ZaZa Energy Corporation
Advanced Reservoir Characterization and Proof-of-Concept Drilling in the Eagle Ford and Eaglebine Shales

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EVP Exploration & Production

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<th>Details</th>
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| Hess Joint Venture              | - Strategic shift in operational outlook on behalf of both Companies led to the dissolution of the joint venture with Hess, whereby ZaZa focused primarily on Texas plays  
- As a result, ZaZa received ~60,500 net acres in the Eagle Ford area and $84 million in cash, the right to receive a percentage of the net sales proceeds if Hess divests the Cotulla Prospect, as well as a 5% overriding royalty interest in the Paris Basin |
| Management Build Up             | - Subsequent to ZaZa’s dissolution with Hess, ZaZa executives hand-picked a management team comprised of individuals with distinguished backgrounds in top-tier geology, engineering, land management, legal, and finance roles who are familiar with the operational and competitive environment |
| Eaglebine Evaluation            | - Technical evaluation of the juncture between the organic- and carbonate-rich Eagle Ford group and the silica-rich Woodbine plays provided an operational thesis to make the Eaglebine an area of primary focus |
| First Mover Advantage           | - Amassed and maintained key acreage in the play with the vision to find a partner with significant capital resources to fully develop acreage on an aggressive timeline  
- ZaZa maintains one of the most consolidated acreage positions in the Eaglebine area |
| Eagle Ford East / Eaglebine     | - Signed Joint Exploration and Development Agreement to further develop Eastern Eagle Ford/Eaglebine acreage.                                                                                                                                                        |
| Development                     | | Portfolio Rationalization                                                                                                                  | - Corporate non-op restructure and strategic divestment of South Texas Eagle Ford and Edward assets.  
- Technical shift to evaluation and assessment of new emerging plays and focused positioning for future growth |

**ZaZa Energy – Company Build-up**
## ZaZa Energy – Leadership Transformation

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<tr>
<th>Name</th>
<th>Title/Role</th>
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<tr>
<td>Todd Brooks</td>
<td>Founder, Executive Director, President &amp; CEO</td>
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<tr>
<td>Ian Fay</td>
<td>EVP Exploration and Production</td>
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<tr>
<td>Kevin Schepel</td>
<td>EVP Exploration and Production</td>
</tr>
<tr>
<td>Thomas Bowman</td>
<td>EVP Evaluation, Geology and Geophysics</td>
</tr>
<tr>
<td>Stewart Delcambre</td>
<td>EVP Land</td>
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### Todd Brooks
- Founder of Neuhaus Investments, LLC, a company making strategic energy investments across multiple geographic regions
- Production Analyst for L. J. Melody & Co. investment bank, and landman for OGM Land, both headquartered in Houston, TX
- B.A. in Economics from Vanderbilt University; J.D. from South Texas College of Law

### Ian Fay
- Founding Partner at Odin Advisors LLC
- Served as Head of the Energy & Natural Resources Group | Americas at BNP Paribas
- Worked as Managing Director for RBC Capital Markets and Director of M&A for UBS Investment Bank
- Graduate of the University of North Carolina at Chapel Hill and Morehead-Cain scholar

### Kevin Schepel
- Executive Vice President of Exploration and Production since June 2010
- Served as Vice President of Worldwide Exploitation for Pioneer Natural Resources, Chief Petrophysicist for BHP Petroleum and 15 years as an advanced Geoscientist at Exxon
- B.S. from Michigan State University; Licensed by the Texas Board of Professional Geoscientists

### Thomas Bowman
- Served in various roles at Aspect Abundant Shale, Bass Enterprises, Fina Oil and Chemical and Tenneco Oil Co.
- Industry-recognized specialist in identification of resource plays and the utilization of geophysical advancements; involved in the completion of over 1,000 horizontal resource wells across a majority of US shale plays
- B.S. from Montana College of Mineral Science and Technology; Licensed by the Texas Board of Professional Geoscientists

### Stewart Delcambre
- Has served as EVP of Land for ZaZa since July 2012
- Has been involved in the acquisition, management, exploration and divestiture of over 1,000,000 acres over his career
- B.S. from the University of Southwestern Louisiana; served in the military for eight years
ZaZa Energy – Technology Evaluation

