



Western States Land Commissioner's Winter Meeting

January 14th, 2020



Confidential

Hunter Wallace Introduction

Chief Operating Officer of Atlas Sand

Petroleum Engineer from Texas A&M



Agenda

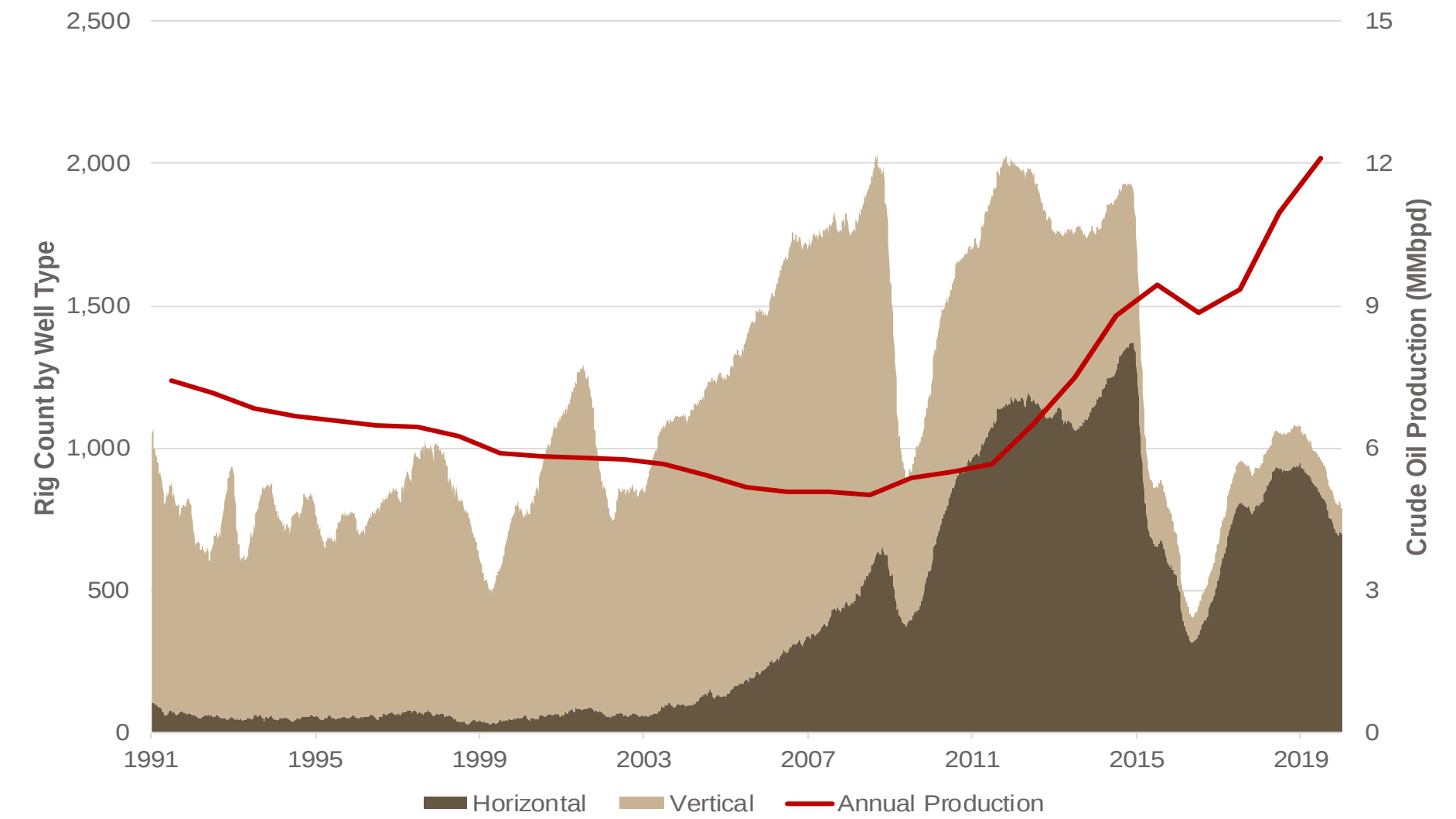
- Industry Background Information
 - Shift from Vertical to Horizontal wells in the US
 - Hydraulic Fracturing 101
 - Increased Need for Proppants/Sand – Quick History of Usage
- Permian Basin and the “Gold Rush” for in-basin Sand
- Geology of the Permian Sand Deposit
- The Dune Sagebrush Lizard
- Future Project – Remove Trucks from the Roads



