

ENVOI

(Energy Venture Opportunities International)

Project Synopsis P108b

# NW Paraguay (Chaco Basin)

*Exploration & Potential Appraisal of entire prospective hydrocarbon play area of NW Paraguay, as confirmed by independent reports*

Boqueron, PG&E and Gabino Mendoza  
Blocks

CDS Oil & Gas Group Plc

October 2006

**Opportunity to earn into the substantial hydrocarbon potential of the historically under-explored area of the Chaco Basin in N.W. Paraguay, including est. 2+ TCF Devonian gas accessible with modern technologies + large new Carboniferous oil play.**

**CDS Oil & Gas Group Plc**

**EXECUTIVE SUMMARY**

**Introduction:** CDS Oil & Gas Group Plc is a London based AiM listed company which owns CDS Energy SA, a Paraguayan company formed in 2002 to pursue the exploration and development potential of three blocks covering a very large area (7.22 million acres or 29,210 Km<sup>2</sup>) of north western Paraguay in South America. CDS has a 100% working interest in all three blocks which include the 400 km<sup>2</sup> Gabino Mendoza Block, the 4,910 km<sup>2</sup> PG&E block and the 23,000 km<sup>2</sup> Boqueron Block. These blocks contain large oil and gas exploration potential within the Devonian gas and newly defined Carboniferous oil plays, in acreage associated with the eastern part of the Chaco Basin (ref: attached montage). The area is an eastern and up-dip extension of the asymmetric foreland basin developed to the west in Bolivia, in front of the Andes Cordillera. Large thrust traps, productive in Bolivia, have already produced an estimated 4.1 BBOE since the 1920s with estimated gas reserves of 54.9tcf (ref: YPFB 2003 P1+P2). CDS would like to find a partner(s) to join them in progressing the exploration of their acreage for a negotiated interest in this under-explored and largely misunderstood part of the Chaco Basin.

**Play Overview:** CDS's evaluation has confirmed that 96% of the total 26 old wells drilled in NW Paraguay, an area of around 30,000+ km, encountered shows with 18 wells (69%) finding multiple hydrocarbon shows in one or both of the main Carboniferous and Devonian reservoir objectives. The stratigraphic interpretation of these plays suggests that the Devonian play is derived from the north and is most prospective in the northern part of CDS's acreage. Here, potentially large gas reserves are present in relatively tight distal marine reservoir sands that are excellent candidates for modern (more 'unconventional') completion technologies. These are now being employed very successfully to open up old areas of exploration elsewhere in the world, and particularly in the USA. By comparison, the overlying Carboniferous play is derived from the south and is most prospective in the southern CDS Blocks. Here, the play developed with more conventional clastic proximal deep sea fan reservoirs near to their sediment source at the paleo-shelf break now recognised in the south of CDS's acreage. The Paraguayan reservoir sands in CDS's acreage have slightly better porosity and permeability than where

they are productive in the thrust traps of the forefront of the Andes of Bolivia, where the equivalent sands were deposited in a more distal facies. Significantly, CDS's work indicates that few, if any, of the small number of existing wells were accurate tests of valid closure, due to the sparse and largely inadequate old seismic coverage available.

**Prospectivity:** The modern interpretation indicates that, of the 26 existing old wells drilled in and around CDS's acreage (~ 30,000km) over a 48 year period, prospective zones in 12 wells (i.e. 46%), if drilled today, would probably have been flow tested and may have produced commercial hydrocarbons, aided by modern drilling and completion techniques (including UBD, horizontal wells and reservoir stimulation). Some 12 Devonian and Carboniferous leads are identified, 11 of which are associated with shows in adjacent or nearby existing wells.

Independent reports commissioned by CDS include the most recent, in August 2006, by independent consultants CAS International, a part of Collarini Associates in Houston (USA). Their report confirms the potential for commercial accumulations of gas and oil in the Independencia and Emilia leads.

**Size & Value:** Collarini's analysis gives Emilia's Carboniferous a potential 'mean' oil producible resource of 6.4 million bbls, which scoping economics indicate could generate a combined fully-risked NPV @ 15% of US\$76 million, based on an oil price of US\$ 50/bbl. To the north, the Independencia area (from which CDS tested gas in 2004) is estimated capable of recovering a 'mean' Devonian gas resource of 76 Bcf with a potential NPV @ 15% of US\$ 62 million at US\$5/mcf. Total potential of these two accumulations alone could be an estimated 4.5 Tcf and 60+ MMbo recoverable, based on computer-aided evaluation of the existing data, including data from the recent CDS GM-05-5001 well. Economics show that such reserves would easily justify commerciality and, in the case of gas, export pipeline infrastructures southward to Argentina, and/or east into Brazil, are feasible.

**Obligations & Work Programme:** All firm work commitments and outstanding obligations have been fulfilled by CDS to date on all three of its Licenses, based on a commitment to ongoing exploration and development of their respective potential resource. Work planned for 2006/2008 includes the reprocessing of existing seismic data, acquisition of new aeromag data, plus regional and specific prospect seismic, leading to exploration and appraisal drilling.

**Terms:** CDS is seeking a partner(s) with the resources and experience to join and accelerate the evaluation and exploitation of their extensive acreage and earn an interest and operatorship, if appropriate, in one or more of their blocks. Interest earned is negotiable, dependent upon commitment and contribution to the forward work programme.