Setting Trends in Technology

- ZaZa drilled and completed 28 proof-of-concept well from 2011-2012
- Cut and analyzed over 2000’ of conventional core
- Recovered over 800 rotary sidewall cores
- Tested a number of its new logging tool technologies for advanced evaluation in unconventional resource plays
- Implemented first ZIPPER frac by alternating two wells’ stimulations off the same pad
- Used micro-seismic technology to monitor and improve our completions
- Developing future technology for enhanced micro-seismic and production monitoring

“We focused on drilling proof of concept wells armed with conventional core, some of the most advanced logging suites available, and custom petrophysics designed through detailed integration of the physical rock and fluid data.”

*The American Oil & Gas Reporter* - *March 2013*
Lateral equivalents of upper Cretaceous shale across the southern Gulf Coast of the United States; in outcrop and in sub-surface. Local names include the Lewisville, Dexter, Maness, Pepper Shales, and Raritan.

*Well control noted on map is from Eagle Ford and Woodbine and Eaglebine*
Key Points

- The shale play trends across Texas from the Mexican border up into East Texas, roughly 50 miles wide and 400 miles long with an average thickness of 250 feet.
- It is Cretaceous in age resting between the Austin Chalk and the Buda Lime at a depth of approximately 4,000 to 12,000 feet. The down-dip limits are currently defined by the Sligo shelf edge.
- There are 5367 permits 4,045 producing oil wells and 1,883 gas wells as of August 5, 2012.
- Currently producing over 617,884 Bopd (June 2013)

This image of the United States of America at night is a composite assembled from data acquired by the Suomi NPP satellite in April and October 2012. The image was made possible by the new satellite’s “day-night band” of the Visible Infrared Imaging Radiometer Suite (VIIRS), which detects light in a range of wavelengths from green to near-infrared and uses filtering techniques to observe dim signals such as city lights, gas flares, auroras, wildfires, and reflected moonlight.

Credit: NASA Earth Observatory image by Robert Simmon, using Suomi NPP VIIRS data provided courtesy of Chris Elvidge (NOAA National Geophysical Data Center). Suomi NPP is the result of a partnership between NASA, NOAA, and the Department of Defense.
Eagle Ford Permits – Core and Eastern Expansion Area

Finding the Next Industry Growth Area...

**Eagle Ford East/Eaglebine**

**Main Focus Areas (Eagle Ford)**
- Atascosa County, Bee County, Dewitt County, Dimmitt County, Frio County, Fayette County, Gonzales County, Karnes County, LaSalle County, Lavaca County, Live Oak County, Maverick County, McMullen County, Webb County, Wilson County, Zavala County

**Eastern Extension (Eaglebine)**
- Austin County, Brazos County, Burleson County, Grimes County, Lee County, Leon County, Madison County, Milam County, Polk County, San Jacinto County, Trinity County, Walker County, Washington County

**Discovery Area (Eagle Ford)**
- LaSalle County, McMullen County
Key Points

- The Eagle Ford East/Eaglebine area of interest is located between the Angelina-Caldwell on the north, the Edwards and Sligo shelf edges to the south, the San Marcos Arch on the west and the Sabine uplift on the east.
- The section contains the down-dip toe-slope portion of the Harris delta system (Woodbine Sand/Silt Play) and a lower high organic rich shale interval interlaced with silica-rich sands and silts (Eagle Ford Laminate Play).
- Gross thickness for the Eaglebine section exceeds 1,000'.
- Eaglebine isopach is defined as the section from the Base of Austin Chalk to the top of the lower Cretaceous.

Isopach – Base Austin Chalk to Top of Lower Cretaceous

Legend:
- 1,000'-1,300'
- 200'-500'
- 500'-1,000'
- < 100
Eagle Ford East / Eaglebine Area

- Woodbine sand/silt horizontal play kicked off activity in the Eaglebine in 2009
- Lower Eaglebine target is a ~250’ thick “hot” shale across ZaZa’s leasehold and has recently become a main target
  - Analogous to mature Eagle Ford area
- Upper Eaglebine target is ~250’ thick shale/sand/silt across ZaZa’s leasehold and is between the Harris Delta sand and Lower Eaglebine
  - Has some similarity to the Woodbine sand/silt play
- Potential upside from Lower Cretaceous section
  - Kiamichi and Paluxy are “hot” shale targets across leasehold
  - Additional targets include Buda/Georgetown, Edwards, and Glen Rose
Proof-of-Concept Drilling - Measuring the Value of Information
It is not all about getting the best well right off the bat.

