2017
PROPPANT MARKET REPORT
SAMPLE PAGES

Published March 5, 2018

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Forward

Last year, we highlighted some of the past and current trends which are impacting regional sand use in hydraulic fracturing. This year is no different, unless one considers the scale and speed at which it is occurring. In simplest terms, more proppant and more completions equals unparalleled growth in terms of usage and supply.

Establishing new proppant operations are challenging regardless of facility size. Locating material sources, securing funding, accessing sufficient power, water and labor, and navigating the complicated local, state/provincial and federal permitting and environmental regulations all present challenges. Despite the oft repeated claims of high barriers to entry, however, sand supply continues to grow. The entire proppant supply industry has been nothing short of remarkable in its combined ability to increase capacity in the past decade. Barriers to entry have not proved to be insurmountable, serving more as a thorny hedge as opposed to a steel wall.

There are undoubtedly significant up-front savings to be incurred with expanded use of in-basin sources. Natural sands are less expensive than ceramic and other specialty proppants in North American basins, and the use of available in-basin sand can reduce delivered proppant costs by as much as $50/ton or more at the wellhead. Considering proppant demand appears to be trending to over 100 million tons in 2018, the potential savings in delivered proppant costs are in the billions of dollars.

The question that has yet to be definitively answered, however, is whether the expanded adoption of regional, in-basin sources of proppant is the most optimum for industry needs considering the inherent natural limitations in terms of in-basin proppant mesh size and quality.

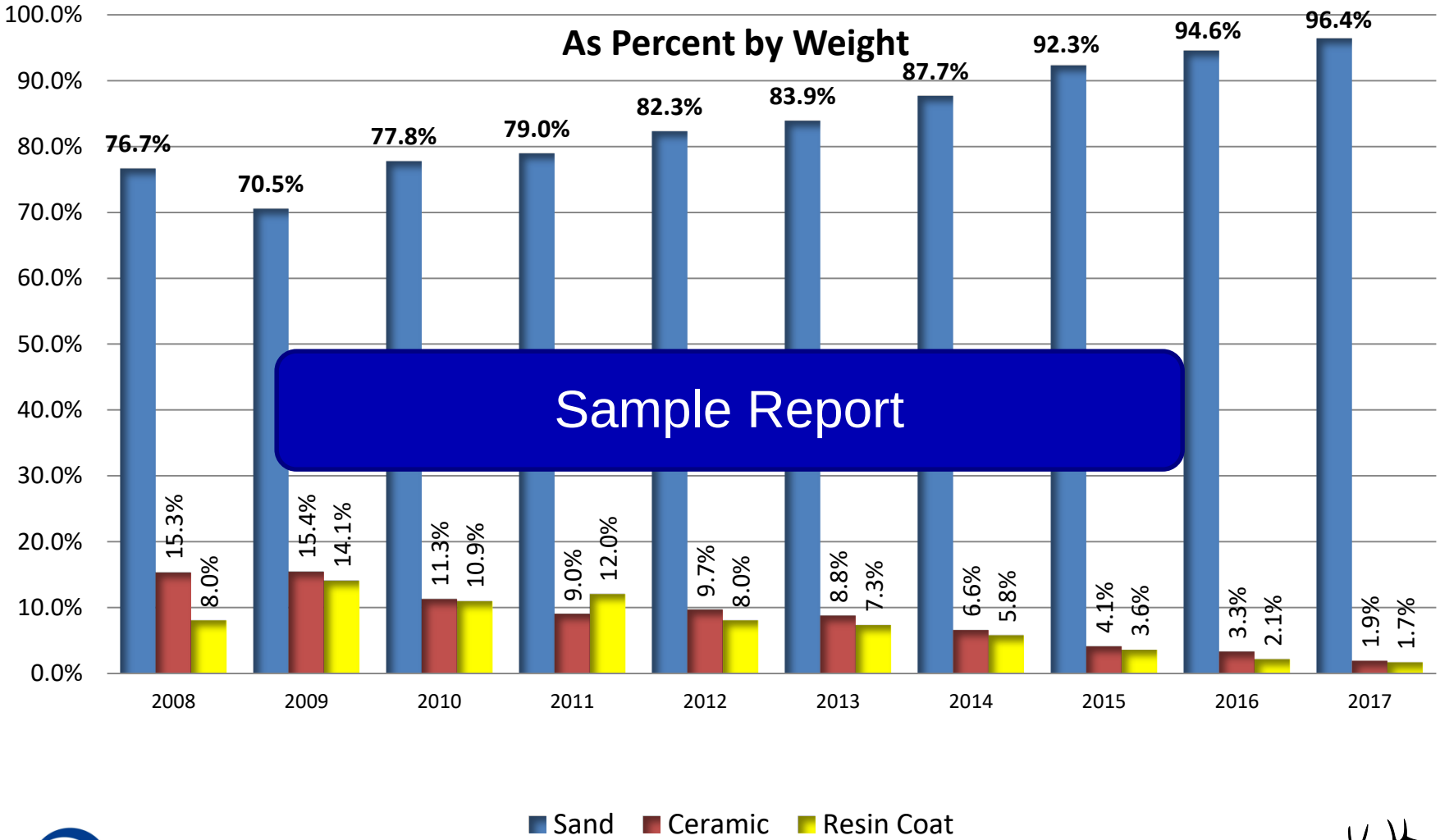
We ask industry colleagues who actively design completions and monitor well performance, "Is it working?" The responses vary and are sometimes contradictory. The one response we hear more often than not in terms of longer term or total production is that "we do not know." Initial production rates are promising, but decline rates remain exceptionally high. What are we leaving in the ground over time?