**Historically under explored with only 27 wells in 30,000 km<sup>2</sup>, even though 70% contained multiple hydrocarbon shows!**

**Exploration History:** By comparison with proven producing areas in Bolivia and Argentina, the Paraguayan Chaco Basin area has only been intermittently explored since 1947. Only 27 exploration wells have ever been drilled to date in petroleum concessions now under CDS control (an average of one well per 1,000 km<sup>2</sup>). Of these wells, however, 26 (i.e. 96%) contained hydrocarbons and defined primary oil and gas play potential in four primary play types within the Devonian and Carboniferous targets. In addition, large untested gas potential exists in the Silurian.

Only one well, Independencia 1, (a 1993 re-entry of the earlier Mendoza 1R, drilled in 1959) has ever been production tested. The Independencia 2, drilled in 1996, was the first new well drilled since 1977. Since then the recent CDS well (GM-05-5001), drilled in late 2005, is the only other well drilled in the CDS Concession Blocks during the past 29 years.

The original Mendoza 1R well was open-hole DST'd flowing 3.0 MMCFGPD from the deeper Devonian objective at around 2,600 m. The Independencia No 1 well, a 1993 re-entry of this well by Primo Cano Martinez SA, is the only well understood to have been production tested in Paraguay. Gas flowed at 1MMCFGPD from the shallower Carboniferous sandstones at around 588 metres (1,928 ft). Small volumes of natural gas have been produced since then for local camp needs.

CDS re-entered the Independencia No.1 well in March 2004 and properly production tested it. The well flowed up to 960 MCFD dry (94% methane) sulphur-free gas through a 22/64" choke from only 4 metres of this 6 meter pay zone identified in the well.

CDS drilled a new well (CDS-GM-05-5001) some 200 metres southeast from the Independencia-1 well, principally to test two of the deeper Devonian sandstone targets, including a potential oil zone below 723 metres and a gas zone below 1,500 metres (DST'd by the Mendoza 1R well). The shallower Devonian oil target was achieved, where the well was suspended for later deepening to test the deeper gas target pending evaluation of the data. This oil zone was too tight to produce the oil without stimulation, but

core analysis confirmed its suitability for gas production in the deeper Devonian target that was not reached by the well. The well also successfully fulfilled the CDS license obligations and ensured that the valuable Gabino Mendoza Block remained part of CDS's acreage portfolio. Little is known about the true extent of the resources associated with the shallow Carboniferous and potential of the deeper Devonian accumulation, due to the limited amount of poor quality seismic, limited modern well information and, critically, lack of any core data.

The founders of CDS have worked the area since 2001 including a review of the 1,176 kms 1967 and 1971 reprocessed 2D seismic data that exists over this extensive area. Combined with their review of digitized and reprocessed well logs from the historical exploration drilling, CDS confirmed that all key aspects of the geology required for commercial potential are present (including adequate source, reservoirs, seals, trapping mechanisms, migration and timing). Their conclusion was that the hydrocarbon potential is substantial, but historical exploration has been inadequate to accurately confirm (or disprove) this, due to limited 2D seismic data, old conventional drilling methods used, no core data and limited or no testing.

Significantly, CDS's evaluations also confirm that **all** 26 historical wells were drilled overbalanced with high mud weights to eliminate possible blowouts and/or inflow of fresh water from aquifers higher up the wells. These penetrating muds damaged the reservoirs to the point that they would questionably have produced economically, even if they had been tested. One example is the Emilia well, which was drilled about 1.5 ppg (pounds per gallon) overbalanced in the Carboniferous. Oil shows were masked as mobile oil was pushed into the formation. In addition, an RFT (repeat formation tester) tool became temporarily stuck in the hole, resulting in further tests being abandoned. This traditional drilling approach, along with long periods of low commodity pricing, 30-year old technology, inadequate oil & gas infrastructure, and the politics of that time, have resulted in this area being largely disregarded and misinterpreted until now.

CDS has a new interpretation of the highly prospective Carboniferous deep sea fan (distal and proximal facies) play which is proven on-strike to the south west in the giant San Alberto/San Antonio field complex in Bolivia. This area, brought into production by PetroBras in 2001, produced at a rate of 600 mmcfd in 2005, and has reserves estimated at 11.8 Tcf (P1+P2).

## Prospective Carboniferous & Devonian play potential related to newly defined and locally developed stratigraphic evolution

### ***Regional Evolution & Play Overview:***

Tectonic and stratigraphic evolution of NW Paraguay can be simplified as three main phases of development. In Summary:

The Palaeozoic's development of the Gondwanaland super-continent radically altered deposition along a previous passive margin in the region. The subsequent Mesozoic was dominated by a failed rift in northern Argentina and associated igneous activity which left a structural fingerprint across NW Paraguay. Finally the Tertiary and associated Andean Orogeny led to extensional faulting and uplift in NW Paraguay, in response to crustal loading from the west in the Bolivian foothills.