- Design a well to get producible hydrocarbons and to get the technical information you need to access commerciality.
- The first wells are important to prove up the play and drive future expansion and development.

**Proof-Of-Concept Drilling**

**Scoping Criteria**

Well data, physical rock properties, geochem, maturity, reserves, productivity, scale, timing, impact, drilling costs, competition, entry strategy, and partnerships and all keys to success
In addition to standard hotwire, chromatograph, and sample description services...

**Vertical Well**

Collect Isotube gas samples as follows:
- Sample every 100’ from surface to TD
- Sample every 50’ if good gas shows are encountered
- Sample every 10’ through core interval

Collect cuttings in Isojars as follows:
- Sample every 100’ from surface to TD
- Sample every 50’ if good gas shows are encountered

Cuttings sampling and description
- Collect 3 sets of dried and 1 wet cuttings as follows
  - Surface to top Austin Chalk – 50’ interval
  - Top Austin Chalk to well TD – 10’ interval

**Horizontal Well**

Collect Isotube gas sample as follows:
- 500’ interval for entire lateral while in Eagle Ford

Collect cuttings in Isojars as follows:
- 500’ interval entire lateral while in Eagle Ford
Monitor Well Coring Program

- Acquire 4” conventional core in Eagle Ford
- Target Approximately 400-480’ of core
  - Coring point picked on location
  - Start at the base of the Austin Chalk (20’)
  - Core entire Eagle Ford section
  - Core top 20’ of the Buda
- Evacuate, Scribe, Orient and Spectral GR core
- Core Labs will handle all on-site core operations
  - Gas Desorption
  - Preserved Plugs (Houston)
  - All core contributed to Core Labs Eagle Ford Study
Conventional Core

Core #4: Recovered 128.2' (7932' to 8060')

“Poker chip” character of the rock

Eagle Ford - Buda Contact

Preserved: 7934, 7952, 7962, 7970, 7980, 7990, 7995, 8004, 8012, 8025, 8034, 8046, 8049
Desorption: 7935, 7952, 7962, 7970, 7980, 7990, 7995, 8004, 8012, 8025, 8034, 8046, 8049
Formation Drilling Program

Stratigraphic Column
East Texas Basin

- **Page Dimensions:** 720.0x540.0
- **Image 10x6 to 537x512**
- **Image 609x273 to 694x298**
- **20x15 DUG Eagle Ford - September 2013**
- **628x42 Element Capture (ECS)**
- **662x32 Dual Oil-Base Micro-Imager**
- **695x43 50-100 Rotary Sidewalls**
- **476x273 LWD (GR-RES)**
- **415x429 3500’**
- **562x59 Platform Express Triple Combo (AIT/CNL-FDC/PE) NGT-NEUT to surface PEX**
- **595x109 Dipole Sonic/Sonic Scanner**
- **613x368 GR-Acoustic to surface (DSI)**
- **172x32 OPTIONAL 4” CORE**
- **415x39 14,000 BHT: <300 degrees**
- **180x111 EAGLEFORD/WOODBINE “EAGLEBINE”**
- **195x516 Formation Drilling Program**

- **Schlumberger**
- **Elemental Capture (ECS)**
- **Dual Oil-Base Micro-Imager**
- **50-100 Rotary Sidewalls**
- **BHT: <300 degrees**
Customized Petrophysical Analysis

ZAZA ENERGY, LLC
WELL #1

Volume % Mineralogy
(Includes TOC as Kerogen)  Average
Quartz 14.065
K-Feldspar 0.135
Plagioclase 2.945
Calcite 60.89
Dolomite & Fe-Dolomite 0.68
Pyrite 1.875
Marcasite 0.44
Illite/Smectite 6.42
Illite & Mica 3.58
Kaolinite 1.755
Chlorite 0.095
Kerogen 7.125
Total 100.005
Vclay 11.85
Calc. G.D. (g/cc) 2.6446
TOC 3.2
"This well is the first test of the low resistivity organic Eagle Ford which is similar in composition to the Eaglebine in East Texas"

264 BOPD and 2,434 MCFGPD
FLAIR fluid logging and analysis in real time is a premium gas service focused on fluid facies characterization and early information about formation fluid composition.

