marketing of unconventional petroleum accumulations in undiscovered prospective resources at “high, low and best” deterministic levels in accordance with the SPE guidelines preferred by the ASX. The study also comments on the potential for the utilization of gas to liquids (GTL) technology and processes in central Australia, detailed in a report appended to the main body of the earlier report prepared by consulting engineers Holt Campbell and Payton Pty Ltd (Holt Campbell Payton). This report does not attempt to produce profit forecasts for Central Petroleum Limited and should not be relied upon as a basis for investment in Central Petroleum Limited.

This report is intended for those persons who may have an interest in examining the potential for the commercial development of GTL plants in central Australia as joint venture or farmin partners.
The authors are competent persons with appropriate qualifications and relevant experience and the assumptions used and the conclusions reached in this report are considered by them to be based on reasonable grounds and appropriate for the scope of the assignment.

The report has drawn upon a number of sources including the statement of potentially recoverable hydrocarbons in the Amadeus and Pedirka Basins provided by the Independent Geologists, Mulready Consulting Services Pty Ltd, who have consented to the use of data drawn from their Independent Geological Report included in the Central Petroleum prospectus dated 12th September 2005, Pre-feasibility Study for a 10,000 bbl/day FT GTL Plant in Central Australia with notes on 50,000 bbl/day and 140,000 bbl/day options by Holt Campbell Payton, March 2006 and March 2007, who have also consented to the use of their reports. Reference was also made to “The Unconventional Hydrocarbon Potential of EP 93 and EPA’S 130&131 and PELA 77 Pedirka Basin Onshore Northern Territory and South Australia Australia”. Mulready Consulting Services Pty Ltd. Public domain data available from the Northern Territory and South Australia Geological Surveys, and other sources last reviewed in February 2007 was also utilized.

Estimations of plant costs and other costs such as gas production are likely to escalate over time, new and improved technology is likely to be developed and no forecasts of oil prices other than accepted investment community generalizations can be made, nor is attempted. The conclusions reached in this report are based on market conditions and technical knowledge at the time of writing and as such may not be relied upon as a guide to future developments, nor do the authors take any responsibility for commercial decisions that may be made on the basis of this report.

This is a scoping study aimed at defining potentially recoverable, but un-discovered, prospective resources and viable uses of gas resources that may be discovered in central Australia in Central Petroleum Limited’s newly acquired acreage.

At the time of presentation of this report, Central Petroleum Limited does not own nor control any drilled petroleum resources in central Australia nor has any drilling yet been undertaken by Central Petroleum Limited.

2.0 INTRODUCTION

2.1 General

Central Petroleum Limited has requested Mulready Consulting Services Pty Ltd to provide an independent report on the potential for non-conventional hydrocarbon accumulations in its newly acquired Pedirka Basin holdings, EPA’s 105, 106 and 107. This is in addition to the company’s other holdings in the Pedirka Basin, which are covered in an earlier report, “The Unconventional Petroleum Potential of EPA 93 and EPA’s 130 & 131 and PELA 77 Pedirka Basin Onshore Northern Territory and South Australia Australia”.

Central Petroleum Pty. Ltd (Central) is a recently formed public company with the objective of exploring for, developing, producing and commercializing hydrocarbon accumulations, both conventional and non-conventional, i.e. coal bed methane (CBM), underground coal gasification (UCG), and tight gas reservoirs in their under-explored central Australian acreage in the Northern Territory (NT) and South Australia (SA). The prime focus is on the Permian aged Pedirka Basin: however there is also potential in the overlying and underlying basins. Central also is examining potential for value adding to production options such as gas to liquids (GTL) and possibly coal to liquids (CTL) transformations to produce a range of liquid petroleum
products such as dieselene, jet fuel and naphtha. The coal rich Pedirka Basin is of particular interest in non-conventional gas resources (CBM and basin centred gas accumulations), CTL as well as conventional hydrocarbon reservoir types.

Although there is significant potential for both conventional and unconventional hydrocarbon resources, for CBM alone, undiscovered recoverable Prospective Resources (SPE definition) thought to be hosted in EPA’s 105,106 and107 are as tabled in below.

<table>
<thead>
<tr>
<th>BASIN</th>
<th>LOW ESTIMATE</th>
<th>BEST ESTIMATE</th>
<th>HIGH ESTIMATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pedirka (Permian)</td>
<td>6.0 TCF</td>
<td>8.6 TCF</td>
<td>12.8 TCF</td>
</tr>
<tr>
<td>Simpson Desert (Triassic)</td>
<td>2.9 TCF</td>
<td>4.2 TCF</td>
<td>6.2 TCF</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>8.9 TCF</strong></td>
<td><strong>12.8 TCF</strong></td>
<td><strong>19.0 TCF</strong></td>
</tr>
</tbody>
</table>

Table 1 CBM Possible Recoverable Resources - Trillions of Cubic Feet of gas (TCF) EPA’s 105, 106 and 107 only

It should be noted that this is in addition to the prospective resources likely to be hosted in the company’s other Pedirka Basin tenements, EP 93, EPA’s 130 & 131 and PELA 77, which are also listed below.

<table>
<thead>
<tr>
<th>BASIN</th>
<th>LOW ESTIMATE</th>
<th>BEST ESTIMATE</th>
<th>HIGH ESTIMATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pedirka (Permian)</td>
<td>15.6 TCF</td>
<td>22.3 TCF</td>
<td>33.5 TCF</td>
</tr>
<tr>
<td>Simpson Desert (Triassic)</td>
<td>8.0 TCF</td>
<td>11.4 TCF</td>
<td>17.1 TCF</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>23.6 TCF</strong></td>
<td><strong>33.7 TCF</strong></td>
<td><strong>50.6 TCF</strong></td>
</tr>
</tbody>
</table>

Table 2 CBM Possible Recoverable Resources – Trillions of Cubic Feet of gas (TCF) EP 93, EP As 130, 131 and PELA 77

Hence the corresponding values for all 7 of Central’s Pedirka Basin blocks are as listed below.
### Table 3 CBM Possible Recoverable Resources – Trillions of Cubic Feet of gas (TCF) EP 93, EPAs 130, 131, 105, 106 and 107 and PELA 77

<table>
<thead>
<tr>
<th>BASIN</th>
<th>LOW ESTIMATE</th>
<th>BEST ESTIMATE</th>
<th>HIGH ESTIMATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pedirka (Permian)</td>
<td>21.6 TCF</td>
<td>30.9 TCF</td>
<td>46.3 TCF</td>
</tr>
<tr>
<td>Simpson Desert (Triassic)</td>
<td>10.9 TCF</td>
<td>15.6 TCF</td>
<td>23.3 TCF</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>32.5 TCF</strong></td>
<td><strong>46.5 TCF</strong></td>
<td><strong>69.6 TCF</strong></td>
</tr>
</tbody>
</table>

The calorific value of these resources is anticipated to be relatively high compared to many other CBM resources due to the oil prone nature of the coal source rocks, which are known to contain fresh water Type 1 and Type 2 macerals. These rocks have high exinite to vitrinite ratios compared to source rocks in other basins, such as the Cooper Basin, and as such these source rocks are considered to be oil prone.

Although there is generally a paucity of information, an indicative “factory gate” delivered cost inclusive of exploration, development and production is thought to be approximately A$ 2.00 per thousand cubic feet of gas (mSCFG) for a centrally located GTL plant in the Pedirka Basin. This price is expected to be higher, due to piping costs, at A$2.20/mSCFG for a GTL plant located in Alice Springs. These indicative costings are highly volume dependent but would probably support a very large scale GTL plant at oil prices prevailing above US$ 30, according to Holt Campbell Payton, Consulting Engineers of Perth. Such volumes, of course, could also be available to service gas markets on the eastern seaboard subject to prevailing market conditions. Markets for the sale of sales gas do exist in southern and eastern Australia.

According to Holt Campbell Payton, typically a GTL plant will require about 10 thousand standard cubic feet of gas (mSCF) to synthesize one barrel of oil. Hence the “high” indicative possible resource anticipated in the company’s newly acquired Pedirka Basin acreage, 19.0 TCFG could produce some 1,900 million barrels of liquids. This is in addition to the 50.6 TCFG or 5,060 million barrels of liquids which could be present in the company’s other Pedirka Basin permits, as detailed in the earlier report. Consequently Central’s entire Pedirka Basin acreage package could contain some 69.6 TCFG or approximately 6,960 million barrels of ancilliary liquids.

**Figure 1.b Central’s acreage in detail**

The possible resource in EPA’s 105, 106 and 107 could conceivably sustain a GTL plant producing 140,000 barrels of liquid GTL products per day for about 37 years. It is assumed, reasonably, that each well would average 0.25 million cubic feet of gas per day (MMCFD), hence some 560 producing wells would be required to feed a GTL plant of this capacity. This is a considerable capital outlay which would entail a major drilling campaign. If Central’s program is successful, then with a large scale development drilling program the cost per well would fall
markedly due to the reduced mobilization costs. For such a large scale drilling program Central could further reduce their costs by purchasing drilling rigs and sub contracting the manning of them to an established drilling contractor. Similarly, for a 140,000 bbl/day output plant, the best estimate of 12.8 TCF would sustain a 27 year operation and the low case of 23.6 TCF, a 13 year plant life. The Company would of course plan on bringing all potential gas production from the other permits together with EPAs 105,106 and 107 to give a combined total of 33 TCFG, 47 TCFG and 70 TCFG for the prospective recoverable resource figures which would conceivably give a 140,000 bbl/day GTL operation plant lives of 70 years, 100 years and 150 years at “low”, “best” and “high” estimates of prospective recoverable resources.