In more detail:

***Phase I - Palaeozoic:*** The Silurian strata which are encountered in the Chaco Basin of NW Paraguay and eastern Bolivia are indicative of passive margin deposition, starting with the Lower Silurian deeper water organic rich source rocks of the La Paz Formation (Kirusillas Formation in Bolivia). These are a primary source rock and are mature present day to the west in the Andean foreland. Geochemical data from the Parapity 1 well and Pennzoil's Don Quijote well in Paraguay reveal that these rocks are also in the gas generating window in Paraguay. Deep water turbidites and fractured novaculite (chert) beds of the Lower Santa Rosa Formation (Sara sandstones of the Carmen Formation in Bolivia), above the La Paz source rocks, are reservoirs in the Upper Silurian. They are productive in the Boomerang Hills area of Bolivia in the H. S. Roca, Vibora, Ypacani and other fields NW of Santa Cruz. The difficulty of drilling through chert of the Santa Rosa Formation has relegated Silurian potential to a low position among NW Paraguay opportunities. Furthermore, above a seismic sequence boundary, the Upper Santa Rosa Formation (Lower Devonian) is a series of tight novaculite (chert) beds having negligible porosity.

These grade up into a regionally extensive distal deep sea fan facies of the Devonian Icla Formation, which is a source rock, in addition to its potential as an

unconventional 'fractured' reservoir. The Icla consists of roughly 15% laminated, very fine grained sandstone, 25% siltstone, and 60% dark grey shale, having about 1.5% original TOC. NW Paraguay in Devonian times is interpreted to have been located in the distal deep water part of a large marine basin, with its western and northern margins defined by the Bolivian Central High and Guapore Craton respectively. Devonian clastic sedimentation and associated reservoirs appear best developed in proximal deep sea fans close to the shelf and slope. The logs and core data from proven producing fields to the west and NW of CDS's concession blocks, including the Montecristo Oil Field NE of Santa Cruz, Bolivia, confirm this depositional model. Clastic turbidites appear to have penetrated sufficiently far south and eastward in the Devonian basin to be prospective in NW Paraguay and, therefore, CDS's acreage, particularly within the Huamampampa, Los Monos, and Iquiri Formations. These 3 formations, and the underlying Icla, form the San Alfredo Group. All 4 formations have sufficient TOC in their shales to generate hydrocarbons. Prospective reservoirs of the San Alfredo Group are tight and, therefore, more 'unconventional' in nature, but they are extensive and have the potential to contain significant gas reserves below the top of the wet gas window at roughly 1.8 km depth.

A regional unconformity separates the Devonian and Carboniferous as a result of the continental collision in late Devonian times. The Gondwanaland super-continent was subsequently dramatically uplifted in the south. As a result, the sediment source (provenance) switched from the north to the southeast, and the Upper Devonian was eroded in the SE portion of the Boqueron Block prior to deposition of the Lower Carboniferous. Evidence includes the Don Quijote well, which had 281m of Devonian removed, along with 441m now missing in the Gabriela well, 678m in the Santa Rosa well, and up to 2,400 m in the Lopez 1 well. The Lower Carboniferous Tupambi formation was deposited above this "screaming unconformity" across an essentially flat continental shelf, SE of the hinge line separating shelf sediments from deep sea fans.

A newly defined NE-SW trending marine paleo-shelf edge break is now interpreted to run through the southern part of CDS's Boqueron Block. This appears to be the SE boundary of deep sea fan deposition of the Carboniferous Tupambi, Tarija, and Escarpment formations. Although limited, existing seismic lines document the outer continental shelf to the southeast and rapid transition northwestward over the continental slope and into proximal deep sea fans and channel sands. These are also evident in the existing wells in CDS's Boqueron Block and

contain potentially excellent reservoirs in a fairly narrow proximal fan fairway, before grading laterally to the north and northwest into less prospective mid fan facies, as evidenced by the wells in the northern part of CDS's acreage. Significantly, due to the inadequate recon seismic, wells were probably not drilled in optimum structural positions. Even so, oil and gas shows in the Emilia, Alicia, Hortensia, Julia and Katerina wells are probably indicative of structural closures against sealing faults, believed to have formed at a much later time in the Mesozoic and Tertiary. By comparison, the gas-bearing structures in SE Bolivia were also formed in the final Tertiary evolution as a result of Andean compression. One example is the anticline that contains the San Alberto Field, which lies along depositional strike with CDS's Carboniferous oil leads. Gas exports from this field originate in the Carboniferous Escarpment Formation - the same zone that contains an excellent gas show in the Emilia well.

In the late Palaeozoic, the Chaco Basin filled in until Permian sediments in NW Paraguay were deposited in shallow marine conditions.

**Phase II - Mesozoic:** The Triassic is absent in NW Paraguay. Outcrops, however, in central Bolivia consist of fossil sand dunes deposited onshore in desert conditions. Any Triassic rocks in Paraguay would have also been deposited on dry land, as the ocean was west of central Bolivia at the time. A failed rift graben formed in northern Argentina in late Jurassic and Early Cretaceous times. Prior to formation of the graben, uplift in the immediate area caused erosion of the Triassic strata of NW Paraguay, and also the Carboniferous near the graben. This Pirity Graben (Salta Rift in Argentina) extended a short distance into NW Paraguay, and is centred about 100km south of the SE corner of CDS's Boqueron Block. The failed graben is part of a suite of structures caused by the break-up of Gondwanaland and the formation of the South Atlantic Ocean. Associated volcanism and igneous emplacements occurred in Paraguay sporadically from 143 to 60 m.y. ago.