The interpretation of the gas data from the 8 formation levels led to the identification of 4 main fluids.

FLUID 1: This fluid is recorded from Limestone’s in Austin Chalk. This fluid is composed of 64-70% C1. Formation is Limestone and Shales.

FLUID 2: This fluid is recorded from the deeper Austin Chalk and has a lighter HC composition with 78% C1.

FLUID 3: Fluid 3A, 3B are recorded in the Eagleford and show a gradual gradation to heavier composition at the base ranging from 76% C1 at the top to 71% at the base.

FLUID 4: Fluid 4 recorded in the Buda Limestone shows a lighter composition with 83% C1.

Detailed analysis of normalized C1-C4 suggest a high concentration of oil with associated gas (volatile oil) for the organic section.
Optimized Stimulation Design (Pilot to Lateral Rock Properties)
Optimized Stimulation Design (FRAC Procedure)

**Initial Design**

- 16 stages optimized using 2D and 3D stresses derived from vertical log and using horizontal gamma ray correlation
- Based on length of like stresses – Range of 3-5 clusters and 60-80 feet were chosen; 2 foot perf. spacing – 6 shots per foot
- Pump schedules adjusted per stage based on cluster concentration and spacing

**Adjustments to Achieve Success**

- Increase Pad by 5 lb./1000 gallon gel (35#) to increase the viscosity in order to increase fracture width. Slurry pumped with 30# gel
- Add Treesaver – to increase treating pressure to 12,000 psi and increase rate to aid in width
- Increase Pad volume to 50% of the dirty slurry volume in order to offset the fluid loss experienced in the vertical fracture direction
Microseismic Overview

Offic

FracCAT

Treatment Well

InterAC T

Wireline

Geophysicist

Pumping

Monitoring Well
Well No. 2H
Porosity  6-14%
YM (Static)  3.4 - 4.6 E6
Poisson Ratio  0.25 -0.28

After 8 months
Rate  205 bopd
Cum Prod  88,000 bbls

Well No. 3H
Porosity  15-23%
YM (Static)  2.8 - 3.2 E6
Poisson Ratio  0.25-0.27

After 8 months
Rate  155 bopd
Cum Prod  69,000 bbls
Geologic Overview – Eagle Ford East / Eaglebine Play
Key Points

- The cross section represents the Woodbine sand / silt play, the Upper Eaglebine play and the Lower Eaglebine organic rich sand / shale section below.
  - The Eaglebine Laminate is recognized as a "hot" shale with increased resistivity that exhibits oil and gas shows on the mudlogs across the zone.
    - The recent successfully completed Weber 1H horizontal well targeted the Lower EF/Eaglebine in the oil window.
    - Range’s Gibbs 1H was drilled in the wet gas window, but encountered mechanical difficulties.
  - The Upper EF/Eaglebine is a silty shale play with lower resistivity similar to the TMS in Louisiana.
    - Halcón’s Covington 1H well appears to target the Upper Eaglebine.

**Woodbine Sand/Silt Play**

**Lower Eagle Ford “El Halcon”**

**EF/Eaglebine Laminate Play**

**Lower Cretaceous**

**“Cheaglebine” Play (Polk and Trinity Co.)**

**Harris Delta System**
Eagle Ford East / Eaglebine Trend – Transition of Play Types

Woodbine Sand Play

- Weber Lewis Pay
- Halcon and Crimson Exploration (Woodbine Sand and Lower Eagle Ford)
- ZaZa Energy (Eagle Ford East/Eaglebine)
- "Cheaglebine" Play (Polk and Trinity Co.)