2.2 Strategy

As part of its strategy, commencing in 1998 when oil prices were US$ 12/bbl, the Company acquired four contiguous and very prospective tenements in the onshore Pedirka Basin of Central Australia. These permits are located in far southeastern NT and far northern SA, as shown in Figures 1, 2 & 4, the company’s acreage holdings and infrastructure maps, respectively. This acreage has been augmented by the recent purchase of EPA’s 105, 106 and 107, the subject of this report. The company also has other extensive interests in the adjacent Amadeus Basin.
In the short term, Central aims to develop early cash flow via the discovery and development of and production from conventional oil targets, for example, the Blamore and Avalon Prospects in EP 93 which are reported by RPS Energy to have prospective recoverable resources at “best” estimate of c.60 MMbbls and the Guinevere and Madigan leads reported by Robsearch to have potential for “best” recoverable prospective resources of 275 MMbbls. However the company has also examined the potential for GTL for a range of plant sizes from 2,500-10,000-50,000 bbl/day plant options located at Alice Springs and fed by conventional gas reservoirs.

However Central's longer term strategy in the Pedirka Basin involves the search for both conventionally and unconventionally reservoired gas to feed larger scale GTL plants.

Additional reserve based asset acquisition, to grow the company, will also be considered by the company.

Whilst the Pedirka Basin is not yet productive of hydrocarbons, significant indications of hydrocarbons and minor recoveries had been made in wells drilled for conventionally reservoired hydrocarbons, in this sparsely explored basin, for example at Colson 1 and Poolowanna 1, the locations of which are shown on Figure 3, a schematic cross section. Indications of hydrocarbons were also encountered in the overlying Triassic aged Simpson Desert Basin in the latter well.
Figure 3 Schematic cross section of Pedirka Basin

To date no effort has been made to search for or to develop non-conventional hydrocarbon accumulations in this area, although similar aged sedimentary section sustains commercial production of non-conventional hydrocarbons in Queensland (QLD) and New South Wales (NSW). Rocks of a similar age, genesis and lithology are productive of conventional hydrocarbons in SA, QLD and NSW. Rocks of an older age, which underlie the Permian section of the Pedirka Basin sequence sustain oil and gas production in the Mereenie and Palm Valley Fields, respectively, of the Amadeus Basin in the Alice Springs area of the NT. Rocks of the Amadeus Basin sequence are probably present in all seven of Central’s Pedirka Basin blocks.

Markets for hydrocarbons, either conventionally or non-conventionally reservoired, exist. Eastern and southern Australia faces a looming shortfall in gas supply. Oil, and/or other liquid petroleum products such as diesel, jet fuel and naphtha, whether of a natural or synthetic genesis, are readily saleable, particularly with the current high oil prices of over US$ 45/bbl. These prices are expected to prevail in the foreseeable future.

Central has prepared, or has had other consultants prepare, reports on the conventional hydrocarbon prospectivity of their permits. Accordingly this will not be discussed in depth in this report. Central have plans for an initial 6 well drilling programme, in their Pedirka Basin and Amadeus Basin permits, to target prospective recoverable resources of 3.4 TCF of gas, 105 BCF of Helium and 300 MMBBLS of oil.

In addition to the chances of discovering and producing conventional hydrocarbons from the Pedirka Basin, Central is also drawn to the basin by the large potential coal resource known to be present. Intersections of extensive coal intervals have been encountered in some oil exploration wells drilled in the basin and ubiquitous coal horizons are identified on seismic data acquired in the basin. The company is investigating little utilized, but known and proven, techniques of producing gas and oil from the extensive coal measures and possibly...
carbonaceous shales present in their acreage. These processes include:-

- Coal bed methane drainage
- Gas to liquids synthesis

At a later date, if applicable, the company will consider other options, if appropriate, including:-

- Coal to liquids processing
- Underground coal gasification
- Coal mining for hydrogenation
- Fracture stimulation of tight, gas saturated intervals

Whilst there is no infrastructure present in the area at this time to transport any produced hydrocarbons from the area of Central’s permits, the magnitude of the potential hydrocarbon resource and expected production rates could sustain the construction of high pressure gas pipelines or dual phase gas and liquids pipelines to new facilities. In the short term, to ensure a speedy cash flow, any liquids produced, from either conventional or small scale development of non-conventional sources, could be trucked to the Alice Springs to Darwin rail line and thence direct to port facilities at Darwin for export or domestic consumption.

The existing adjacent infrastructure including rail links to Darwin and existing oil and gas pipelines present is shown in Figure 2, an infrastructure map.

Large volumes of gas, if discovered or synthesized, could be sold directly, subject to prevailing market conditions. This to would involve the construction of a new a high pressure gas pipeline to existing facilities in the Cooper Basin and subsequent transmission into the national gas pipeline grid which interconnects South Australia with Queensland, New South Wales, the Australian Capital Territory, Victoria and Tasmania. Similarly, this gas could be transported by a potential pipeline to connect with the Alice Springs to Darwin pipeline for local sale in the “Top End” or for compression and export. These pipelines are also shown in Figure 2.

Markets, either national or export, appear to exist for any hydrocarbons produced from the Pedirka Basin acreage, whatever their genesis.

2.3 Prospectivity

The results of the study to prepare this report have established that the onshore Pedirka Basin fulfills all the requirements for the hosting of hydrocarbon accumulations, namely:-

- The presence of rich, mature, source rocks, with some liquids generating potential
- The presence of reservoir quality rocks and carrier beds
- The presence of sealing units
- The presence of traps, both of a structural and stratigraphic genesis
- The presence of thick and widespread coal beds for methane adsorption, at appropriate depths

The source rocks mentioned above could source either conventional or non-conventional hydrocarbons. They could also have generated oil and or wet gas, and with deeper burial, dry gas
It is the author’s view that, to the present, the lack of commercial exploration success and production from the area of Central’s newly acquired permits has been due to the lack of seismic coverage and the sparsity of drilling, and in some cases the lack of drilling, as well as the perceived distance from existing facilities. Another factor is that dating back to 1963 when Santos and Total were in a joint venture exploration over the area, commercial gas was discovered at Gidgealpa 3 in the Permian section and the exploration focus of the two companies shifted exclusively to the Cooper Basin sequence. The oil price slump in 1986, followed by the stock market crash of October 1987 also made fundraising for juniors engaged in exploration very difficult for many years. Finally, the lack of infrastructure before the rail link to port facilities at Darwin was completed in 2004 coupled with low oil prices up until recently meant that the monetisation of gas in particular (via GTL) but oil as well would have been difficult.

However, the size of Central’s intended targets, and the proposed associated exploration and development projects, if successful, will counteract these previous constraints. The intention to produce synthetic crude oil and then refined liquid products from either gas or coal is particularly innovative and may ensure the development of a large, known, but un-utilized, coal, and possibly methane resource. It also must be remembered that globally, oil consumption is increasing, with Western countries importing increasing volumes of oil.

3.0 TENEMENTS

Central holds seven petroleum exploration permits over the area of the Pedirka Basin. Four of these, EP 93, EPA's 130 &131 and PELA 77 are discussed in the earlier, previously mentioned report, to which the reader is referred. The three permits which are the subject of this report, EPA’s 105, 106 &107 are all located in the south east of the Northern Territory (NT) (Figure 1b..)

In all cases the permit tenure is of 5 years duration and is renewable, with a fifty percent relinquishment at the end of each 5 year period. The awarding also involves the rights to any coal bed methane as well as conventionally reservoired gaseous and liquid hydrocarbons. If any commercial discovery is made, the operating company, and any Joint Venture partners are automatically granted a 21 year Production License over the discovered field. This Production License is renewable for the life of the field. In the event of a non-commercial discovery the company can apply for a Retention Lease over the field. This Lease is of 5 years duration and is renewable at the discretion of the Authority.

The right to explore for and to mine and develop coal is held by the holders of any superimposed coal exploration tenements but it is believed that the Company’s rights to develop any CBM will prevail over any, most unlikely efforts, to mine coal for export. This results from the huge distances required for the transport the coal to suitable ports, and the depth of burial of this relatively low value commodity. This issue will ultimately have to be resolved by negotiation.

Recently the company has concluded an arrangement with Traditional Oil Pty Ltd (Traditional) to purchase that company’s Pedirka Basin acreage. This purchase, which will give Central control of most of the Pedirka Basin acreage, involves EPA’s 105, 106 and 107.

EPA 105 covers some 185 graticular blocks or approximately 14,000 square kilometres, whereas EPA 106 extends over 61 graticular blocks or 5,000 square kilometres, and finally EPA 107 encompasses 91 graticular blocks or some 7,000 square kilometres. Hence the company has gained another 26,000 square kilometres of ground in Central Australia. The newly acquired tenements are located to the west of Central’s currently held acreage, with
the north west corner of the acreage package located only some 20 kilometres east of Alice Springs.

The recently acquired three blocks will be owned by Merlin Energy Pty Ltd, a wholly owned subsidiary of Central. After the settlement of the purchase Traditional will hold a 1.25% gross production royalty over the three blocks in question, after the deduction of transport costs and other costs from the well head to the point of sale allowable under the Petroleum Act.