The WSW-ENE trending Pirity graben to the south of CDS's acreage is productive in Argentina from locally developed, Cretaceous aged, volcanoclastic reservoirs. As the lithosphere under the failed rift cooled, subsidence resulted in deposition of marine clastics during the rest of the Cretaceous, and sporadic deposition in the Tertiary of first marine, then subareal, clastics. Today the Pirity Graben has a maximum depth of 8 km to seismic basement. The relevance to CDS's acreage is two-fold. WSW-ENE faults parallel to the Pirity Graben occur in the southern portion of the Boqueron Block, and in the centre of CDS's lease position. These faults are probable conduits for vertical

hydrocarbon migration from Devonian source rocks to Carboniferous reservoirs. There is also potential for long-range lateral migration of oil and gas out of the Pirity Graben, north-westward to the area of the Gabriela well in the southern Boqueron Block.

**Phase III - Tertiary:** Andean mountain building caused the major structural features of the Chaco Basin, and also caused the deposition of an eastward thinning wedge of molasse (subareal clastics) during the Tertiary. Crustal loading of the lithosphere in Bolivia caused moderate uplift and extensional faulting in NW Paraguay. Gravity data reveal that the tops of structures near the Emilia and Independencia leads are slightly out of isostatic equilibrium, indicating continued uplift until the present. All CDS leads are fault-separated away from the tops of the structures, which are apparently poorly sealed, due to episodes of uplift in Mesozoic and Tertiary times. Most of the CDS leads are structural traps within the Carandaity Sub-Basin or appear to be formed along the northernmost flank of the Pirity Graben.

## New regional Devonian & Carboniferous play model based on modern interpretation of old and sparse data set

### **Petroleum Geology & Prospectivity:**

CDS's new interpretation of the two key plays in their concession blocks includes the regional development of the primary Devonian gas play in CDS's northern areas (considered more of an unconventional gas play but with substantial reserve potential), The overlying Carboniferous oil potential is the other primary play objective, which is most prospective in the southern part of their prospecting area associated with the newly defined paleo-shelf break and proximal deep sea fan fairway. The petroleum geology and reserve potential of each of their two plays can be further summarised:

**Reservoirs:** The Devonian sands that extend southward into the CDS's northern Gabino Mendoza and PG & E blocks appear to have been deposited in a distal deep marine environment, with sediment transport southwards into a paleo-basin. Gas-bearing sands in the distal deep sea fan fairway have so far only been penetrated by 3 wells in CDS's northern concession areas. These include the Picuiba B-1 well, drilled in 1949; the Lagerenza 1 well in 1958, and the Mendoza 1R well in 1959. Natural gas was reported bleeding from Devonian whole cores in the Picuiba well. The Lagerenza well encountered Devonian gas shows while drilling. The Mendoza 1R

well DST'd at 3.0 MMCFGD from a 13m zone, which yielded a whole core containing a 1/8 inch (3mm) open fracture, although partly filled with calcite crystals. These whole cores from the Devonian were reported as mostly shale and siltstone, containing some sandstone laminations too thin to resolve on wireline logs. This unconventional reservoir requires the proven vertical fractures to connect the sand laminations and allow for profitable production. The recent CAS International report and core analysis from the CDS-GM-05-5001 well suggest that this 3.0 MMCFGD DST rate in the Mendoza 1R well was probably limited by old drilling techniques, including high mud weights leading to formation damage. CAS International also concludes that fracture stimulation would probably increase flow rates from the Devonian significantly. This is particularly critical in tight and other 'unconventional' reservoirs historically not considered as reservoir, such as the Barnett Shale in Texas, USA. This is also in some ways an analogue for possible CDS Devonian production. CAS International's mean estimate of Devonian gas potential is 15 Bcf per km<sup>2</sup>.

The **Carboniferous** is considered the main oil target where clastics, including channel and marine fan sands and sandy conglomerates, are now known to be best developed along the SW-NE proximal deep sea fan trend described in the preceding section. Significantly, these Carboniferous clastics are already proven productive on depositional strike to the SW in the giant San Alberto field in Bolivia. The existing Emilia well in CDS's Boqueron Block also confirms that the Carboniferous sands and conglomerates have stacked oil pay potential within the Tarija and Tupambi Formations. Reservoir quality in the Carboniferous is more 'conventional' in nature, with excellent permeability compared with many other Palaeozoic reservoirs. Some 107 Carboniferous sidewall cores from the existing wells in NW Paraguay have more than the minimum 20% porosity needed for oil production. The average porosity is 24% with air permeability averaging 355mD.

The Emilia well contains 85m of sand having greater than 20% porosity, averaging 24% porosity in 7 distinct zones over a 363m interval between 516m and 879m depth. Wireline log and core analysis, coupled with water production data from the Carboniferous of NW Paraguay, allows CDS to estimate an initial production rate of 428 BOPD, if the oil shows in these sands are indicative of hydrocarbon saturations averaging 55%. The mean CAS International estimate for pay thickness in the accumulation, using Monte Carlo simulations, is 29m. A mean oil pool area of 1.5 km<sup>2</sup> leads to a mean resource estimate of 6.4 MMBO recoverable (4 mmbo/km<sup>2</sup>), based on a 24% recovery factor, and known Carboniferous oil producing

characteristics in the USA Mid-Continent and elsewhere. Carboniferous sandstones in NW Paraguay also have slightly better reservoir porosity than producing Carboniferous reservoirs in eastern Bolivia because of the facies and shallower depth of burial in NW Paraguay.