Does proppant conductivity matter when completing unconventional rock? In the presence of high stress, particularly with point loading, is it possible that small mesh proppant (sub 70 mesh) may actually provide more conductivity than 30/50 or 20/40? Conversely, if 100 mesh sand essentially has no conductivity under stress, why does it appear to be working? Decades of industry research on proppant characteristics in simulated downhole conditions exist, but much of the work and the equipment developed to test it was based on more traditional and more conductive proppants (e.g., 20/40) at higher proppant loadings (e.g., 2 lb./ft.^{2}) in conventional formations. Challenging economics in recent years limited research efforts, but advancements are in progress. For example, we are learning more about the impact that proppant size, density and even particle shape has on proppant transport in simulated, highly complex fractures. More work remains.

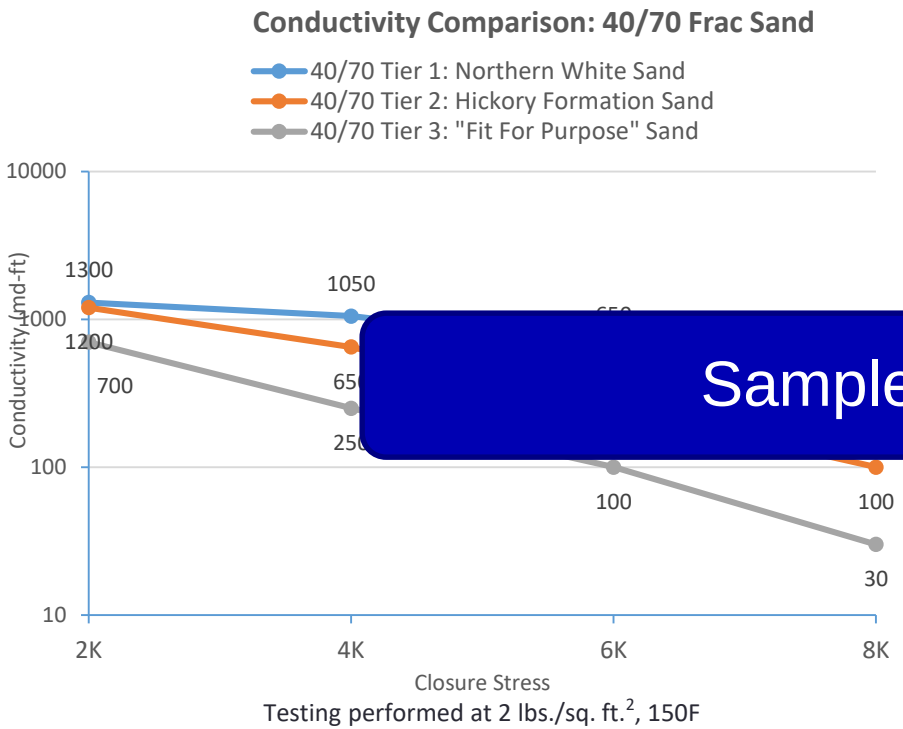
Short term, "just pump more sand" remains the primary trend, particularly in formations where the primary goal is to expose tremendous amounts of reservoir rock over long laterals. Improved oil and gas prices will benefit higher conductive and specialty proppants (e.g., resin coated sand), but high-intensity completions using various small mesh proppants (40/70, 100 mesh and even finer) are the norm.