Industry Background Information

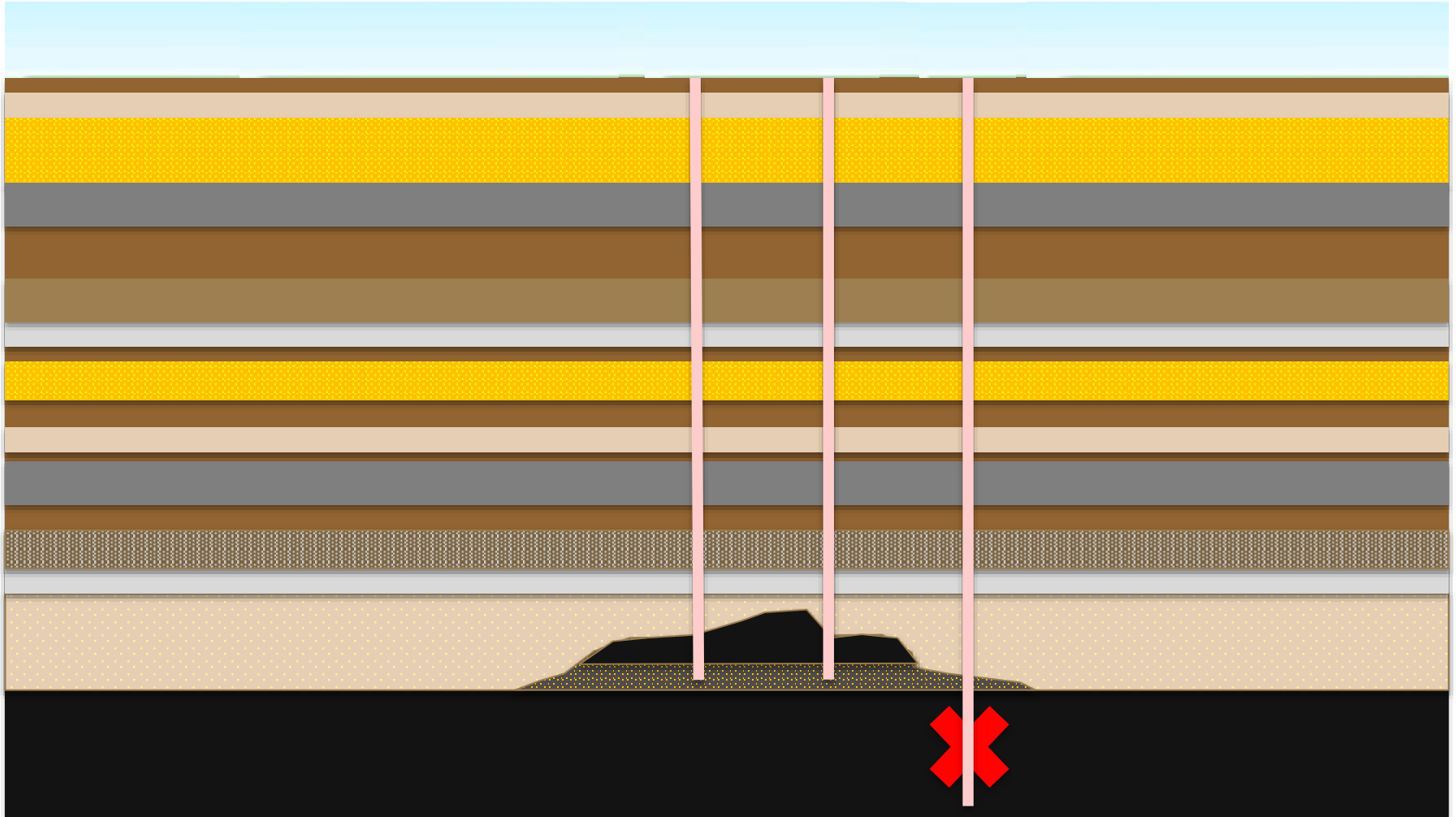


US Oil Production Revived by Horizontal Technology



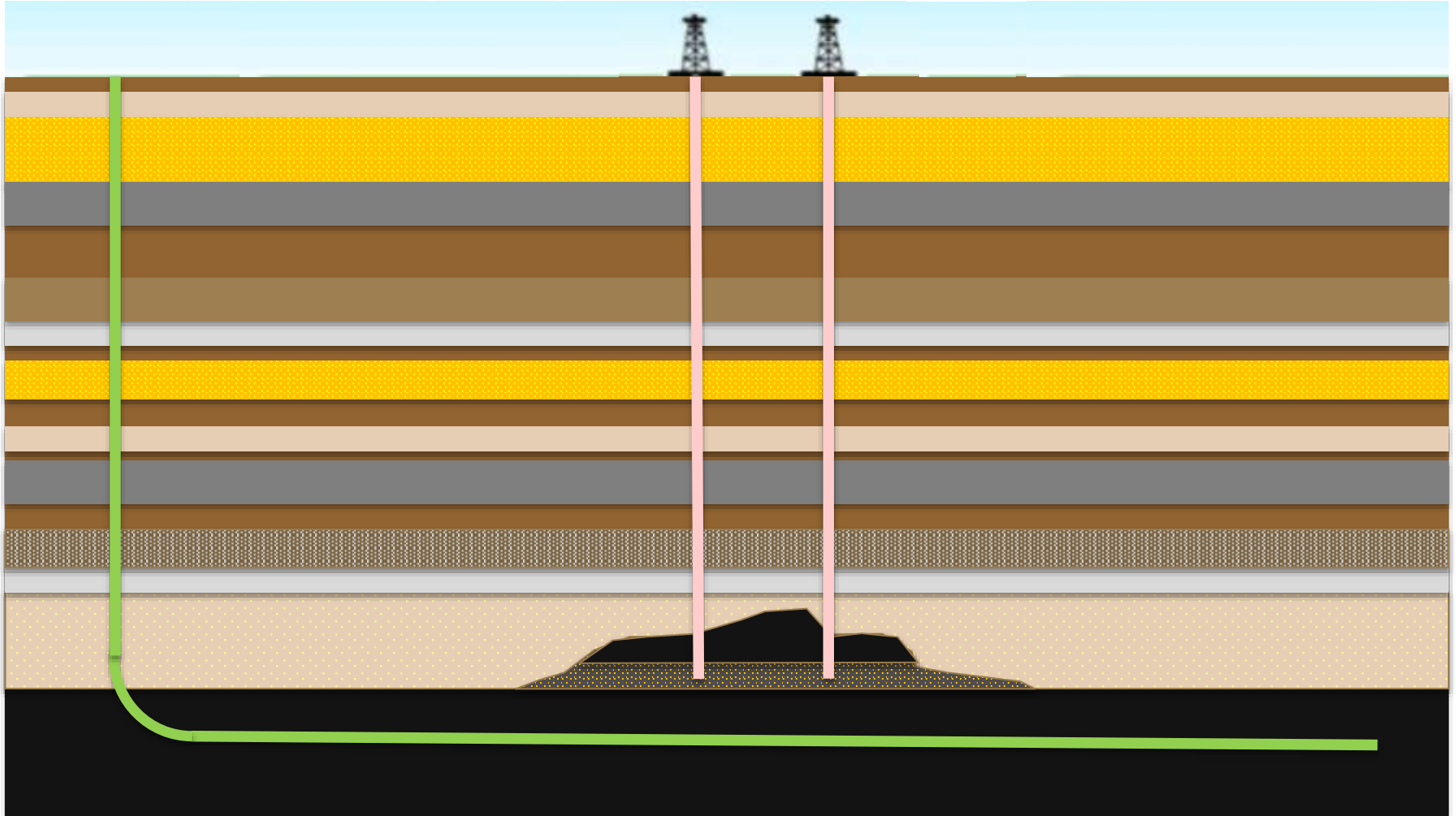
Source: EIA.