**Source & Seal:** Organic rich shales are known to exist in both Silurian and Lower Devonian, and are predicted by geochemical studies to be mature in the present day for both oil and gas. Type II and III kerogens predominate both in the Silurian, which consists of 1-2% TOC, and in the Devonian, which exhibits TOC's between 0.5 and 1.5%. The earliest oil generation in the Chaco Basin is thought to have occurred in Devonian times. The present transition between the oil and gas generating windows occurs about 2 km deep. In most areas of the CDS concession blocks, the Devonian Icla Formation is in the gas generating window now. The top of the oil window in NW Paraguay is known to be only about 750 metres deep. Carboniferous oil-bearing sands are believed to be sourced recently from Devonian Los Monos shales, and from previously migrated oil from deeper in the Devonian.

An overpressured Tertiary artesian aquifer overlies the normally pressured Carboniferous in the Carandaity Sub-basin, at the center of CDS's land position. This formation pore pressure relationship strongly supports the theory that the Carboniferous is well sealed over much of the Boqueron and PG & E Blocks. Interbedded shales throughout the target Devonian and Carboniferous strata are also good top-seals, which also set up the potential for stacked pay objectives.

**Structure:** From the existing, albeit very sparse, ~1,700 km of existing 2D seismic data and wells, both structural and potential stratigraphic traps are evident within CDS's concession blocks. The various tectonic episodes have been responsible for creating structural fault bounded structures and 4-way dip closures, although successive mild deformation episodes may have altered trap size over time. Fracturing, particularly in the Devonian, is expected to have been enhanced as a result of these various tectonic phases. Analysis of the existing aeromagnetic data also indicates that several large structures have not been tested, particularly in the Carboniferous oil play in the central part of the Boqueron Block. There is also evidence that in the Devonian, traps are partly stratigraphic with productive reservoir rims around large bald highs due to erosion. More modern aeromag and seismic data is required both regionally and locally to properly evaluate and accurately map the regional structure and individual prospects.

**Prospects & Leads:** Some 12 prospects and leads are identified from the existing data in CDS's acreage. Of these the primary targets include:

**Gabino Mendoza Block:**

- *Independencia:* Deep Devonian gas trapped in what is now interpreted from existing data as a stratigraphic rim around a large bald high. The entire 400 km<sup>2</sup> Gabino Mendoza Block lies along this rim and may be productive. From the sparse well and seismic data, CAS (Collarini) estimated a mean potential closure of around 2,500+ acres around the original Mendoza 1R well, which tested natural gas in the Devonian.

The largest estimate of possible recoverable gas resource size in the Devonian of the Gabino Mendoza Block is 4.5 Tcf, based on geochemistry and core data, if the fractured reservoir extends across the entire block.

**PG&E Block:** The eastern portion of the Izozog Arch occupies the NW corner of this Block, and may be a continuation of the Devonian Gas Play area of the Gabino Mendoza Block. Most parameters of the unconventional reservoir system are believed to be continuous across this area of the Izozog Arch. A program of recon surface geochem data, in the planning stages, may help delineate the eastern limits of this play in the PG & E Block. This block also includes large Devonian gas potential in the Lagerenza lead, already penetrated by a well drilled in 1958, and Carboniferous oil potential associated with the Julia and Katerina wells drilled in 1971. Based on the existing data, resource potential associated with these leads may be in the tens of millions of barrels for Julia and Katerina, and several hundred BCF for the Lagerenza area. However, no detailed maps are possible with the limited seismic data currently available.

**Boqueron Block:** The primary prospectivity includes

- *Emilia:* Review of existing seismic around the existing well suggests it encountered carboniferous oil pay on the margins of a much larger faulted nose than can be definitively mapped on existing data. It is thought that this large faulted closure nearby could cover an area of up to 150 km<sup>2</sup> (possibly 100+ MMBO potential) regionally updip of the existing Emilia well, yet still within the area of the topseals.
- *Other Secondary Leads:* These include *Alicia*, *Hortensia*, *Picuiba*, *Dorotea Deep* and *Gabriela* which could potentially contain both Devonian and Carboniferous potential, but all need further evaluation of existing and new data.

**Independently Defined Resource Potential:**

The recent CAS International (Collarini) independent report indicates the Independencia lead alone could possibly produce a mean gas resource of 76 Bcf and an upside of 330 Bcf to 4 Tcf (3000 case Monte Carlo simulation). Their mean estimate of what the Emilia lead could possibly produce is 6.4 million barrels, with an upside of 16+ MMBO (1000 case Monte Carlo simulation). Based on evaluation of the sparse existing seismic, old wells and associated hydrocarbon shows, CDS's regional work suggests that an upside resource potential in their three blocks could be in excess of ten times these estimates. This potential needs to be substantiated with regional and prospect-scale remapping of re-processed seismic data, subsequent acquisition of new modern infill seismic data and drilling and production testing of the two principle targets; Emilia (Carboniferous Oil and Gas) and Independencia (Devonian Gas).