Long term trends are uncertain. Repeating last year, we must evolve from "bigger is better" to "smarter is better." This is all the more true considering the potential scale in terms of proppant demand in basins where completion resources (water, wheels, power, people and proppant) are already limited. The rapid expansion of new regional sources is either a major paradigm shift in the proppant supply chain or a costly venture considering the level of investment currently underway.

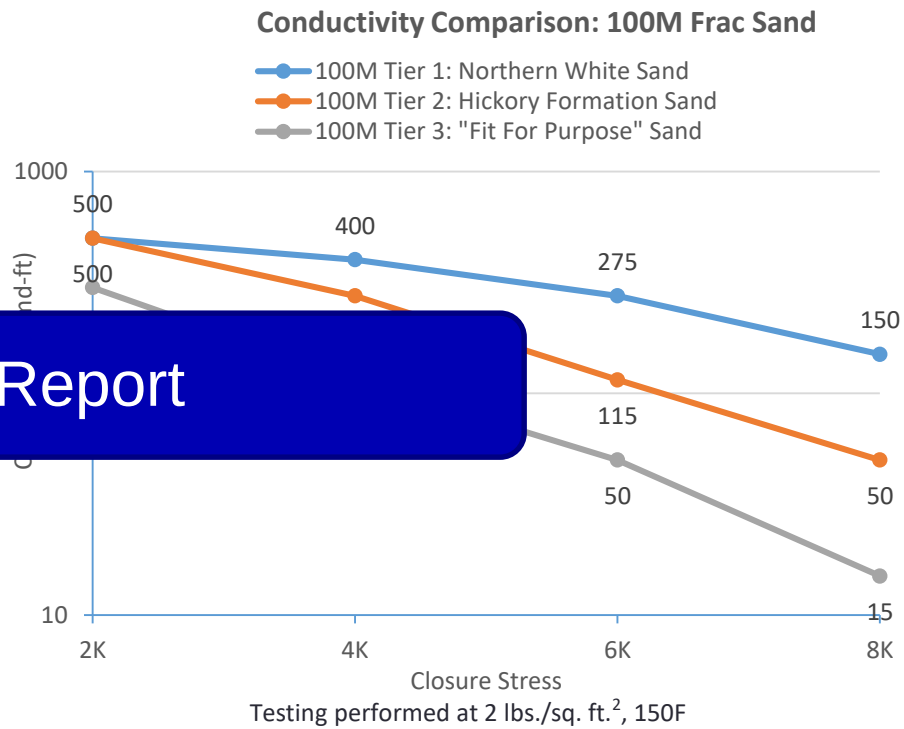
Proppant Consumption By Type (%)



Proppant Conductivity Comparisons



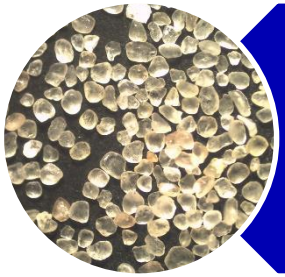
Testing performed at 2 lbs./sq. ft.^{2}, 150F



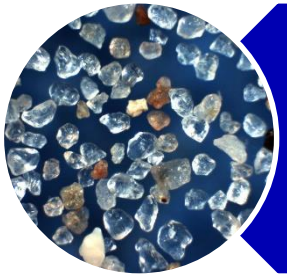
Testing performed at 2 lbs./sq. ft.^{2}, 150F