Oil & Gas 101 – Vertical Wells VS Horizontal Wells

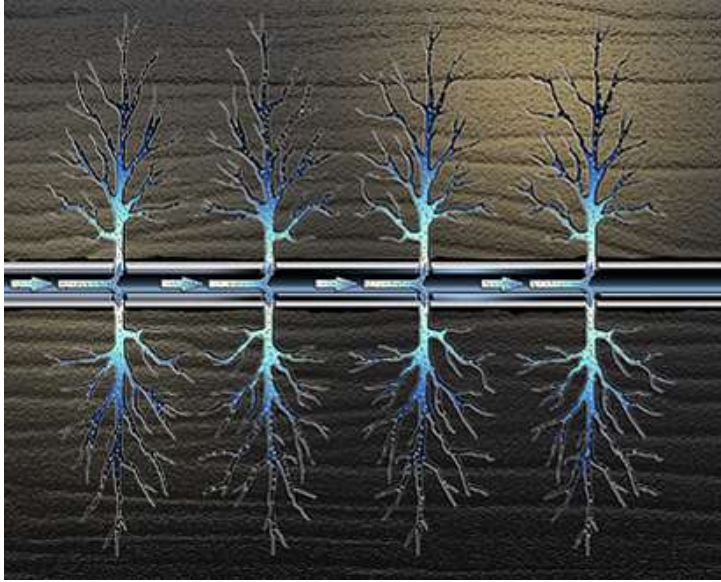


Oil & Gas 101 – Vertical Wells VS Horizontal Wells

Horizontal Shale wells have unlocked billions of barrels of oil in the US



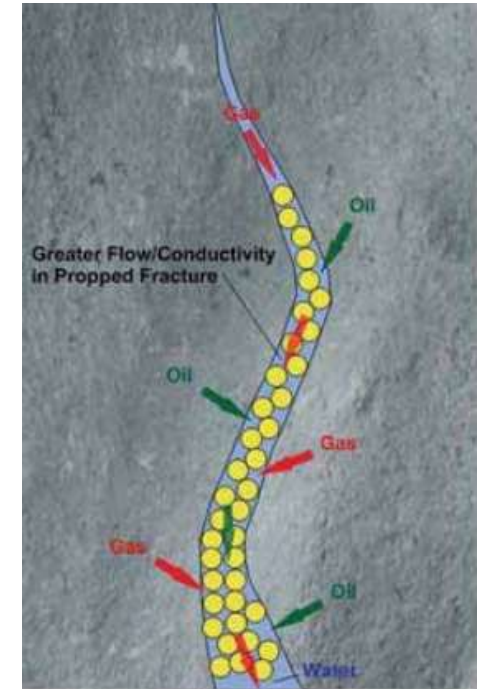
Hydraulic Fracturing – Need for Proppants



Hydraulic Fracturing is the practice of pumping water and proppants into the rock

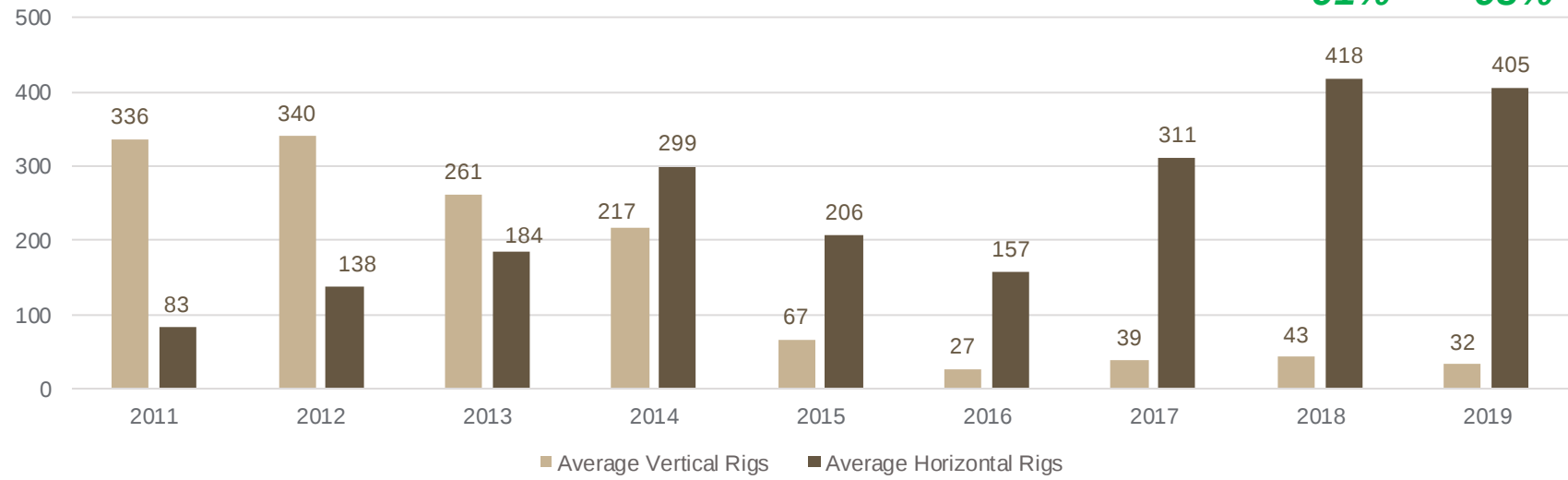
~99.6% of what is pumped is water and proppants

Proppants are used to help “prop” open the rock to allow oil & gas to flow out of the rock afterward