**Excellent project economics ensure low development thresholds and significant long term potential return.**

**Commercial Potential:** The commercial terms and value potential of CDS's three Blocks can be outlined as follows:

**Fiscal Regime:** CDS has been granted Concession Laws (equal to Acts of Parliament) in two blocks - the Gabino Mendoza and Boqueron - and an application for a Concession Law for the PG&E Block is in progress. CDS's blocks already under Concessions are licensed under Paraguay's favourable Hydrocarbon Law, which is based on a Tax-Royalty system. This involves a sliding scale of 'Oil Royalties' from 10% on production from 1 – 5,000 BOPD, up to 14% at production exceeding 50,001 BOPD, and a Gas Royalty from 11% to 12% on unlimited production. *Tax considerations* include a depletion allowance of 15% on the Boqueron Block and 27% on the Gabino Mendoza Block, up to a maximum 50% of net revenues. Corporate taxes are 10%-30% and there are no Import Tariffs or VAT payable on equipment brought into Paraguay for the project.

**Markets & Infrastructure:** Paraguay currently has no domestic production, so all its hydrocarbon requirements are currently imported. There is a 7,500 bpd refinery near the capital, Asuncion, which is currently only refining ~1,000 bpd and will purchase oil at the 'well-head' at world prices in accordance with the Hydrocarbon Law 779/95. There is also a current serious gas shortage in the Southern Cone,

following export restrictions to Chile and Uruguay from Argentina, as well as uncertainty about reliability of delivery from Bolivia. The prime prospects of CDS are ~300kms from the existing Argentina/Chile distribution pipeline and ~350kms from an existing gas line for delivery into Brazil. CDS also has pipeline rights of way defined in its contracts, ensuring that if its operations prove up the reserve potential being estimated, either of oil or gas, they will be able to tie these into both domestic and the growing international markets. Initially, gas could best be used for export markets and later for local power generation projects, for which there are excellent market opportunities.

**Potential 'Value':** In 2000 the US Geological Survey in its World Petroleum Assessment estimated that the Central Chaco High region of Paraguay, which contains all of CDS's acreage, held resources of 369 million bbls of oil and 1.587 Tcf of gas. In Paraguay as a whole, it estimated there is potential for 645 MMBBL's of oil and 3.181 Tcf of gas.

Scott Pickford's analysis in 2005 estimated CDS's recoverable resources at 75 million bbls equivalent on just two of its prospects. Although the more recent Collarini report gives smaller mean resources associated with the Independencia and Emilia prospects, the potential productive area they associate with each is reduced, such that Collarini estimates a higher productivity per unit or closure than Scott Pickford. This effectively reduces risk based on the existing interpretation. This is only likely to increase the potential of CDS's acreage if and when new modern data is acquired and a more accurate interpretation is possible.

Even based on the smaller Collarini resource potential in the two key prospects being focused on, Emilia would generate a mean 6.4 MMBBL at a fully risked NPV of US\$ 55 million, based on an oil price of US\$ 40/bbl oil price and a discount rate of 15%. This could be as high as US\$ 96 million based on US\$ 60/bbl.

Independencia is estimated capable of generating an NPV @ 15% of US\$ 30+ million at only US\$ 4/mcf and as much as US\$ 94+ million at US\$ 6/mcf.

These figures include the small overriding royalties of 3.5% on the Gabino Mendoza Block and a 0.6% on the PG&E Block, payable to third parties initially involved in facilitating their opportunity.

Bearing in mind the extent of the acreage which currently incorporates the entire prospective area of the play, the project's upside economics could be substantial and over an extended period

**All firm obligations fulfilled, enabling new group to design an effective work programme to achieve early returns**

### **Work Programmes & Obligations:**

**Gabino Mendoza Block:** CDS fulfilled all outstanding work programme obligations in the block with their well in late 2005. This block is within an Exploitation Period under a 40 year license which expires in 2038. It holds this status by production from the Independencia 1 well, which is used for camp needs. There is a commitment to deepen the CDS-05-GM-5001 well to test the Devonian gas reservoirs in 2007

**Boqueron Block:** This is the largest block area, currently Licensed by CDS under Concession Law #2568/05 granted on the 12<sup>th</sup> May 2005, and has a maximum term of 38 years. Prospecting, Exploration and Exploitation are permitted under the Concession Law. The block is in transition from the existing Prospecting Period to Exploration Period, which is due to happen by the end of 2006. The Exploration Period requires a relinquishment of 1,589,900 ha out of a total of 2,389,900 ha on the block. CDS can achieve this without loss of the most prospective play areas, which are contained in the 800,000 ha (20 lots of 40,000 ha each) remaining. The Exploration phase will require a minimum work commitment of US\$2.75 million to include three wells drilled within four years, 250k of 2-D seismic and geochemical studies (including an aeromag survey).

**PG&E Block:** No immediate obligations. The full concession law application is in process and is expected to be formally approved in mid 2007.