Since the preparation of the earlier report and this report, Central have signed a Memorandum of Understanding (MOU) with Petroleum Exploration Pty Ltd for a farmout to the latter company. The farminee plans to farm into all 18 of Central’s tenements on a 2 for 1 basis by funding 40% of the expenditure to earn 20% of the tenement. This expenditure is capped at a maximum of $3million of seismic and three wells in each Permit. This MOU is to planned to be ratified by the board of each company in a formal farmout agreement by the end of June 2007.

The initial exploration targets were conventionally reservoired hydrocarbons, in this prospective, but under-explored, basin. However these permits are also prospective for unconventional hydrocarbon exploration, due to the presence of extensive coal measures. Correlatives of these coal measures are known to be “gassy” and productive of coal bed methane in similar aged section in other basins of eastern and central Australia. Hence the company has decided to explore for both conventional and non-conventional resources simultaneously. It is expected that oil prospects will be the initial targets. This report will only address non-conventional hydrocarbons.

A thick siltstone, the Horn Valley Siltstone, which, when drilled to date in the Amadeus Basin has been gas saturated, is also postulated to be present over a wide, area under, the Permian Pedirka Basin sequence, and due to its affinity with “basin centred gas accumulations”, it may be a good candidate for fracture stimulation and gas production. Central plans to evaluate this unit also, during the drilling of wells aimed at overlying targets.

4.0 METHODOLOGY

The basis of this report was an open file study of much of the data available on the onshore Pedirka Basin (Permian) in both the Northern Territory and South Australian sectors of the basin, although reference was made to the underlying Amadeus Basin (Devonian and older) and overlying Simpson Desert (Triassic) and Eromanga (Jurassic) Basins. Some internal reports provided by Central were also utilized and one of these by Holt Campbell Payton was relied upon for comments on GTL and CTL fundamentals, as were presentations from Syntroleum of Tulsa, Oklahoma, Rentech Inc. and the Japan Oil and Gas National Corporation. The reader is referred to these reports. Knowledge in the possession of the author of coal bed methane drainage in NSW and QLD was also included as was his knowledge of conventional exploration in NSW, QLD, NT and SA. Publications on coal bed methane exploration, development and production were also referred to.

5.0 THE COMPANY

As indicated by the name, Central is a company focused on the hydrocarbon potential of central Australia. It is a new public company with extensive acreage holdings in the sedimentary basins of central Australia. Currently Central operates over 226,000 square kilometres of ground in granted permits and applications, of which 26,000 square kilometres relates to the newly acquired tenements, EPA’s 105, 106 and 107. Hence it has a strong
acreage position. It has objectives to produce both conventional and non-conventional hydrocarbons from these prospective but under-explored basins. The company has innovative plans to develop and produce hydrocarbons from a potentially large, long known but un-utilized coal resource.

Given the company’s extensive acreage holdings, if their programs are successful, they will control much of central Australia’s future hydrocarbon production, particularly in the Pedirka Basin. The company has innovative and far-sighted plans to develop a potentially huge, non-conventional hydrocarbon resource in a time of energy shortage. Their plans for the synthesis of liquid hydrocarbons from coal and or gas are particularly enterprising, as liquid hydrocarbons command a premium over the sale of gas, and the nation and the Western world is in short supply of oil. Zero to low sulphur ultra-clean dieselene, a planned product of the Company’s GTL strategy, is expected to command an increasing premium over conventional mineral oil diesel as it is being progressively more extensively used for blending to meet environmental regulations. Diesel powered motor cars have increased their market share in recent years and this trend is likely to continue.

6.0 PREVIOUS EXPLORATION

The area held by Central in the area of the Pedirka Basin is virtually unexplored, in an exhaustive and definitive manner. Some early rudimentary exploration, aimed at Cambrian targets, was conducted by the Delhi-Santos consortium in the early 1960’s. At a similar time Beach Petroleum explored in the NT sector of the basin. After the discovery of gas by Delhi in the Permian section of the Cooper Basin at Gidgealpa 3 in 1963 some exploration aimed at Permian targets occurred in the area. Following the recovery of 38 degree API gravity oil, from the terrestrially sourced Poolowanna Formation of the Eromanga Basin sequence at Poolowanna 1 in 1977, (Western Mining Company), attention was directed towards the Mesozoic section in the area of Central’s permits. This exploration was regional in nature and not really focused on specific plays or targets. Little exploration has occurred in recent years in the area covered by the company’s Pedirka Basin acreage.

Recent work by the Departments of Mines and Energy of both the NT and SA has upgraded the petroleum potential of the area markedly. This work has established the presence of mature source rocks, with oil generative potential in the area of question, the presence of traps, and confirmed the accepted belief in the presence of excellent reservoir units. Seals are known to be present within the blocks. No work, other than Central’s, has been done on the non-conventional prospectivity of the tenements. This prospectivity appears to be high.

7.0 GEOLOGY

The Pedirka Basin is one of a number of intra-cratonic sedimentary basins located in central Australia. Minor recoveries of, and indications of, hydrocarbons have been made in several of the few wells drilled into this prospective but under-explored and remotely located basin. These wells seem to be inappropriately sited to definitively evaluate traps, in particular, and the basin in general.

The area encompassed by Central’s permits contains several sedimentary sequences, which are productive of conventional hydrocarbons in basins immediately adjacent. Namely the Paleozoic aged Amadeus Basin, to the northwest in the NT, where gas and oil are produced from Ordovician section in the Palm Valley and Mereenie Fields, respectively. These sediments are expected to be present in all of Central’s newly acquired tenements, namely EPA’s 105, 106 and 107, as well as in the company’s previously acquired permits, EP 93,
and in EPA’s 130 and 131 in the NT and in PELA 77 in SA.

Hydrocarbons are also produced from the Permo-Triassic aged Cooper Basin of SA and QLD, to the east, where the giant Moomba, Gidgealpa and Dullingari Gas Fields, amongst others, are located. The Cooper Basin is Australia’s largest onshore gas province, and it also contains the nation’s biggest onshore oil field, at Tirrawarra. Correlatives of the producing and source intervals are known to be present in Central’s permits.

The Mesozoic aged Eromanga Basin of SA and QLD, also to the east, contains most of Australia’s onshore oil fields. Correlatives of producing and source intervals of the lower Eromanga Basin sequence are present in Central’s permits. Oil, of a waxy nature, probably indicating sourcing from underlying Permian or Triassic coals, or carbonaceous shales has been recovered from wells in the Poolowanna Trough of the Simpson Desert Basin, to the east of the company’s acreage.

Further east in QLD, but not adjacent, much gas and some oil has also been produced from the Permo-Triassic aged Bowen Basin. The Permo-Triassic Gunnedah Basin of northwestern NSW also produces gas. A correlative of the Eromanga Basin, the Surat Basin, sustains oil and gas production in QLD. This basin hosts Australia’s first commercial oil field, discovered in 1961 at Moonie.

All of the Paleozoic, Permian, Triassic and Lower Mesozoic intervals, or their lateral equivalents, which source the above-mentioned hydrocarbon accumulations, are known to be present in the tenements which Central hold. It is known that the Permian coals are the source of the oil and gas reservoired in the Cooper and Bowen basins and the gas in the Gunnedah Basin. Further more it is widely believed that they are also the source of the oil produced from the overlying Mesozoic Eromanga and Surat Basins. Oil has also been recovered and produced from some Triassic intervals, particularly in SA, and it is thought that the Triassic section also contains mature source rocks. Coal of Triassic age, which is buried to shallow depths, is mined at Leigh Creek in central South Australia by open cut methods. Hence, Central’s acreage is essentially surrounded by, and contains, rich, mature and generative source rocks, a fundamental requirement for hydrocarbon generation and entrapment, either conventional or non-conventional.

7.1 Regional Geology

The Pedirka Basin of central Australia is located in both the NT and SA, and it covers an area of approximately 73,000 square kilometres, of which Central holds some 40,000 square kilometres or 55% of the basin. The acreage recently purchased from Traditional, EPA’s 105, 106 and 107, extends over 26,000 square kilometres in total with approximately 6-8,000 square kilometres of Permian sediments and much more Triassic and Jurassic sediments thought to be present. The company’s previously held Pedirka Basin tenements covered approximately 33,000 square kilometres.
Central’s Pedirka basin acreage is located in northern SA, north of the settlement of Oodnadatta and in south eastern NT and it straddles the state-territory border. The northwest corner of the acreage package is just 20 kilometres east of Alice Springs. Its location is shown on Figures 1, 2 and 4, along with the underlying and overlying basins.
The area of Central’s permits contains 4 distinct sedimentary sequences, the oldest being the Paleozoic sediments of the Amadeus Basin sequence which overly metamorphic and granitic basement. This sequence is unconformably overlain by sediments of the Carboniferous-Permian Pedirka Basin sequence, which is rich in coals and carbonaceous shales. Central’s acreage package contains the basin’s two main depocentres, the Eringa and Madigan’s Trough in the east, mainly in the company’s previously acquired acreage. The Simpson Desert Basin contains a large thickness of Triassic section. Its main depocentre, which is located to the east of the company’s tenements, is known as the Poolowanna Trough. It too contains coal and carbonaceous shales. This source-rich basin is unconformably overlain by the oil productive Eromanga Basin.

### 7.2 Tectonic Setting

The Pedirka Basin sequence had its genesis in Carbonaceous-Early Permian time when sedimentation occurred in a downwarp over the pre-existing sediments of the Proterozoic-Early Carboniferous Amadeus Basin.

Sedimentation in the Amadeus Basin was controlled and constrained by basement blocks of metamorphic and igneous composition, the Arunta Block to the north and the Musgrave block to the south. The western margin of the basin is a shallow basement ridge separating the Amadeus Basin from the Canning Basin of Western Australia.