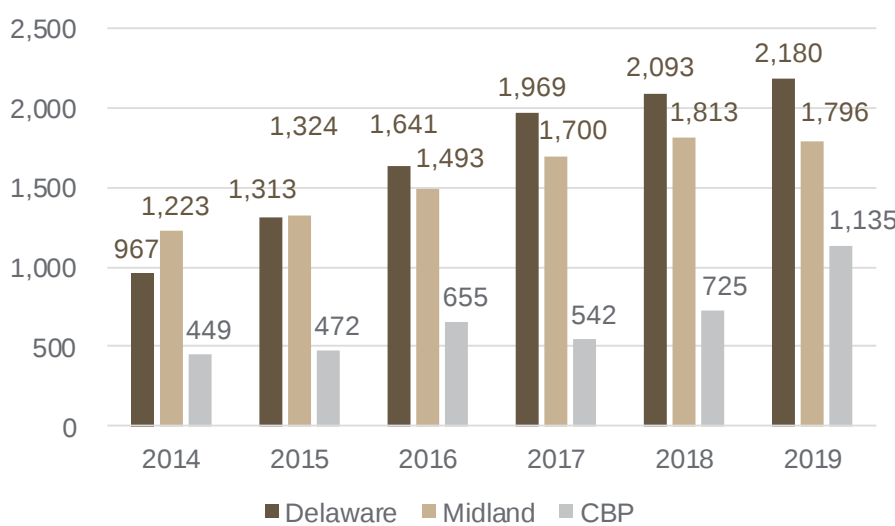


Drilling & Completions Trends (Permian)

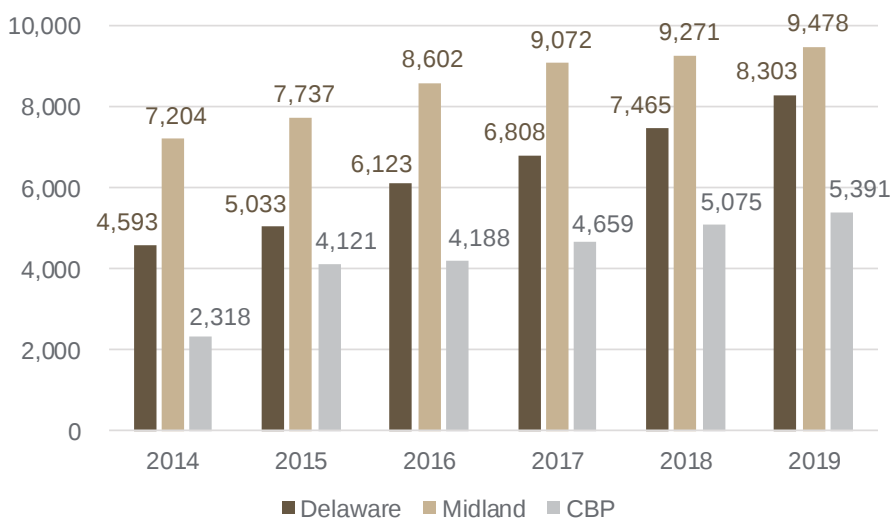
Permian Basin Rig Count by Type



Proppant Loading Trends (lbs/ft)

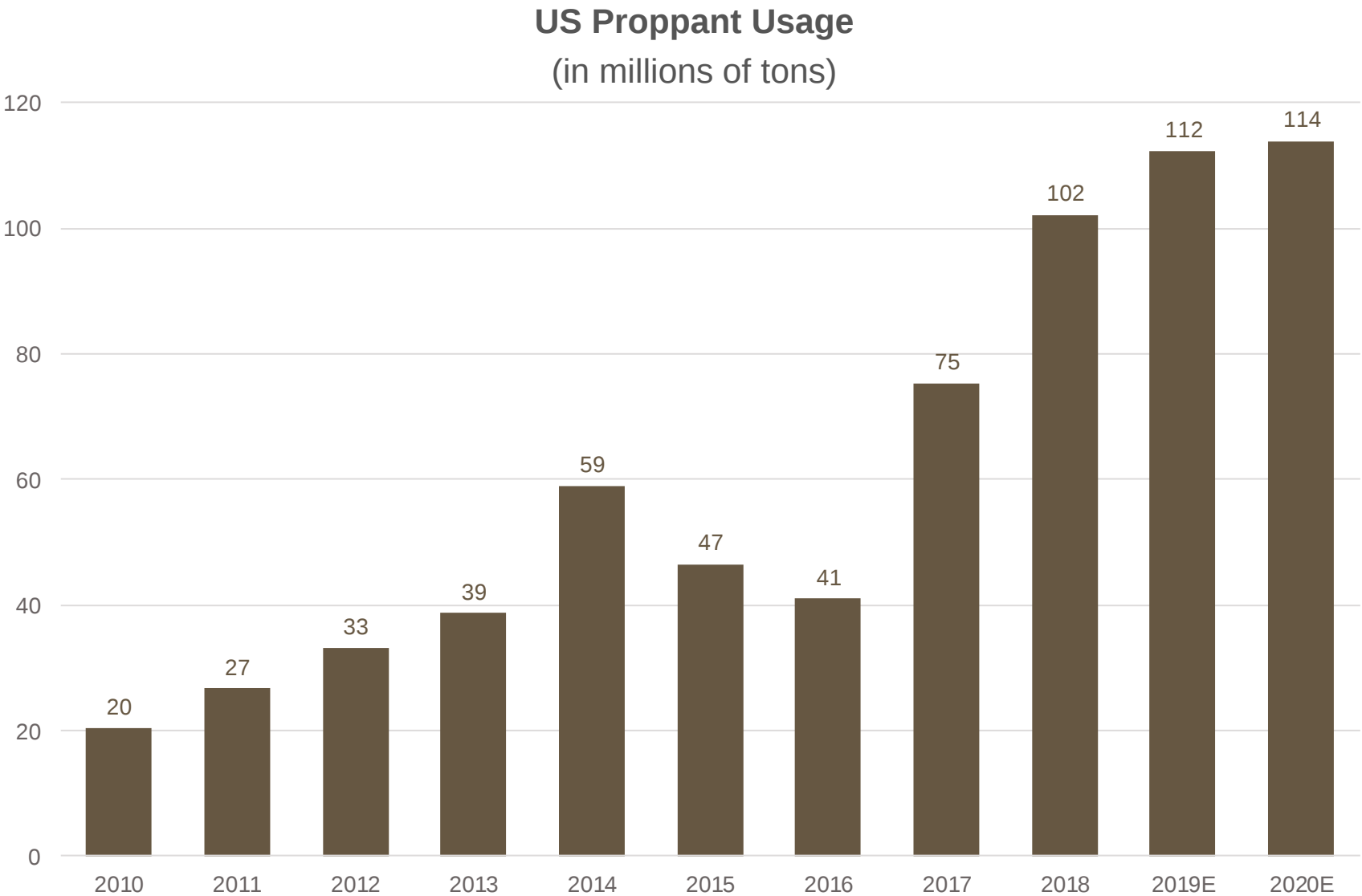


Lateral Length Trends (ft)



Sources: Baker Hughes, EIA, Enverus, Coras Oilfield Research.