Sample Report

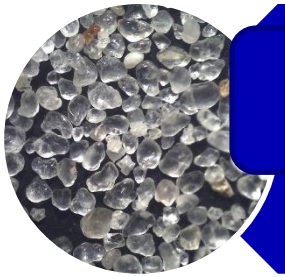
100 Mesh Examples - Not As Defined



Wisconsin
St. Peter



North TX
Paluxy



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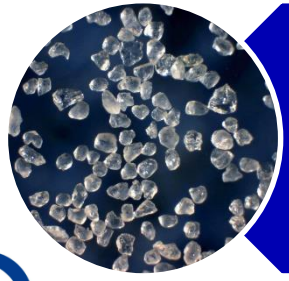
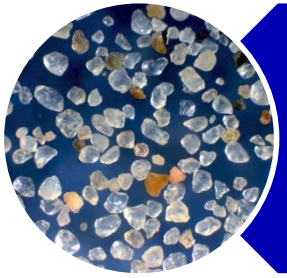
River



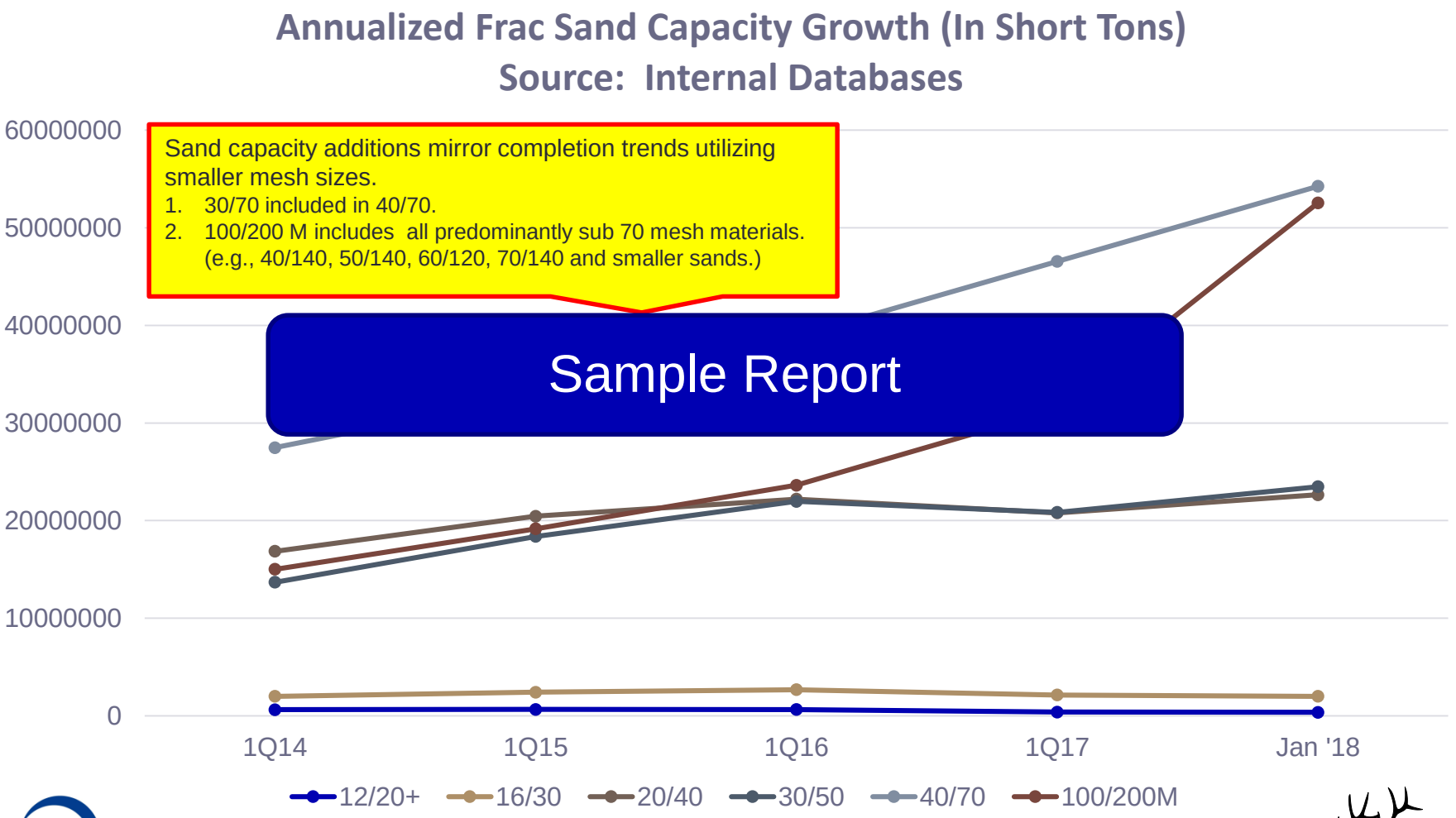
Illinois
St. Peter



West TX
Dune

Company	Plant Locations	Source Material	Direct Access	Estimated Realistic Frac Capacity and Noteworthy Events
Capital Sand Proppants, LLC **www.capitalsandproppants.com**	Cape Girardeau, MO Monahans, TX	St. Peter Non traditional	Truck/Barge Truck	**Capacity: 4.000 billion (2,000,000 tons) [Trend 5 Million tpy 2018/19]** **Grades: 30/50 thru 100 M/200 M** Established in 1973, Capital Sand, Inc., a subsidiary of Farmer Holding Company, commenced supplying frac sand after constructing a new 2.0 Million ton frac sand processing plant in April 2015. Known as Capital Sand Proppants, LLC, the new barge and truck-to-rail facility produces 30/50 thru 100 mesh from the St. Peter sandstone in Missouri. The company also supplies silica flour. The company has also announced a pending facility near Monahans, TX (Capital Sand Permian).
Burro Sand **Aequor Mgt LLC**	Van Horn, TX (Oct'17) ***New 2017***	Non traditional	Truck	**Capacity: 4 billion lbs (2,000,000 tons) [Trend 3.8 Million tpy 2Q18]** **Grades: 100 M** Burro Sand, a subsidiary of Aequor Management, LLC, was one of the early entrants to West Texas production when it constructed a 2 million tpy 100 mesh plant northeast of Van Horn, TX in Culberson County. Commissioned in October 2017, the company expects to expand capacity to 3.8 million tpy as early as May 2018.