The basin's eastern margin is not well understood but appears to be truncated. Two pulses of marine deposition occurred, these were followed by a later pulse of continental sedimentation. Several episodes of structuring occurred, involving uplift and erosion and then sinking and marine transgression. The previously mentioned basement blocks acted as immobile bulwarks against which the sediments of the Amadeus Basin were deformed and structured, due to north-south compression.

Subsequently subsidence occurred in the deeper eastern end of the basin and the lacustrine, fluvial, and often glacially derived sediments of the Pedirka Basin were deposited unconformably on the Amadeus Basin section. Much coal was deposited in this cycle. A hiatus then occurred before the Triassic aged Simpson Desert Basin sequence was deposited, unconformably, on the Pedirka Basin sequence. These sediments are of lacustrine, flood plain and fluvial origin, with some glacial influence. This cycle is dominated by carbonaceous shale with significant coal. The depocentre of this basin, the Poolowanna Trough is eastwards of the Pedirka Basin depocentres, the Eringa and Madigan’s Troughs, and eastwards of Central’s acreage. However Simpson Desert Basin section is present in all of Central’s Pedirka Basin blocks.

Uplift and erosion occurred as a result of the widespread Triassic structuring event. This was followed by the cyclic sedimentation of the Eromanga Basin sequence, of fluvial and flood plain origin. The Poolowanna Formation, the basal unit is a good source rock, containing much coal and carbonaceous shale, which are known to be mature and to contain oil prone macerals. A marine transgression occurred in Cretaceous time when the Wallumbilla Formation was deposited. This unit is a regional top seal to the Eromanga Basin sequence. The basin complex has had, for most of its life, an intra-cratonic setting. In eastern and central Australia this has resulted in the deposition of considerable amounts of coal and or carbonaceous shale, good source rocks, along with many good fluviatile sandstone reservoir units.
7.3 Stratigraphy

Included as Figure 5 is a combined stratigraphic column for the basin complex. There are known source and sealing intervals in each basin sequence along with good quality conventional reservoirs units. As this report is concerned with the unconventional hydrocarbon potential of the basin complex, the conventional reservoirs will only be discussed in passing. They are fully discussed in other reports in the possession of Central and in the papers listed in the list of references.

For unconventional hydrocarbon exploration the intervals of major stratigraphic interest are:-

- **The Horn Valley Siltstone of the Amadeus Basin Sequence**
- **The Purni Formation of the Pedirka Basin Sequence**
- **The Peera Peera Formation of the Simpson Desert Basin Sequence**

The Horn Valley Siltstone, where drilled in the Amadeus Basin, is of Lower Ordovician age and was laid down in a marine environment and is composed of organic rich siltstones and black shales, underlain by a dolomitic and or glauconitic limestone sequence. It is commonly pyritic, highly fossiliferous with graptolites and other invertebrates and is commonly gas saturated.

The Early Permian aged Purni Formation is composed of interbedded grey shale and carbonaceous siltstone, fine to coarse grained sandstone along with coal and conglomerate. It was deposited in a flood plain, lacustrine and fluvial environment. The unit is known to be 350 metres thick in the Mokari 1 well, east of the company’s acreage.
Figure 5 Combined Stratigraphic Column
The Peera Peera Formation is of Triassic age and is composed of grey and black shales, coal and thin fluvial sandstones. It was laid down in a flood plain, lacustrine and fluvial environment.

The Eromanga Basin sequence, in its classic producing areas to the east of Central’s acreage, consists of cyclic, interbedded and juxtaposed shale and silty units overlain and underlain by excellent reservoir units of fluvial sandstones. The finer grained units, whilst they do contain some organic matter, are not as rich source rocks as those of the underlying Triassic and Permian intervals of coals and carbonaceous shales, except for the Poolowanna Formation. It is generally accepted that the bulk of the hydrocarbons reservoiried in the Eromanga Basin have been expelled from the underlying Cooper Basin, that is the Triassic and Permian units. However there is a chance of hydrocarbons being trapped in the Poolowanna Formation, either conventionally by intra-formational seals or even non-conventionally. At this stage there is insufficient information to attempt to quantify a possible magnitude of resources in this unit. However care should be taken whilst drilling through this unit to deeper targets, as it may be hydrocarbon bearing.

On the western flank of the Eromanga Basin, in the area of Central’s permits, the section becomes progressively more sandy and most of the sequence merges into the Algebuckina Sandstone, which is overlain by the Cadna Owie Formation, which in turn is overlain by the marine shales of the Wallumbilla Formation, hence the Eromanga Basin sequence still has a regional top seal in the area of the company’s acreage. As a consequence if any hydrocarbons are present, above the Poolowanna Formation, they should have been noted in oil exploration wells or water bores, beneath the Wallumbilla Formation sealing unit.

It should be noted that several shallow mineral holes, CUR 3 and CUR 5, drilled just east of the outcropping Musgrave Block, west of Central’s acreage, encountered organic shales at an early mature stage in a unit equivalent to the Jurassic aged Birkhead Formation of the Eromanga Basin sequence. It is thought that it is unlikely that this unit will be laterally widespread and a major source contributor to the Eromanga Basin sequence. Given the lack of well control and the many sandy intersections in the few wells in the area it is difficult to estimate the size of any possible resource either conventional or non-conventional in the upper Mesozoic section of Central’s acreage.

8.0 PETROLEUM GEOLOGY

To have a hydrocarbon accumulation the following conditions must be met:-

• **The presence of organically rich and un-oxidized source rocks, usually shales or coals**

• **The burial of these source rocks to depths whereby the organic material begins to expel hydrocarbons, oil first and then, with deeper burial, dry gas**

• **The presence of porous and permeable carrier and reservoir beds to allow the migration of generated hydrocarbons from the hydrocarbon generating kitchens near the basin depocentres to shallower sites of entrapment, which can be economically reached with the drill bit.**
The presence of sealing units overlying the carrier and reservoir beds which inhibit the upward migration of hydrocarbons, which results from the principle of floatation in which less dense materials float on those which are denser. Water is denser than oil, which in turn is denser than gas. These traps can be of either a structural or stratigraphic genesis.

• Natural gas, mainly methane, can also be trapped, by adsorption, against the faces of cleats within coals, forming unconventional accumulations

• In the case of dirty and tight source beds hydrocarbons can sometimes be trapped unconventionally in “basin centred accumulations” in these source intervals

All of these conditions are known to be present in Central’s permits.

Once trapped, conventional hydrocarbon accumulations can be destroyed by later earth movements, which can breach traps, igneous events, which can oxidize entrapped hydrocarbons and deeper burial, which can reduce porosity and subsequently hydrocarbon storage.

For non-conventional accumulations compressive events can close cleats reducing both permeability and the macro-porosity of the coals. Igneous intrusions can fuse the cleats, having the same effect.

8.1 Source Rocks

There are many intervals of known source rocks in the Amadeus, Pedirka, Simpson Desert and Eromanga Basin sequences. The source intervals range in age from Ordovician to Jurassic, and they, or lateral correlatives, are known to have generated hydrocarbons, both oil and gas.

Amadeus Basin Source Rocks

The oldest of these is the Horn Valley Siltstone, of the Ordovician aged Larapinta Group of the Amadeus Basin sequence. This unit is known to have sourced the oil and gas hosted in, and produced from, the Pacoota and Stairway Sandstone reservoirs in the Mereenie and Palm Valley Fields, respectively, to the west and northwest of Central’s Pedirka Basin acreage.

The unit, which is of 120 metres maximum thickness in the central part of the basin, near the previously mentioned fields, is believed to be of a similar thickness in most of Central’s acreage. The Horn Valley Siltstone is a very rich source rock of marine origin averaging up to 10% total organic matter and is known to be mature for oil and gas generation over a very wide area. Many wells drilled within the Amadeus Basin have, either discovered, recovered or encountered indications of hydrocarbons from this unit. However it should be noted that at Mc Dills 1 the unit was composed of barren red beds. Most wells in the Pedirka Basin were not drilled deep enough to intersect this unit.
If Gussow’s Theorem has been, or is, operational then the undrilled southeastern margin of the basin, located within Central’s Pedirka Basin acreage, may host undiscovered oil accumulations. This theorem, which appears to have been verified empirically by oil accumulations on the northern basin margin, states that early generated oil is trapped first then displaced by later generated dry gas. The mechanism of the theorem is that the gas, which is less dense than oil, will enter the trap and rise to a crestal position and in doing so will spill already reservoired oil from the base of the trap, up-dip and towards the basin margin.

Given the wide lateral extent and the thickness of this unit it could have generated a substantial oil, and later gas, charge.

Other units of the sequence have exhibited both oil and gas generative potential, namely gas potential from some of the Proterozoic intervals and oil potential from the Chandler Limestone and Tempe Formation of the Middle-Lower Cambrian Pertaoorta Group, as well as the Pertatataka and Areyonga Formations and the Gillen Member of the Proterozoic Bitter Springs Formation.

The Amadeus Basin sequence is likely to be oil prone rather than gas prone, given its marine genesis. This is confirmed empirically in the Amadeus Basin by production and the many oil shows and minor recoveries. Further deep drilling will be required to evaluate the prospectivity or otherwise of the older Palaeozoic sequence within Central’s permit areas.