US Proppant Demand Has Grown Significantly



Source: Coras Oilfield Research.

Proppant Types – A Quick History

Naturally Occurring



Ottawa Frac Sand



Brown Frac Sand

Man Made



LiteProp™ 108 ULWP



Low Density Ceramic



Resin-Coated Sand



Sintered Bauxite

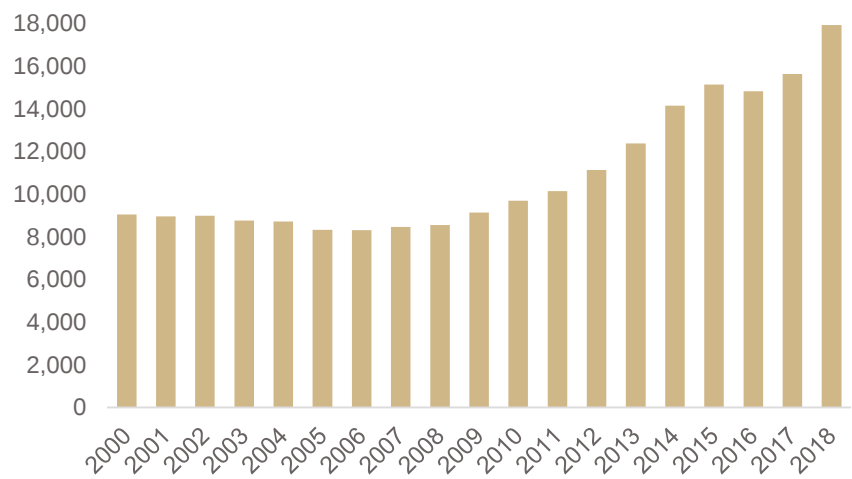


Permian Basin and the 'Gold Rush' for in-basin Sand

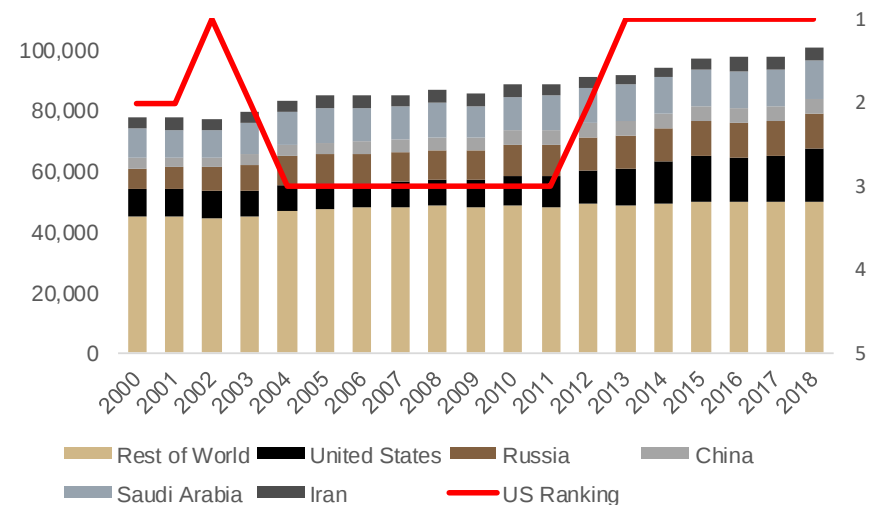


Horizontal Shale Technology's Effect on US Production

US Daily Oil Production (000's bpd)



World Oil Production (000's bpd)

