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THE UNCONVENTIONAL REVOLUTION WE ARE JUST BEGINNING THE JOURNEY

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Unconventional development is in its infancy: With approximately 1,400 rigs drilling over 25,000 wells in 14 U.S. unconventional plays this year alone, some might suggest that several plays (most notably the Bakken and Eagle Ford, each with approximately 200 rigs, and the Permian Basin, with more than 500 rigs drilling for stacked pays) are entering the "mature" phase of development activity and are essentially fully valued in the marketplace.

U.S. unconventional development is still in the early stages, with less than 10 percent of the ultimate total number of wells having been drilled in any major play. In addition, there is considerable additional value realization for current operators and new entrants from "manufacturing learning" around drilling (drilling days per well reduction), single-well productivity improvement (completions), and down-spacing/stacked pay development.

Quantifying learning and other value drivers is critical: The ability to quantify the uncertainty around future learning will separate successful operators and other value chain players from the pack and will drive future consolidation and merger and acquisition activity. The combination of drilling and completion learning will unlock value via sweet-spot expansion toward "fringe" acreage and creation/transference of knowledge between plays, players, and emerging plays. Incorporating learning into valuation and resource assessment significantly changes operator beliefs about the amount and timing of production from individual assets and plays, which goes directly to asset value and play value.

The industry's current lack of incorporating the magnitude and uncertainty associated with learning has led to underestimation of production. This underestimation has led to delayed infrastructure investment, among other issues. In the Bakken/Three Forks, underestimation led to existing infrastructure being quickly overwhelmed early on. The result is the industry's reliance on more expensive rail and trucking of crude, and the ongoing flaring of gas that can't be brought to market. In the Marcellus, wells were shut in as productivity of wells overwhelmed the then-current transportation infrastructure—when infrastructure did catch up, we saw the unusual phenomenon of significant increase in gas production (with no new

drilling), as previously drilled wells were completed and brought online. At the same time, the overall industry success in unconventionals has led to unprecedented investment opportunity in U.S. midstream, refining, and chemicals.

Consolidation is Beginning and Will Accelerate

All major basins go through operator consolidation over time, and the Bakken (37 operators/active players) and Eagle Ford (200 active operators/active players) are highly fragmented. The San Joaquin Valley had many operators in the early stages of development, but now has only two to three dominant players. Similar consolidation is expected to occur in the major unconventional plays over time—faster if a drop in liquids prices is observed. In fact, we believe consolidation has begun in the Bakken, where Whiting Petroleum recently purchased Kodiak Oil and Gas, creating the largest Bakken Three Forks producer, while providing for "meaningful production and operational synergies" and "materially enhanced scale to support growth."

The ability to understand where and how value is created in these plays will be key to successful consolidation—with learning-driven cost and productivity improvement leading the way.

How Learning Occurs, and How to Value It

The "cumulative" impact of multiple operators and service companies working to improve costs and performance drives industry investment and returns. In these plays, where there are many operators and many service providers actively focused on reducing costs while improving productivity, all technologies and ideas are quickly disseminated across the play and to other U.S. and international plays. Looking at historical drilling and production data, every unconventional play has demonstrated the cumulative impact of this rapid dissemination of learning. Further, the results for individual operators are widely dispersed across these dimensions. Those companies (construction, frac fluid, digital oil field services, cement, drilling mud, etc.) that seek to enter the unconventional value chain must provide products and services focused on supporting these learning value drivers if they expect to get the attention of operators and oil field service providers. There are three critical learning factors driving value:

1. **Bringing production forward through drilling efficiency:** Drilling cost/time improvements will be led by rig upgrades, directional downhole tools, pad drilling, and a host of incremental improvements that reduce costs and increase drilling efficiency. In the past five years, the Bakken has seen a 45 percent decrease in days to drill a well, and this trend will continue. The net result has been faster-than-expected production growth as operators drilled more wells than forecasted in initial field development plans.

2. **Performance improvement:** Well productivity is a huge value driver. Increasing the size and permeability of the conceptual cylinder of fractured rock that surrounds the well bore ultimately increases well productivity. A multitude of methods are currently employed to increase well performance, including optimization of well spacing, the number and length of laterals, number of

fracs per lateral, perforation techniques, amount and size/type of proppant (sand, resin-coated sand, ceramic, resin-coated ceramic), amount and type of frac fluid, and timing of fracs (zipper frac, simulfrac, etc.). It is important to recognize and value the fact that these techniques will continually evolve and successful models will ultimately lead to productivity improvement.

3. **Stacked pay identification and development**: The king of the stacked pay is the thick and prolific horizons of the Permian Basin in West Texas. The Bakken also has stacked plays with multiple Three Forks Benches. Initially, the play focused on the Bakken alone, but it quickly moved to the Three Forks. Further investigation has identified multiple additional Three Forks benches, which are being tested by multiple operators. In the Eagle Ford, we have the potential for the Pearsall Shale and the northeast extension of the play, the Eaglebine.