American Silica LLC **www.americansilica.com**	Black Rock, AR	St. Peter	BNSF	**Capacity: 3.000 billion lbs (1,500,000 tons) [Trend 2.0 Million tpy 2Q18]** **Grades: 30/50 thru 100 M** American Silica LLC constructed a $48 Million, unit-train capable, BNSF-served …he St. Peter sandstone mine is …anuary 2017, the company is …pacity to increase production to 2
Texas Frac, LLC **www.texasfracllc.com**	St. Jo, TX (Nov'17) ***NEW 2017***	Non traditional	Truck	**Capacity: 3.000 billion lbs (1,500,000 tons)** **Grades: 40/70 and 100 M** Texas Frac, LLC commenced initial production from a new 1.5 million tpy mine and production facility at the former EOG pending site in St. Joe, Texas in Cooke County on November 1, 2017. Producing regional 40/70 and 100 mesh, the facility has 12,000 tons of storage and two truck load outs.
CSI Sands (WI) Ltd. **(La Prairie Group)** **www.laprairiegroup.com**	Arcadia, WI (former MSS site)	Jordan	Truck	**Capacity: 3.000 billion lbs (1,500,000 tons)** **Grades: 20/40 thru 100 mesh** The former Mississippi Sand site in Arcadia is now CSI Sands (WI) Ltd., which is part of the La Prairie Group. The company also operates a Peace River, AB, Canada mine sand plant (see Canada section). The Arcadia facility became operational again in 2017 and has a stated capacity of 1.5 million tpy.

Frac Sand Capacity Changes By Grade



US Rig Counts – By Basin