Pedirka Basin Source Rocks

The overlying Pedirka Basin, like all other Carboniferous-Permian basins of eastern and central Australia, is coal rich, and, although source rock analysis from the 14 wells drilled to date shows a much higher exinite to vitrinite ratio than source rocks of the Cooper Basin, (ie more oil prone) it is considered likely to have generated more gas than oil. However some oil will have been generated as the organic matter in the source rocks, whether coals or carbonaceous shales, is rich in the Type 2 macerals, which are oil prone. Indications of oil have been encountered in exploration drilling in rocks of the Pedirka Basin sequence.

The prime source rock interval in the Pedirka Basin sequence is the Early Permian Purni Formation. This unit, which contains much coal, is of intra-cratonic genesis, and is naturally of a terrestrial origin, hence it is expected to be gas prone, but oil prone macerals have been identified within it. The Purni Formation, which is widespread across both depocentres of the Pedirka Basin, the Eringa and Madigan’s Troughs, is one of Central’s main targets for coal bed methane exploration. It is known to be up to 350 metres thick, from well intersections, which are located on large highs or on the flanks of the depocentres. The unit is likely to be deeper and thicker in the NT, as the Eringa Trough plunges northwards. Also it is expected to be much thicker in the basin depocentres, a later expected target area for Central’s proposed exploration drilling. However the cut-off depth for economic development of coal bed methane (approximately 1,250m) may preclude much of these thicker units from consideration, initially.

Simpson Desert Basin Source-Rocks

In the Simpson Desert Basin the prime source rock is the Triassic aged Peera Peera Formation. This unit is composed of grey and black carbonaceous shales, coal and thin fluvialite sandstones. It too is known to contain much mature source rock and some oil prone macerals, although it is more gas and condensate prone. The depocentre, the Poolowaanna Trough, is located east of Central’s acreage, however the unit is present in the company’s tenements. The Simpson Desert Basin sequence is believed to be approximately 1,000 metres thick in the basin depocentre to the east of Central’s permit areas.
8.2 Maturity

All of the quantitative data that is available on maturity from the area of the company's acreage indicates that the source rocks are mature for hydrocarbon generation, both oil and gas. This is supported by the empirical evidence of gas shows and oil fluorescence in inappropriately sited oil exploration wells. Recent geochemical analyses conducted for the Geological Surveys of SA and the NT have also confirmed that the Pedirka and Simpson Desert Basin and lower Eromanga basin sequences contain rich and mature hydrocarbon source rocks. The reader is referred to the listed references. Hence the area has generated oil and gas.

These studies indicate that the oil generative window commences at about 1250 metres in both the Pedirka and Simpson Desert Basin sequences. It should be noted that vitrinite reflectance suppression has been observed so that the actual window is probably shallower. The hot dry gas window will be more deeply buried. The Horn Valley Siltstone of the more deeply buried Amadeus Basin sequence is known to be now in the dry gas window. The source rocks of the Early Jurassic Poolowanna Formation (=Basal Jurassic of Queensland) are also early mature for oil generation in the Poolowanna Trough, and perhaps in Central’s acreage. However it should be noted that this interval, a basal Eromanga Basin unit, is not a blanket unit and is often absent from basement 'highs and accordingly may not be laterally extensive in Central’s acreage, particularly in the most western of Central’s Pedirka Basin blocks, the newly acquired acreage.

Hence the company’s Pedirka Basin acreage contains a multitude of known mature source rocks. Recognized reservoir units are known to juxtaposed with these potentially generating intervals. Large structural traps have been identified within the area. All of this bodes well for the existence of large conventional accumulations of hydrocarbons.

In the case of non-conventional accumulations at depths less than the oil window the chance of biogenic methane and/or thermogenic methane also exists, as at early maturity levels wet gas can be generated. It is known that shallowly buried members of the Jurassic aged Walloon Coal Measures of the Surat Basin sequence host coal bed methane. During earlier oil exploration programs several seismic shot hole drilling rigs were burnt out in Queensland as a result of shallow gas flows from this unit. Hence the coals do not have to be within the gas window to host methane.

The fact that the potential source rocks are rich in oil prone macerals is fortuitous as the gas, adsorbed to the coal, will contain higher homologues than methane and should produce more synthetic crude during synthesis than methane alone would.

8.3 Reservoirs

Many good quality conventional reservoirs are known to be present in the Pedirka, Simpson Desert and Eromanga Basin sequences. The chance of discovering conventional hydrocarbons in these units is considered to be high. The area of Central’s permits is virtually unexplored, no modern and focused exploration has been conducted in the area apart perhaps than that of the Sydney Oil Company in the mid 1980’s which was centred on the Madigan Trough area. Studies by officers of the South Australian and Northern Territory Department of Mines and Energy have identified potentially active petroleum systems in all three basin sequences, in conventional reservoirs. These petroleum systems are analogues of proven systems in adjacent basins, in laterally equivalent units. This is detailed in the
Central are also intent on unconventional exploration in the area of their permits, and as such are also focused on non-conventional reservoirs. These include

- **The Horn Valley Siltstone (Ordovician Amadeus Basin)**
- **The Purni Formation (Permian Pedirka Basin)**
- **The Peera Peera Formation (Triassic Simpson Basin)**

As discussed above the Horn Valley Siltstone is a very rich, proven source interval, which has sourced the commercial oil and gas production in the NT sector of the Amadeus Basin. In many wells high gas readings have been encountered whilst drilling through it, typically the readings “were off scale”. A good gas show was tested at Tent Hill 1, however due to poor conventional reservoir quality, the subsequent flow rate was not commercial.

Due to its silty composition and compaction along with the ubiquitous gas shows over a wide area it is considered to be a good candidate for fracture stimulation, as the rocks are competent and should be able to be fractured, to enhance flow rates. The gas saturated section seems to extend through the entire section, hence a large volume of gas could be entrapped in this unit. The chance of encountering oil cannot be discounted. It should also be noted that the eastern end of the basin is deeper and the dip into the basin from this direction is gentler and that the mechanism of Gussow’s Theorem may not have been as active in this area, as in the north, and may not have displaced all of the early reservoired oil.

An unusual feature of both “basin centred gas accumulations” and coal bed methane is that separate and distinct source and reservoir units are not necessarily required. In the former case, hydrocarbons, generally gas, are held in the source beds by either hydrostatic and or capillary pressure. This results from the tight and dirty nature of the interval. Whereas for coals, the generated methane is adsorbed to the faces of the cleats and is held there by hydrostatic pressure and to a lesser extent, by capillary pressure.

In the case of conventionally reservoired hydrocarbons, the hydrocarbons are expelled from the source beds to porous and permeable reservoir rocks and held there by overlying fine grained, impervious sealing units. However it should also be noted that under conventional trapping geometry, either structural or stratigraphic, that coals and tight, dirty units (ie unconventional reservoirs) can possess a gas cap in the traditional sense, in crestal or structurally high locations. Wells located in such locations generally flow at higher rates and often without water.

As a consequence of the above for unconventional exploration, the source, seal and reservoir units are one and the same. Hence the prime reservoirs in Central’s proposed exploration programs for unconventional hydrocarbons are:

- **The Horn Valley Siltstone**
- **The Purni Formation**
- **The Peera Peera Formation**
Conventional and good quality reservoirs have been identified in the sedimentary sequences of all the basins present in Central’s acreage. They are legitimate targets for exploration in their own right.

### 8.4 Sealing Units

As discussed above, non-conventional hydrocarbon accumulations are hosted in the source beds and are trapped by unusual mechanisms. In the case of “basin centred gas” by hydrostatic and or capillary pressure and for methane within coal beds, by adsorption to the faces of the cleats in the coals. The entrapped methane is held there by hydrostatic pressure and to a lesser extent by capillary pressure.

Hence for non-conventional hydrocarbon accumulations the source, reservoir and sealing units are one and the same, namely the source beds. As a consequence of this the prime sealing units are:-

- The Horn Valley Siltstone
- The Purni Formation
- The Peera Peera Formation

Conventional seals of a regional and intra-formational nature are also known to be present in all sedimentary sequences present in Central’s acreage.

### 8.5 Traps

Conventional hydrocarbon traps of both a structural and stratigraphic nature have been identified on seismic data from Central’s tenements and are expected to be present in EPA’s 105, 106 and 107. As discussed above, conventional traps are not necessarily a prerequisite for non-conventional accumulations. However empirical evidence shows that where wells have been drilled for unconventional hydrocarbons, invariably the better performing wells are sited on conventional traps superimposed on larger non-conventional accumulations. Hence all exploration should initially be aimed at large uplifted structural targets in all of Central’s blocks.

### 9.0 Coal Bed Methane Drainage

The reader is referred to the corresponding section of the previously mentioned earlier report.

### 10.0 Gas to Liquid (GTL) and Coal to Liquid (CTL) Conversion

The reader is referred to the corresponding section in the previously referred to report by Mulready Consulting Services Pty Ltd.

### 11.0. Coal to Gas Processing

The reader is referred to the corresponding section of the previously mentioned earlier report.
12.0 UNDERGROUND GASIFICATION

The reader is referred to the corresponding section of the report on Central's current Pedirka Basin blocks, previously mentioned.

13.0 FRACTURE STIMULATION

The reader is referred to the corresponding section of the report on Central's current Pedirka Basin blocks, previously mentioned.