Implications

Creating sweet spots through application of technology: At a field level, average well rates overall are expected to remain flat from the combined effect of continued productivity improvement in known sweet spots and drilling in fringe areas where improved completion techniques are being applied to formerly uneconomic assets. These same techniques will be used to develop stacked pay zones (e.g., the Three Forks benches, Pearsall Shale) and will likely create economically viable drilling opportunities out of currently marginal and emerging plays in the future. There are decades of drilling (and learning) ahead, and the value of cumulative industry learning in the unconventional arena should not be underestimated.

Learning creates value: Explicit consideration of learning leads to higher quality and more realistic asset valuation, field development planning, resource assessment, and production forecasting. Current sweet spots are likely not fully valued, as the value of additional productivity and drilling learning, down-spacing, and stacked pay is not adequately quantified. Sweet spot expansion, through application of productivity improvement and drilling efficiency learning to fringe acreage, is undervalued, creating investment opportunities for latecomers in active plays. Successful players systematically identify and quantify all sources of value and continually drive learning in each phase of unconventional operations.

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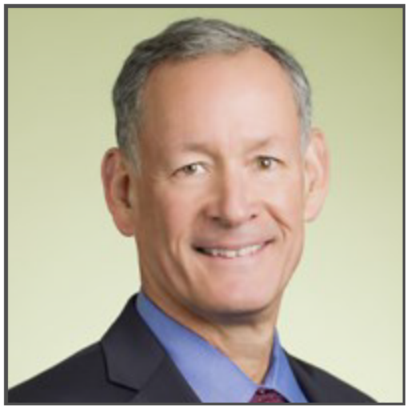

Gardner W. Walkup, Jr. is a global energy executive, innovative strategist, trusted advisor to corporate management and boards, and energy expert for law firms, industry clients, and regulatory agencies. He has developed and implemented strategic transformations and led the alignment of corporate culture and competencies necessary to implement these strategies. He has a deep understanding of the energy value-chain, from land acquisition and exploration through power distribution and energy marketing. He brings a keen understanding of geopolitical, economic, commercial, operational, and technical risks, as well as experience in over 30 countries representing capital investments of more than $300 billion.

As a corporate executive, Mr. Walkup has chaired an Investment Committee directing overall corporate capital allocation, led the development of a new corporate strategy that drastically narrowed investment focus and reduced costs, and led the design and implementation of culture change and capability building efforts in response to new strategies and major acquisitions.

Mr. Walkup is a recognized expert in energy asset valuation and mega-project management. He has advised corporate boards and executives investing globally in unconventional resource plays, including shale gas, tight oil, and coal-bed methane, and investments in global mega-projects with capital requirements of more than $5 billion. He has significant experience in LNG and deepwater development. In addition, Mr. Walkup has advised corporate leadership on portfolio management, transaction support, business-unit growth strategies, and project management leadership capability building.

Mr. Walkup's expert advisory experience includes significant international litigation and arbitration matters concerning industry practices in mega-project development, offshore operations, and operating/non-operating party industry best practices.

Mr. Walkup started his career at Chevron, where he served as senior reservoir engineer for a 250,000-barrel-a-day oil field in Indonesia, led strategic planning and petroleum engineering for a major offshore Gulf of Mexico development, managed a corporate project to improve economic valuation methodologies of large capital projects, and developed novel reservoir-characterization approaches.

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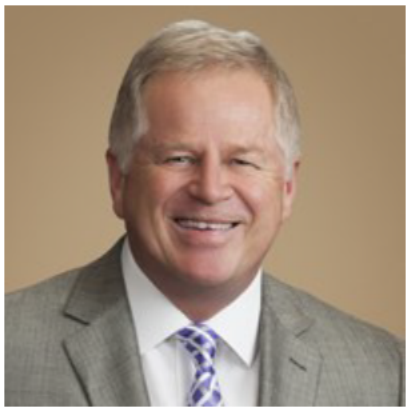

Rick Chamberlain is an oil and gas professional with deep experience in unconventional resource valuation, unconventional and conventional resource assessment, monetization strategy development, field development planning, and mega-project management. Mr. Chamberlain has experience in more than 25 countries representing capital investments of more than $200 billion.

Mr. Chamberlain has advised corporate leadership and financial teams on unconventional oil and gas asset valuation (buy-side), resource assessment, production evaluation, and field development planning. Examples include properties in the Marcellus, Upper Devonian, and Utica fields in Pennsylvania; the Eagle Ford, Sprayberry, and Wolfcamp fields in Texas; the Bakken play in North Dakota; the Niobrara field in Colorado and Texas; the Horn River field in British Columbia; the Montney field in British Columbia and Alberta; coal-bed methane in Queensland, Australia; and the Vaca Muerta in Argentina.

Mr. Chamberlain also has direct industry exploration experience, including developing and implementing Chevron's Alaska Exploration strategy. This included negotiating farmouts, acquisitions and divestitures, and overall budget control. He and his team mapped the Chukchi Sea for the first offshore lease sale and led negotiations for a major joint venture. This included determination of the relative value of producing properties, stranded gas, and rank exploration leases, including the geologic, geophysical, and political risks inherent in projects on the Alaska North Slope and the Arctic National Wildlife Refuge (ANWR). Other industry responsibilities include Gulf of Mexico exploration, development geology of heavy oil fields in California, technical support for enhanced oil recovery (EOR) projects in the Los Angeles Basin, and divestitures of producing properties in California.

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