**Favourable early entry earn-in terms to substantial appraisal & exploration project potential**

**Deal Terms:** CDS is offering an interest in one or more of their blocks based upon commitment and contribution to the immediate past costs and the forward work programme, including planned seismic reprocessing, regional aeromag survey and drilling. CDS seeks to create a new Joint Venture group with one or more partners able to bring established expertise and funding early in the next phase of its exploration and appraisal, when their influence can be most effective,

**Additional Information:** A copy of additional and more detailed information on the CDS project is available on request and after execution of the appropriate Confidentiality Agreement. Seriously interested parties will be invited to a presentation followed by a data room review in CDS's office in the Paraguayan capital, Asuncion or in Houston. Previews and a presentation will also be possible in London. All interest and requests for more information including a copy of the CA should be made through Envoi:

Contact: **Mike Lakin**

**Envoi Limited**  
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Hanwell,  
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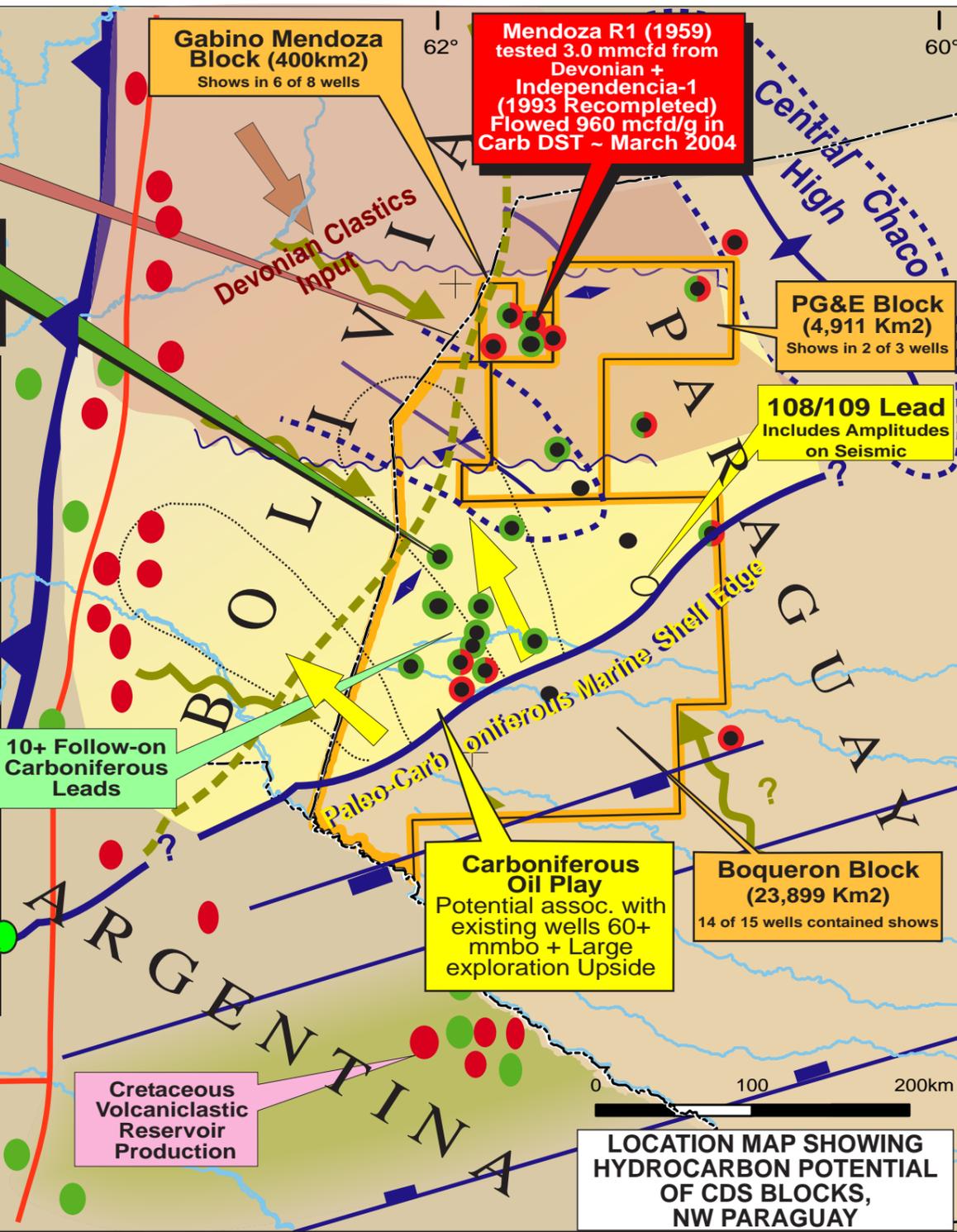
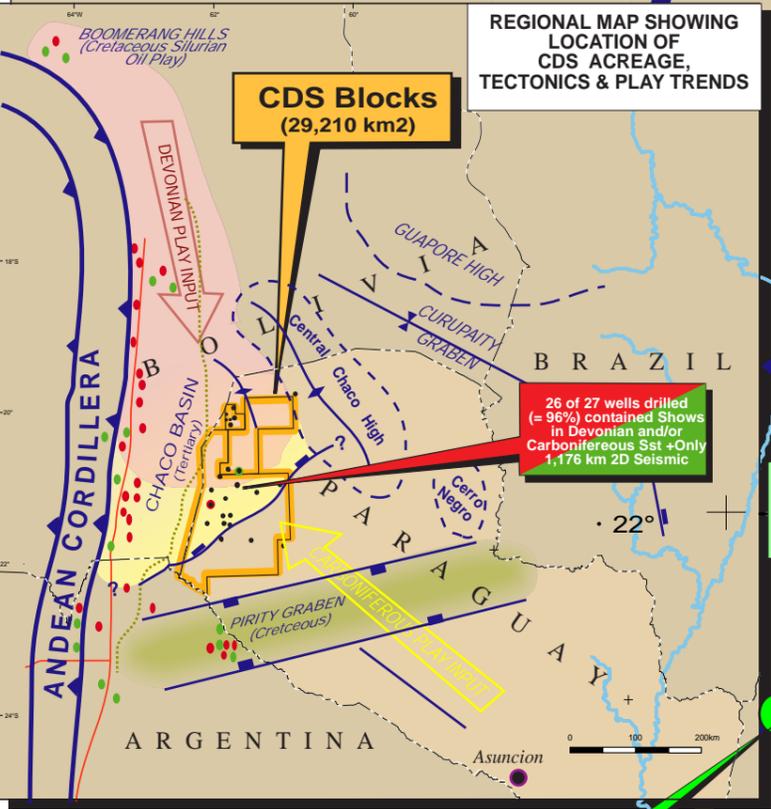
Fax : +44 (0)20 8566 1312