Laminate Play

- Actual Tests
- ZaZa Energy (Eagle Ford/Eaglebine and Lower Cretaceous)
- ZaZa/Range/Anadarko
- ZaZa/SM Energy/Halcon

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<tr>
<th>El Halcon</th>
<th>Kurten Field (WAC)</th>
<th>ZaZa/Range/Anadarko</th>
<th>ZaZa/SM Energy/Halcon</th>
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Geologic Backdrop

- The Upper Cretaceous Eaglebine is an organic rich section situated between the Austin Chalk and the Buda.
- Broadly speaking, the Upper Eaglebine is a collection of sandstone packages making it more conventional in nature, interbedded with organic rich shales.
- The Lower Eaglebine has characteristics of a typical “hot” shale.
- Studies and log data indicate hydrocarbon bearing formations that exhibit high resistivity and porosity.
- Permeability is generally low, but horizontal drilling and multi-stage fracs (10-25 stages) have proven successful in enhancing well productivity.
- Found at depths of 10,500’ – 13,500’ in current focus area.
Eagle Ford East / Eaglebine – Typical Mudlog Response (ZaZa Acreage)

Eagle Ford East/Eaglebine Mudlogs

- Historical mudlogs across the area have significant oil and gas shows in both the Upper and Lower Eaglebine section.

- Eaglebine section is silica-rich organic shale, over 450' thick.

- C1-C5 oil and gas shows prevalent throughout section.

- Historical wells have produced economic quantities of oil and gas in individual sand lenses throughout the Eaglebine section.
Eagle Ford East / Eaglebine – Pilot vs. Horizontal Effective Stress

Mudlog total gas and C1-C5 components show significant increase in horizontal portion of well
Key Points

- Horizontal wellbores are drilled and completed in the Upper or Lower Eaglebine.
- Initial wells encountered casing problems when drilling out plugs and commercial tests were not achieved.
- Oil samples taken from partial flow backs showed 45-48° API gravity.
- Measured TOC and mudlog shows always increase at the tail of the well (Lower Eaglebine).
- All wells had significant surface pressure and indeterminately flowed oil to surface.
- Total gas always increases as the horizontal well enters the Lower Eaglebine.
- 2D/3D effective stress components are significantly different from traditional Eagle Ford.
- Vertical wells can be drilled with MW less than 9.5 ppg.
- Exceeding 65 degrees required >13 ppg MWE.
Drilling Assumptions
- All horizontal Eaglebine wells assumed to be drilled on approximately 160-acre density

Drilling Techniques
- Target depth range: 10,500’ – 12,000’ TVD
- Fresh water mud used for surface hole then switches to oil based mud for intermediate and production intervals
- Lateral length of approximately 5,800’, with effective length of 5,000’

Completion Techniques
- Cemented liner and plug & perf completions have demonstrated superior results
- 13 to 17 stage hydraulic fracture treatments depending on lengths
  - Implies frac spacing of 250 to 320 feet
- Estimated 600 to 1,200 pounds of proppant per foot of lateral
- Proppant size: 20/40 or 30/50
- Proppant type: sand (out of area)
- Treating pressure: 10,000 max psi
Integration of basic geology, physical rock properties, and micro-seismic data significantly improve our ability to characterize features in the horizontal reservoir that directly impact well placement, directional targeting, hydrocarbon volume, and overall well performance.

Design your first well to get producible hydrocarbons and to get the technical information you need to access commerciality.

These first “Proof-of-Concept” wells are important to prove up the play and drive future expansion and development.

A pilot in the first well of a development area will usually provide enough data for layer definition, formation rock properties, target planning, and initial completion design in the horizontal well.

Run the appropriate logging suite to identify matrix mineralogy, total porosity, and saturation (resistivity). Spectral GR data is a cheap option for measuring organics.

Real-time microseismic data, although costly, can significantly aid in reservoir evaluation and completion designs.

Learn how to measure the “Value of Information”

“If we all followed the same industry path with the same data, we would all make the same maps and compete for the same areas. You have to get out of the box and think ahead of the play. Where does it go? How does it change? You have to acquire new data and take risks to grow a play. By doing that, you achieve the first mover advantage.”