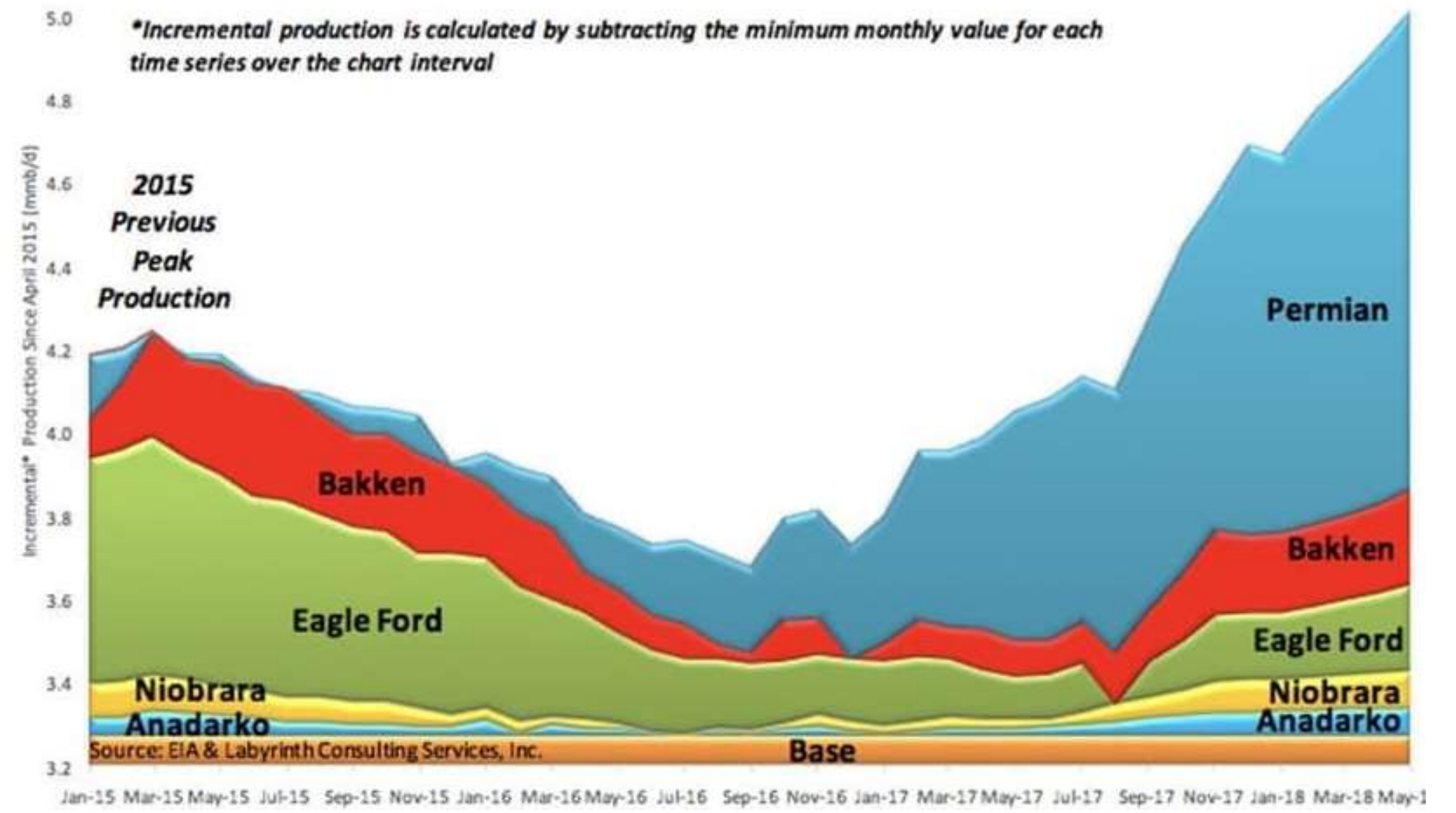


Source: EIA.

Top Crude Oil Producers 2019

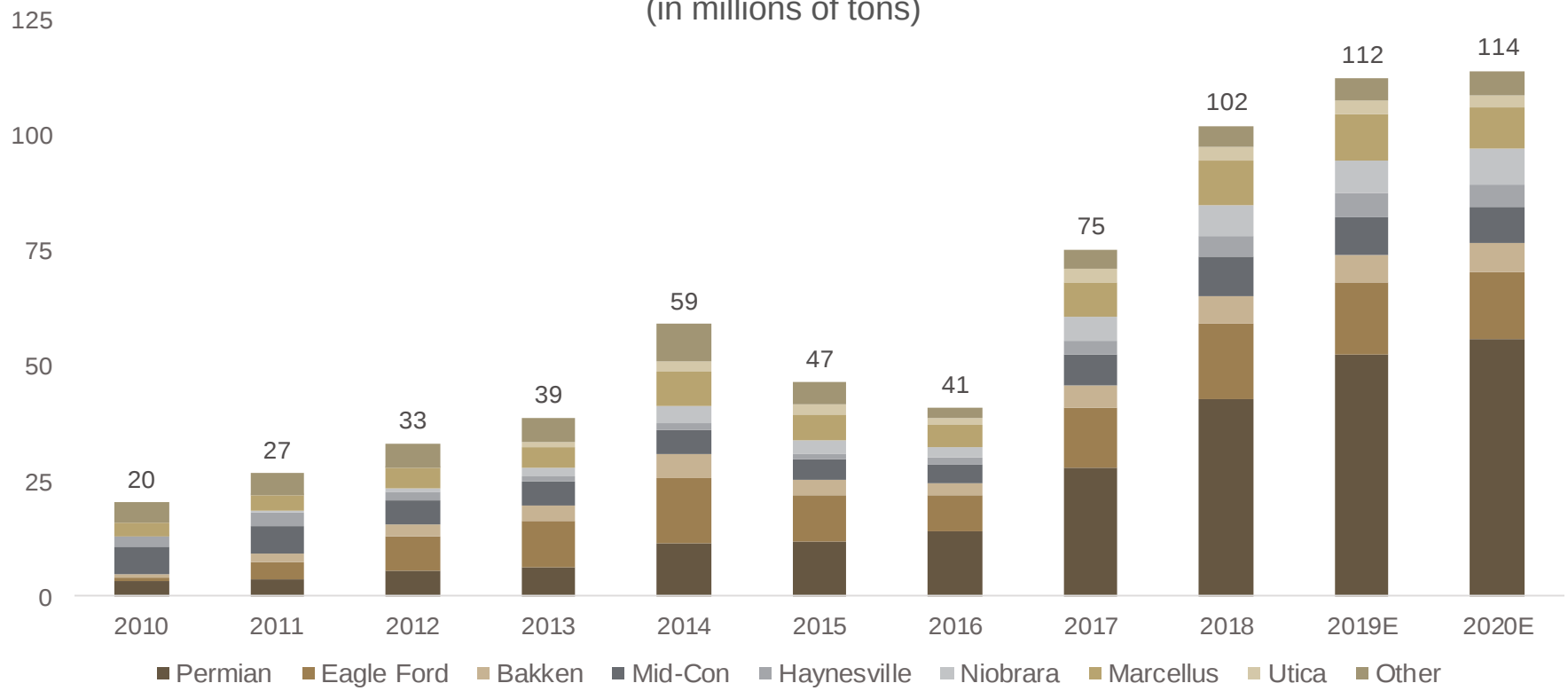
Rank	Country	MM Barrels / Day
1	United States	12.1
2	Russia	10.6
3	Saudi Arabia	9.8
4	Texas	5.0
5	Iraq	4.6
6	Permian Basin	4.3
7	China	3.8
8	Canada	3.6
9	United Arab Emirates	3.1
10	Iran	2.4