14.0 UNTESTED PLAYS

No play has been definitively tested in any of Central's Pedirka Basin acreage. The few existing petroleum exploration wells are not definitive crestal tests or have not tested robust fault independent closure. Only one well, Bluebush 1, is located within the acreage purchased from Traditional and this well was designed to target the Amadeus Basin sequence. No exploration for coal bed methane has been conducted in the area. No fracture stimulation of tight reservoirs has been attempted in the acreage. In light of the above it is suggested that Central's exploration program be directed towards the testing of large uplifted structures, as this will evaluate both the conventional and non-conventional potential of the acreage simultaneously. Several types of traps should be tested between the basin depocentre and the basin margin. This applies to both the Pedirka and Simpson Desert Basin sequences for coal bed methane exploration. Generally traps in these units are coincidental.

The coals should be fully cored for the evaluation of their suitability for coal bed methane extraction. If the results are positive then blanket development drilling could commence.

15.0 POTENTIAL UNDISCOVERED RESOURCE

A large prospective, but as yet undiscovered, hydrocarbon resource appears to be present in all of Central's Pedirka Basin acreage. It is not possible to accurately quantify the possible resource due to the lack of specific definitive data on coal properties and the lack of drilling, particularly in EPA's 105, 106 and 107. To date all exploration within the area has been frontier oil exploration and was not focused on non-conventional hydrocarbon resources. The author considers that the chance of discovering conventionally reservoired hydrocarbons within Central’s Pedirka Basin acreage is also high.

Rudimentary well data from the 14 conventional oil exploration wells drilled in the Pedirka Basin to date, along with regional seismic data indicates that thick and widespread coal horizons are present in the Pedirka and Simpson Desert Basin sequences of Central's acreage. Hence the potential for coal bed methane extraction exists.

Drilling results in the NT indicate that the Horn Valley Siltstone of the Amadeus Basin sequence is gas saturated and widespread. Wireline logs and gas detector instrumentation confirm this high hydrocarbon saturation. Geochemical analyses indicate that the unit is an extremely rich
source rock with oil generative potential, as has been proven empirically by production. Sub-economic gas flows have also been obtained from it, again in the NT. This tight unit is a good candidate for fracture stimulation to enhance gas flow rates, should its depth of burial and facies aspect prove suitable.

15.1 Indicative undiscovered target size

Figure 6 Depth Map to the top of the Permian Purni Formation Coal Measures showing the area of coal above 1,250m in the Northern Territory sector of the Basin.

Amadeus Basin sequence

For the Horn Valley Siltstone, more traditional oil industry parameters would be used in a possible resource determination but there is not enough information, from drilling, to attempt to quantify the extent and thus the potential resources of hydrocarbons in this tight, low porosity and low permeability reservoir in Central’s Pedirka Basin leases. Hence no possible resource determinations will be conducted on the sequence.
**Pedirka Basin sequence**

After reviewing seismic two way time maps, (prepared by Brent Jensen-Schmidt, a consultant to the NT Department of Minerals and Energy as part of the NGMA mapping project), to the Top of the Purni Formation, converted to depth with a representative seismic velocity, it is estimated that the Purni Formation of the Pedirka Basin sequence, subcropping at depths above 1250 metres, extends over some 8,000 square kilometres in Central’s tenements, EPA’s 105, 106 and 107. This compares with approximately 20,875 square kilometres for the area of EP 93, EPA’S 130 & 131 and PELA 77A, as discussed in the main body of the report. A depth map for the NT sector of the basin is included as Figure 6. Similar mapping was used for the SA sector of the basin, this is discussed in the earlier report. This mapping was tied back to the few wells present in the area. Well logs were also perused to ascertain the coal thickness It appears that there is a net coal thickness of 40 metres, in 4.5-7.5 metre seams, in the unit. No gas saturation values have been determined for these coals, however values from the correlative Bowen Basin units in Queensland average about 11 cu. metre/tonne, This latter figure will be used in the possible resource determination for the Purni Formation.

However, other correlatives in the similar aged Galilee basin of Queensland have a gas saturations of about 3 to 6 cu.metre/tonne. Similar values, to the latter, have been determined from the less deeply buried Walloon Coal Measures of the Mesozoic aged Surat Basin sequence, which overlies the Permo-Triassic Bowen Basin. The gas saturation value depends on the nature of the coal; rank and burial depth, the deeper the coals the higher the gas saturation. The Pedirka Basin coals are more deeply buried and the average value stated above is likely to be appropriate.

**Simpson Desert Basin sequence**

After reviewing two way seismic maps to the Top of the Peera Peera Formation, from the above mentioned consultant, converted to depth with a representative seismic velocity, it is estimated that the Peera Peera Formation of the Simpson Desert Basin sequence, subcropping above 1,250 metres, extends over approximately 8,000 square kilometres in EPA’s 105, 106 and 107. This figure is probably conservative as Simpson Desert Basin deposition oversteps the underlying Pedirka Basin sedimentation. This map is included as Figure 7. A similar map was used for the SA sector of the basin, as discussed in the report on EP 93, EPA’s 130 and 131 and PELA 77, where the corresponding area of coal above the cutoff value is 21,875 square kilometres. Again the seismic was calibrated to wells and well logs. There appears to be a lesser thickness of coal but an increased thickness of carbonaceous shale in this sedimentary sequence, compared to the Permian unit. If fractured successfully, these shales will also contribute to the gas flow. It is estimated that the net coal thickness in the Peera Peera Formation is 20 metres. The Triassic coals in the Ipswich Basin have gas saturations ranging from 5.8 cu.metres / tonne to 11.1cu.metres / tonne. These values were measured from cores taken at depths of 300-430 metres and 432-492 metres, respectively, from a well drilled at the Swanbank Power Station in Queensland. An average value of 11.0 cu.metres / tonne has also been assumed for this unit.
Using standard conversion factors for long tons to metric tonnes, the amount of coal of unknown composition per metre depth per square kilometre to coal mass, and for cu. metres to cu. feet, and using the above gas saturation values the calculation for the likely amount of gas contained in these coals has been completed. The values, which are indicative, are detailed below.

The economic cutoff value for coal bed methane extraction of 1,250 metres is also indicative, however coal bed methane drainage from coals at approximately 1,000 metres were considered to be economic by the large US company Enron in the Galilee Basin, in lower gas saturated coals. The cutoff depth will be dependent on gas saturation and the performance of crestal wells, however an estimate of 1,250 metres appears reasonable. Most of the coals expected to be present in EPA’s 105, 106 and 107 are located on the Andando Shelf and are less deeply buried and are expected to be above this cutoff value.

It is thought that for a plant near to the producing fields that the plant gate price will be in the order of A$ 2.00 per mCFG however this price will be highly volume dependent.
Prospective in place resources EPA 105, 106 and 107

Using the above mentioned areas, net effective columns of coal, gas saturation values and the appropriate conversion factors the likely in place resources possibly hosted in the Pedirka and Simpson Desert Basins are estimated to be:-

- **Pedirka Basin sequence** = 17.1 TCF (coal bed methane)
- **Simpson Desert Basin sequence** = 8.3 TCF (coal bed methane)
- **Total** = 25.4 TCF

This figure is considerable and compares favourably with values accepted by Halliburton, a specialist service company, for some other significant methane producing basins. That company estimates that the in place methane resource in the San Juan Basin of New Mexico, the most gas saturated basin in the USA, is between 68 and 84 TCF. They believe that the Appalachian Basin of the eastern USA holds an in place resource of 66 TCF and that the Northern Bowen Basin of eastern Australia has an in place methane resource of 136 TCF. The corresponding value for Central’s other Pedirka Basin tenements, EP 93, EPA’s 130 & 131 and PELA 77 as estimated by Mulready Consulting Services is 50.6 TCF.

It is expected that half of this indicative possible resource may be recoverable. Although the amount of the potential resource ultimately recovered will depend on gas saturation, flow rates, the number of and the spacing of drainage wells, the success of probable fracture stimulation operations and other factors. Not enough data is available on reservoir and gas saturation values to make comprehensive probabilistic estimates of “low”, “best” and “high” cases. Such estimates have been made on a deterministic basis using a range of expected recoveries.

**Prospective recoverable resources EPA 105, 106 and 107**

**High Estimate (75% recovery)**

- **Pedirka Basin sequence** = 12.8 TCF
- **Simpson Desert Basin sequence** = 6.2 TCF

**TOTAL** = 19.0 TCF

**Best Estimate (50% recovery)**

- **Pedirka Basin sequence** = 8.6 TCF
- **Simpson Basin sequence** = 4.2 TCF

**TOTAL** = 12.8 TCF
Low Estimate (35% recovery)

Pedirka Basin sequence=6.0 TCF

Simpson Desert Basin sequence=2.9 TCF

TOTAL = 8.9 TCF

16.0 RISKS

All petroleum exploration, whether conventional or non-conventional, contains inherent risk. The main risks in Central’s proposed non-conventional program are

- The gas saturation of the coals, which are unknown
- The location of water sands within or near the coals
- The lateral extent of the coals
- The thickness of the coal beds
- That economic flow rates are achieved from development wells
- The success of possible hydraulic fracturing operations

In spite of the above risks there is enough encouragement, in the author’s view, to pursue this high potential reward project.

17.0 RECOMMENDATIONS

The prime recommendation of this report is that Central persists with its objective to explore for, develop and produce hydrocarbons of a non-conventional origin from their Pedirka Basin acreage. Their innovative ideas of gas, or coal, synthesis to synthetic crude oil are capable of unlocking a large scale, but un-utilized resource in the basin complex contained within their tenements. Liquid hydrocarbons command a premium over gas and are more readily economically transportable and more readily saleable. Ready local and, probably, export markets exist for liquids in this time of oil shortage and high prices.