E : [mail@envoi.co.uk](mailto:mail@envoi.co.uk)

**AN ACROBAT VERSION OF THIS SYNOPSIS IS  
AVAILABLE FOR REVIEW ON THE 'ACTIVE  
PROJECTS' PAGE OF ENVOI'S WEB SITE**

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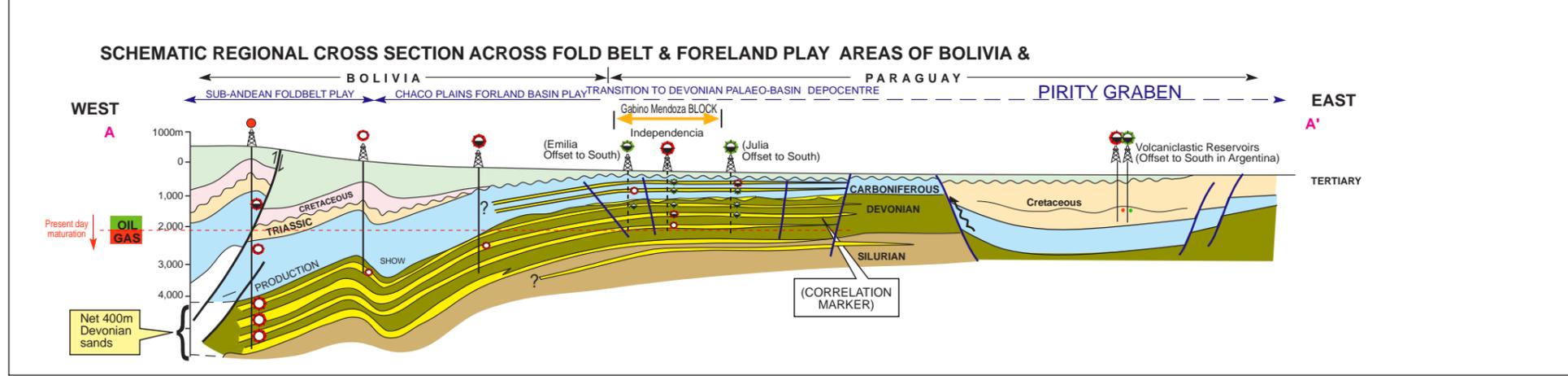


### SUMMARY OF THE STRATIGRAPHY AND PETROLEUM GEOLOGY OF THE CHACO BASIN FORELAND PLAY

AGE	LITHOLOGY	FORMATION	PETROLEUM GEOLOGY			HYDROCARBON OCCURENCE
			RES	SOURCE	DEPOS	
TERTIARY	[Symbol]	TARIQUIA			ANDEAN UPLIFT	[Symbol]
		YECUA			CONTINENTAL TRANSRESSIVE UPLIFT	
		PETACA				
		CAJONES				
		YANTATA				
		VITACAMA				
		CANGAPI				
		SAN TEIMO				
		ESCARPMENT				
		TAGUATI				
MESOZOIC	[Symbol]	TARIJA			REGRESSIVE	[Symbol]
		TUPAMBI				
		IQUIRI				
		LOS MONOS				
		HUAMAM PAMPA				
		ICLA				
		SANTA ROSA				
		CARMEN (SARA)				
		KIRUSILAS				
		PALAEOZOIC	[Symbol]			

**KEY:**

- [Orange Box] CDS BLOCKS
- [Red/Green Circle] OIL & GAS FIELDS
- [Red/Green Circle with Dot] PROSPECTIVE OIL & GAS WELLS
- [Black Circle] DRY WELL
- [Red Circle with X] PRODUCTION TESTED WELL
- [Yellow Circle] RESERVOIR
- [Diamond with S] SOURCE
- [Horizontal Lines] SEAL
- [Triangle] CHERT
- [X] FRACTURES
- [Red Line] GAS PIPELINES
- [Pink Line] REGIONAL X-SECTION



Prepared by **CDS Oil & Gas Group PLC** and **ENVOI** (Energy Venture Opportunities International)

## Montage Showing Potential of CDS Oil & Gas Acreage in Chaco Basin,

Compiled by: M.Lakin      Date: Sept 2006

Ref: P108 - Paraguay Rev (June 06)      Drafting by Wave