US Production Growth – Almost Entirely Permian



Proppant Demand Overwhelmingly Driven by Permian Basin

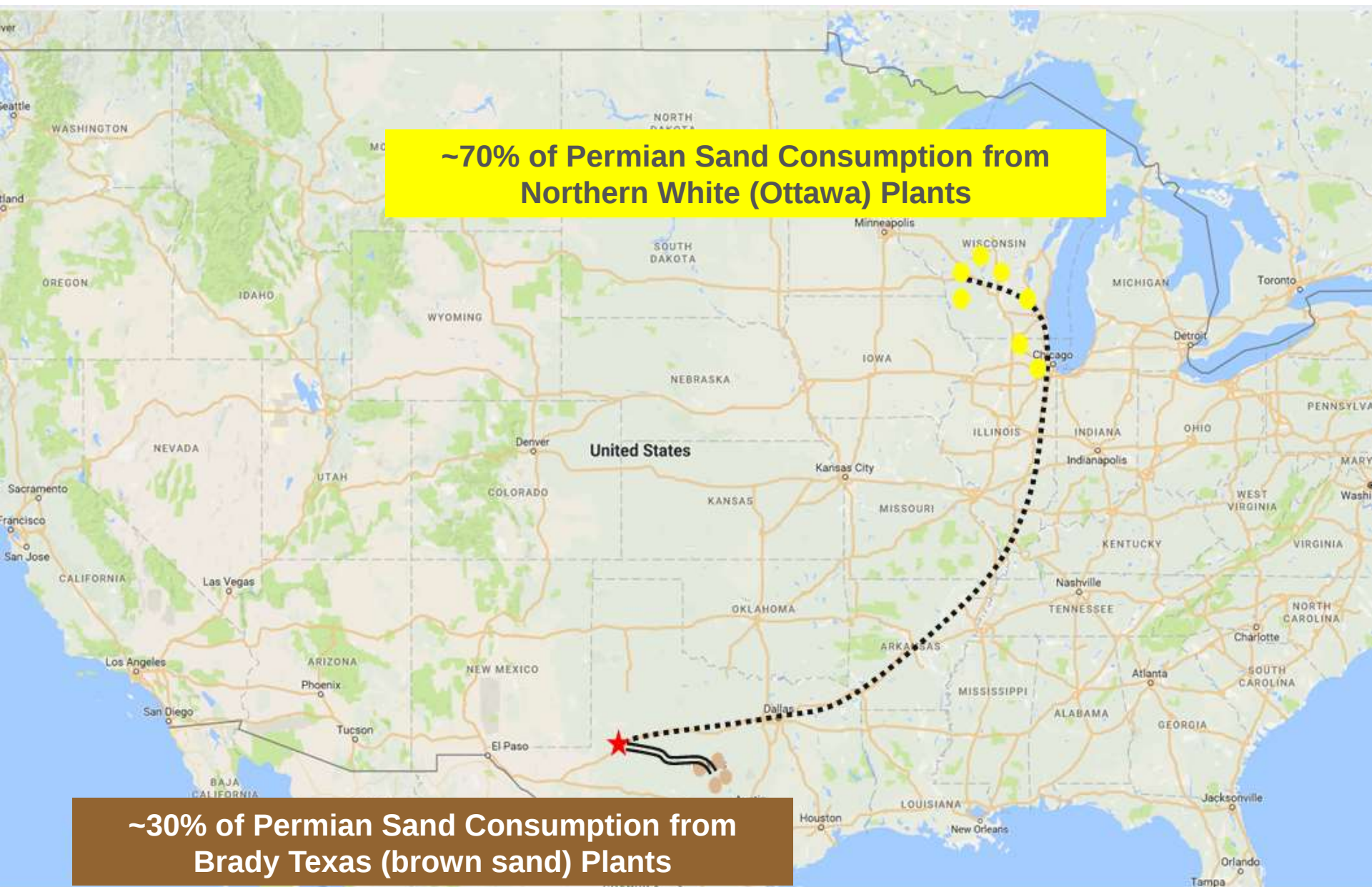
US Proppant Usage By Basin
(in millions of tons)



In 2010, the Permian only accounted for 15% of US proppant usage.

Now, in 2020, the Permian is expected to account for 49% of total US proppant usage.