The company’s objectives are sound in that they are targeting Permian and Triassic coal rich intervals, correlatives of which are known to have sourced both conventional and non-conventional hydrocarbon production in adjacent basins in eastern and central Australia. It is the author’s experience that wells aimed at non-conventional targets perform better when sited on conventional trapping geometry, the laws of Physics and Chemistry still hold in unconventional accumulations. As a consequence it is further recommended that exploration wells be sited on crestal locations on large tensional structures. This will maximize drainage and reduce the associated dewatering costs, an expensive ancillary requirement for both coal bed methane and basin centred gas production. Down flank production wells, probably less productive, could then be drilled later to develop the field.

An additional recommendation is that wells aimed primarily at the the Pedirka and Simpson Desert Basin sequences be drilled into the underlying Horn Valley Siltstone of the Amadeus Basin sequence; despite its tight and dirty nature, as it appears, by analogy with the same formation drilled in the Amadeus Basin to the west, to be gas saturated over a wide vertical and lateral extent. This very rich source rock appears to be an ideal candidate for fracture
stimulation and it is known to be oil prone. This unit should be investigated by coring and conducting fracture stimulation trials.

The Horn Valley Siltstone, under the western portion of the Pedirka Basin and in the Amadeus Basin proper, much of which is also held by Central, also appears to have potential for conventional gas and or liquids production.

Given the perceived lack of organic material in the Eromanga Basin sequence in Central’s acreage it is recommended that **Mesozoic targets only** not be drilled at this stage. The Eromanga Basin sequence is also very sandy in the area of Central’s permits and as a consequence sealing of conventional reservoirs is believed to be problematic in EPA’s 105, 106 and 107.

The Company should be very watchful whilst drilling through the Poolowanna Formation as this unit is the most prospective in the Mesozoic section.

In the initial stages of exploration the search for conventional and non-conventional hydrocarbons should be combined to quickly prove up a resource, which could confirm economic viability.

A final recommendation is that the all early exploration holes be fully cored through the coal units to accurately gauge their thickness and that the subsequent cores be fully analyzed with a particular emphasis on gas saturation, cleating and other fundamental properties.

### 18.0 CONCLUSIONS

- The major conclusion of this report is that EPA’s 105, 106 and 107 along with Central Petroleum Pty Ltd’s current Pedirka Basin acreage are prospective for hydrocarbons, either reservoired conventionally or non-conventionally.

- The coals of the Pedirka and Simpsons Desert Basin sequences are rich mature source rocks and correlatives of them have sourced many oil and gas accumulations in adjacent basins. The carbonaceous shales of these units are also known to be good, mature source rocks. Similarly the very rich source rocks of the Horn Valley Siltstone of the underlying Amadeus Basin sequence are known to be the source interval for the Mereenie and Palm Valley Oil and Gas Fields, respectively of the Northern Territory, but the nature of the sequence in Central’s permits is largely unknown. If suitable facies are encountered during drilling then this gas saturated, but tight, unit could be a candidate for fracture stimulation. It is thought that the Amadeus Basin sequence exhibits much conventional potential in EPA’s 105, 106 and 107.

- If the Company’s exploration programs are successful the sheer size of target resource should enable the construction of a large scale GTL plant and or a CTL plant. Recent feasibility studies suggest that these processes are economic at the current oil price. However the economic viability of these processes is volume dependent.

- Ready markets exist for the sale of liquids and to a lesser extent gas, and other chemical by products.

- Central has a very innovative and elegant proposal to utilize a known, but undeveloped,
possible resource of large magnitude in a remote location.

- The company has an overwhelming acreage position in the Pedirka Basin area, enhanced by the recent acquisition of EPA's 105, 106 and 107, and will dominate production from it if their exploration programs are fruitful.

- The Pedirka and the associated basins in the company’s acreage are virtually unexplored and potential exists for large discoveries of hydrocarbons either of a conventional or non-conventional nature.

**DECLARATIONS**

**Sources of Information**

Data on Central’s Pedirka Basin acreage was supplied by Mr. J Heugh, the Managing Director of Central, Mr Greg Ambrose, the Exploration Manager and Mr T Rudge, an employee of the company. It was supplemented by discussions with officers of the SA and NT Department of Minerals and Energy and by public domain data as listed in the Bibliography (see below).

**Previous Independent Geological Reports**

A prior report on Central Petroleum Limited's central Australian acreage, with emphasis on the Amadeus Basin Basin was prepared by Mulready Consulting Services for inclusion in Central Petroleum Limited's Prospectus. That report is dated 12 September 2005. This report has been prepared as an addendum to an another earlier report dated March 2007, prepared by Mulready Consulting Services Pty Ltd on other tenements controlled by Central in the Pedirka Basin, namely “The Unconventional Petroleum Potential of EP 93, EPA’s 130&131 and PELA 77 Pedirka Basin Onshore Northern Territory and South Australia Australia”.

**Title**

Verificiation of title was not within the brief of Mulready Consulting Services Pty Ltd in relation to this Report.

**Inspection**

As is usual for exploration permits we have not undertaken an inspection of the properties dealt with in this Report.

**Comment**

It is our view that the proposed programme, to explore for and develop un-conventional hydrocarbon resources in Central's central Australian acreage, as outlined in this report, is soundly based on the results of previous exploration, studies by the company and the appropriate state Departments of Minerals and Energy and by recent developments in the synthesis of gas and coal to liquid hydrocarbons. We think the proposed project is sound, appropriate and reasonable.

**Limitations and risk**

In preparing this Report we have relied on the sources indicated above. A draft of this Report
was supplied to Central for comment regarding any errors of fact.

**Exploration for and development of hydrocarbons is inherently speculative.** There is as yet no direct method for determining the presence of hydrocarbons prior to drilling of an exploration well. There is always the risk that any potential trap may not contain hydrocarbons by virtue of inappropriately located or timed hydrocarbon generation or migration, or due to ineffective seal or later disruption of the trap. In the case of un-conventional accumulation there are additional constraints such as the levels of gas saturation of the coals, depths to the coals and the quality and quantity of the water which may need to be disposed of, amongst others. A potential trap may also contain non-commercial volumes due to adverse reservoir conditions or inadequate charge of hydrocarbons. In this Report discussion of potential traps, including structures, features and culminations, and of related potential hydrocarbon volumes, should not be taken to imply that a commercial accumulation is known to exist.

**Independence**

Mulready Consulting Services Pty Ltd is not operating under an Australian financial services license in providing this Report.

$10,000 (GST inclusive) plus any out of pocket expenses is all the remuneration (including commission) or other benefits that any “nominated person” is to receive that might reasonably be expected to be or have been capable of influencing Mulready Consulting Services Pty Ltd in providing this Report.

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(ii) a related body corporate of Mulready Consulting Services Pty Ltd;
(iii) a director or employee of Mulready Consulting Services Pty Ltd or a related body corporate of Mulready Consulting Services Pty Ltd;
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- no other interests whether pecuniary or not and whether direct or indirect, of Mulready Consulting Services Pty Ltd or any associate of Mulready Consulting Services Pty Ltd.
- no other associations or relationships between Mulready Consulting Services Pty Ltd or any associate of Mulready Consulting Services Pty Ltd and Central Petroleum Limited that might reasonably be expected to be or have been capable of influencing Mulready Consulting Services Pty Ltd in providing this Report.

Neither Mulready Consulting Services Pty Ltd nor any of its directors, employees or Associates has any beneficial interest in Central Petroleum Pty Ltd, nor in any of the permits which are the subject of this Report, nor in any adjacent permits.

**Conformity**

This report has been prepared to conform to the requirements of the Australian Securities and Investments Commission Policy 75 (Independent expert reports to shareholders) and Practice Note 42 (Independence of Expert’s Reports) and 43 (Valuation Reports and Profit Forecasts) as applicable.
Date of report

This report is dated June 21st 2007.

Consent

Mulready Consulting Services Pty Ltd consent to the issue of this Independent Geologist’s Report in the form and context in which it is included.

Qualifications

Jack N. Mulready graduated from the University of Melbourne with a B.Sc. (Geology) 1963, Dip. Ed.(1966) and B.A. (1999) and from R.M.I.T. with a Fellowship Diploma in Management in 1978. He has over 38 years of experience within the petroleum exploration and production industry in Australia, New Zealand, USA, Indonesia, China and PNG. He is a member of the Petroleum Exploration Society of Australia, the Geological Society of Australia and the American Association of Petroleum Geologists (Certified APPG Geologist No. 5321), and is subject to the code of ethics of these bodies. He has prepared numerous independent geologist’s reports and valuations for a variety of Australian companies in accordance with the requirements of the Australian Stock Exchange.

Jack Mulready
B.Sc., B.A., Dip. Ed., F.Dip. RMIT, MGSA, MPESA,
Certified APPG Geologist #5321.

Roger Meaney, Associate Consultant Petroleum Geologist, graduated from LaTrobe University with a B.Sc. (Honours) in Physics and a Diploma of Education in 1973. He later completed the requirements for a B.Sc. in Geology from the same institution, part time. He has more than 28 years experience in oil and gas exploration. He was employed as a Petroleum Geophysicist by Esso Australia Limited, AAR Limited and Santos Limited and worked in all facets of hydrocarbon exploration. He has extensive technical experience in both the onshore and offshore sectors of the industry in Australia and some in the United States of America, Canada and Papua New Guinea and in management. Roger also has experience in the coal bed methane drainage industry.

He is a member of the Society of Exploration Geophysicists and of the Petroleum Exploration Society of Australia, and is subject to the code of ethics of these bodies. Roger has completed several independent geologist’s reports for Australian companies in accordance with the requirements of the Australian Stock Exchange.

R.A. Meaney
B.Sc. (Hon), Dip. Ed., MSEG, MPESA
19.0 SELECTED REFERENCES

The reports and publications, listed below, along with internal reports, supplied by Central were used in the compilation of this report, as was knowledge in the possession of the author.


- Pre-Feasibility Study for a 10,000 bbl/day FT GTL plant in central Australia with notes on a 50,000 bbl/day option


- Coalbed Methane Technology, Halliburton Company, Duncan, Oklahoma

- The Cooper and Eromanga Basins Australia, Edited by B.J.O’Neill, 1989

- Handbook of South Australian Geology, Geological Survey of South Australia, 1969

- Field Geologist’s Manual, Monograph 9, Australian Institute of Mining and Metallurgy, 1987

- Pre-feasibility Study for a 10,000bbl/day FT GTL Plant in Central Australia with
Notes on a 50,000bbl/ady Option, Technical Note. Holt Campbell Payton Pty Ltd. Report to Central Petroleum Limited

- Gas-to Liquids and Coal-to Liquids An Obvious Solution. Dennis. L. Yakobsen Rentech Inc.


- Jogmec’s GTL Research and Development for Utilization in the Future. Yoshifumi Suehiro, Japan Oil and Gas National Corporation

GLOSSARY OF TECHNICAL TERMS

Anticline: a tectonic structure in which strata are folded so as to form an arch or dome.
Anticlinal trap: a hydrocarbon trap formed by the upward bowing of strata into a dome or arch.
Appraisal well: a well drilled to determine the extent of hydrocarbons discovered in previous well on the same structure.
Barrel (bbl): the unit of volume measurement used for petroleum and its products.
1 barrel = 42 U.S. Gallons
= 35 Imperial Gallons (approx.) or 159 litres (approx.)

BCF: billion cubic feet \( (10^9 \text{ cubic feet}) = 28.317 \text{ million cubic metres.} \)
bopd: barrels of oil per day.
Basin: a depression of large size in which sediments have accumulated.
Cambrian: a geological time period approximately 545 to 490 million years ago.
Carbonates: sedimentary rocks composed of calcium and/or magnesium carbonate e.g. limestone.
Carboniferous: a geological time period approximately 354 to 298 million years ago
Claystone: a sedimentary rock composed predominantly of particles less than silt size usually comprising clay minerals.
Closure: the area within the lowest closing contour of a structure, also, a closed structure. See four-way dip closure.
Condensate: hydrocarbons (predominantly pentane and heavier compounds) which spontaneously separate out from natural gas at the wellhead and condense to liquid.
Culmination: the highest point on a four-way dip closed structure, also used to indicate that a four-way dip closure exists.
Cretaceous: a geological time period approximately 141 to 65 million years ago
Depocentre: an area or site of maximum deposition in a sedimentary basin.
Depression: a low place of any size on the Earth’s surface, also may refer to a sedimentary trough or basin
Deposition: the laying down of potential rock forming material i.e. sediments.
Devonian: a geological time period approximately 410 to 354 million years ago
Dip: the angle of the plan of a bed relative to the horizontal.
Dry hole: a well drilled without finding gas or oil in commercial quantities.
Exploration well: a well drilled to determine whether hydrocarbons are present in a particular area or structure.
Facies/lithofacies: the rock record of any sedimentary environment, including both physical and organic characters.
Fault: a fracture in the Earth’s crust along which the rocks on one side are displaced relative to those on the other.
Fault trap: A hydrocarbon trap which relies on the termination of a reservoir against a seal due to fault displacement.
Field: a geographical area under which an oil or gas reservoir lies.
Fold/Folding: a bend in strata, commonly a product of deformation.
Formation: a unit in stratigraphy defining a succession of rocks of the same type.
Four-way dip: a structural feature seen on orthogonal seismic lines to dip away in all four possible directions, closure indicating that any hydrocarbons beneath a sealing stratum will be trapped in this feature.
Gas in Place (GIP): an estimated measure of the total amount of gas contained in a reservoir and, as such, a higher figure than Recoverable Gas.
Geology: the science relating to the history and development of the Earth’s crust.
Geophysics: the physics of the Earth; a hybrid discipline involving a combination of
Hydrocarbons: naturally occurring organic compounds containing only the elements hydrogen and carbon that may exist as solids, liquids or gases.

Horizon: a term used in seismic interpretation to identify the signal reflected from a particular layer of rock.

Intraformational: existing within a geological formation, for example a single shale bed in an alternating sequence of sands and shales may be an intraformational seal.

Jurassic: a geological time period approximately 205 to 141 million years ago.

Lacustrine: sediments deposited in a lake environment.

Lead: inferred geologic feature or structural pattern requiring investigation.

Licence: an authority to explore for or produce oil or gas in a particular area issued to a company by the governing state.

Limestone: a rock composed of calcium carbonate.

Lithology: the physical and mineralogical characteristics of a rock.

Log(s): see well log.

Log interpretation: technical analysis of the results of well logging leading to quantitative estimates of various rock properties including contained liquids and gases.

Marine: deposited in the sea.

Mature (source): the condition, caused by pressure, temperature and time, in which organic matter in a potential source rock will be converted to hydrocarbons.

Migration: the movement of hydrocarbons from regions of higher to lower pressure.

MMSTB: millions of standard barrels.

MMCFD: millions of cubic feet per day = 28,317 cubic metres per day.

Net Pay: the subsurface geological layer where a deposit of oil or gas is found in potentially commercial quantities.

NPV ‘Net present value’. A monetary value for future cash flows which is discounted to allow for the time value of money.

Oil: a mixture of liquid hydrocarbons of different molecular weights.

Oil Field: a geographical area under which an oil reservoir lies.

Oil in Place (OIP): an estimated measure of the total amount of oil contained in a reservoir and, as such, a higher figure than Recoverable Oil.

Ordovician: a geological time period approximately 490 to 434 million years ago.

Permeability: a measure of the capacity of rock or stratum to allow water or other fluids such as oil to pass through it.

Permian: a geological time period approximately 298 to 251 million years ago.

Petroleum: a generic name for hydrocarbons, including crude oil, natural gas liquids, natural gas and their products.

Petroleum system: the set geological conditions which give rise to petroleum accumulations.

Petrophysical: the physical properties of rocks, in this context, as measured by well logs.

Pipeline: a pipe through which oil, its products, or gas is pumped between two points, either offshore or onshore.

Porosity: the ratio of the volume of pore space in rock to its total volume, expressed as a percentage.

Prospect: a feature sufficiently defined to warrant the drilling of a well without the necessity of further investigation.

P/Z Pressure vs compressibility, an Engineering analysis used to calculate reserves of gas.

Quartz: a mineral composed of silicon dioxide.
Quaternary: the most recent geological era, commencing approximately 1.8 million years ago.

Recoverable Gas: an estimated measure of the total amount of gas which could be brought to the surface from a given reservoir; this is usually of order 60% - 70% of the estimated Gas in Place.

Recoverable Oil: an estimated measure of the total amount of oil which could be brought to the surface from a given reservoir; this is usually less than 50% of the estimated Oil in Place and commonly in the 20% to 40% range.

Reservoir: pervious and porous rocks (usually sandstone, limestone or dolomite) capable of containing significant quantities of hydrocarbons.

Risk: an expression of uncertainty (high risk) or uncertainty (no risk) often relating to the presence of principal geological factors controlling oil accumulations.

Rugosity: the irregularity or roughness of a borehole, often caused by unstable formation or by poor drilling practice.

Sandstone: a sedimentary rock composed predominantly of sand sized grains, usually quartz.

Seal: an impermeable rock (usually claystone or shale) that prevents the passage of hydrocarbons.

Seismic survey: a technique for determining the detailed structure of the rocks underlying a particular area by passing acoustic shock waves into the strata and detecting and measuring the reflected signals.

Sediment: solid material, whether mineral or organic, which has been moved from its position of origin and redeposited.

Sedimentary rock: a rock formed as a result of the consolidation of sediments.

Shale: a claystone exhibiting a finely laminated structure.

Show: an indication of oil or gas from an exploratory well.

Silt/siltstone: rock intermediate in texture and grain size between sandstone and claystone.

Source rocks: rocks (usually claystone or coal) that have generated or are in the process of generating significant quantities of hydrocarbons.

Stratigraphy: the study of stratified rocks, especially their age, correlation and character.

Structural Trap: a trap formed as a result of folding, faulting or a combination of both.

Structure: deformed sedimentary rocks, where the resultant bed configuration is such as to form a trap for migrating hydrocarbons.

Tectonic: descriptive of all movements of the Earth’s crust caused by directed pressures, and the results of those movements.

Tertiary era: an era of geological time approximately 65 to 1.8 million years ago.

TOC Total organic carbon (content – as a %age)

Trap: a body of reservoir rock, vertically or laterally sealed, the attitude of which allows it to retain the hydrocarbons that have migrated into it.

Trend: a strike direction of a geological feature.

Triassic: a geological time period approximately 251 to 205 million years ago.

Unconformity (angular) lack of parallelism between rock strata in sequential contact, caused by a time break in sedimentation.

Updip: the direction leading most directly to higher elevations on an inclined stratum or structure.

Uplift: elevation of any extensive part of the Earth’s surface relative to some other part.

Well-log (log): a recording of rock properties obtained by lowering various instruments down a drilled well by means of a wireline.