2016 Permian Sand Sourcing



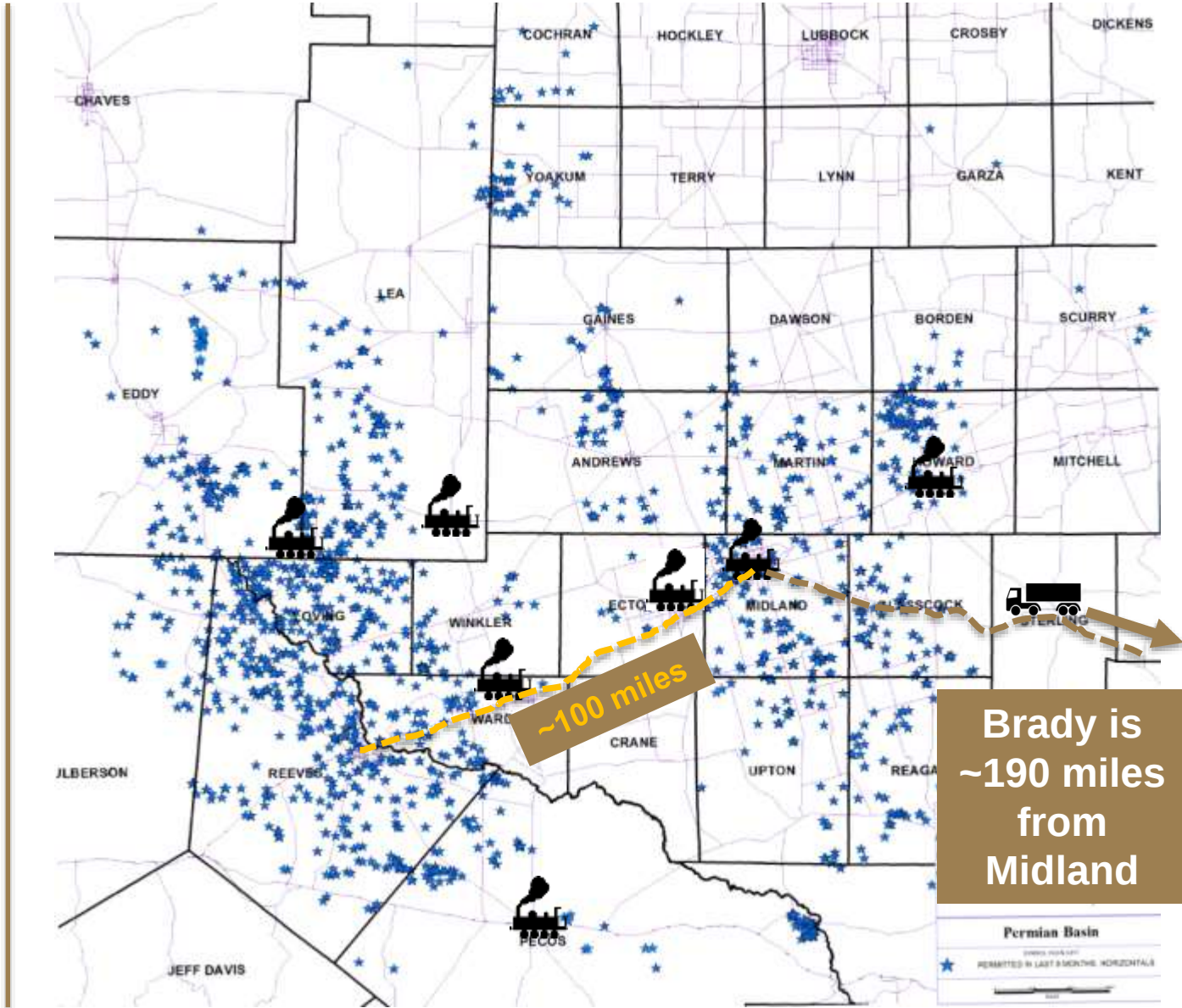
2016 Permian Sand Sourcing

Permian Sand Costs

Northern White
@ \$115/ton

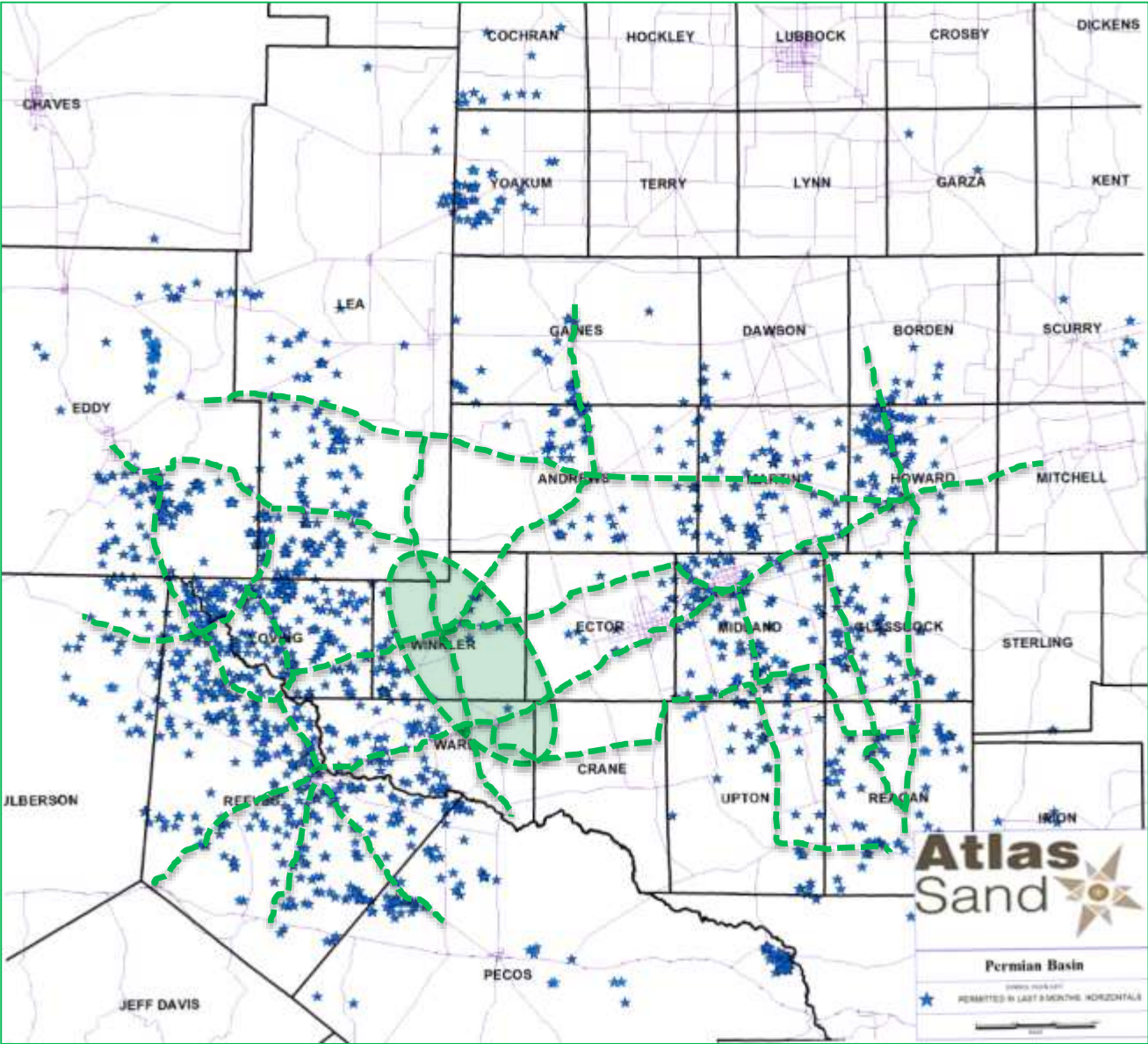


Brady Brown
@ \$85 - \$105/ton

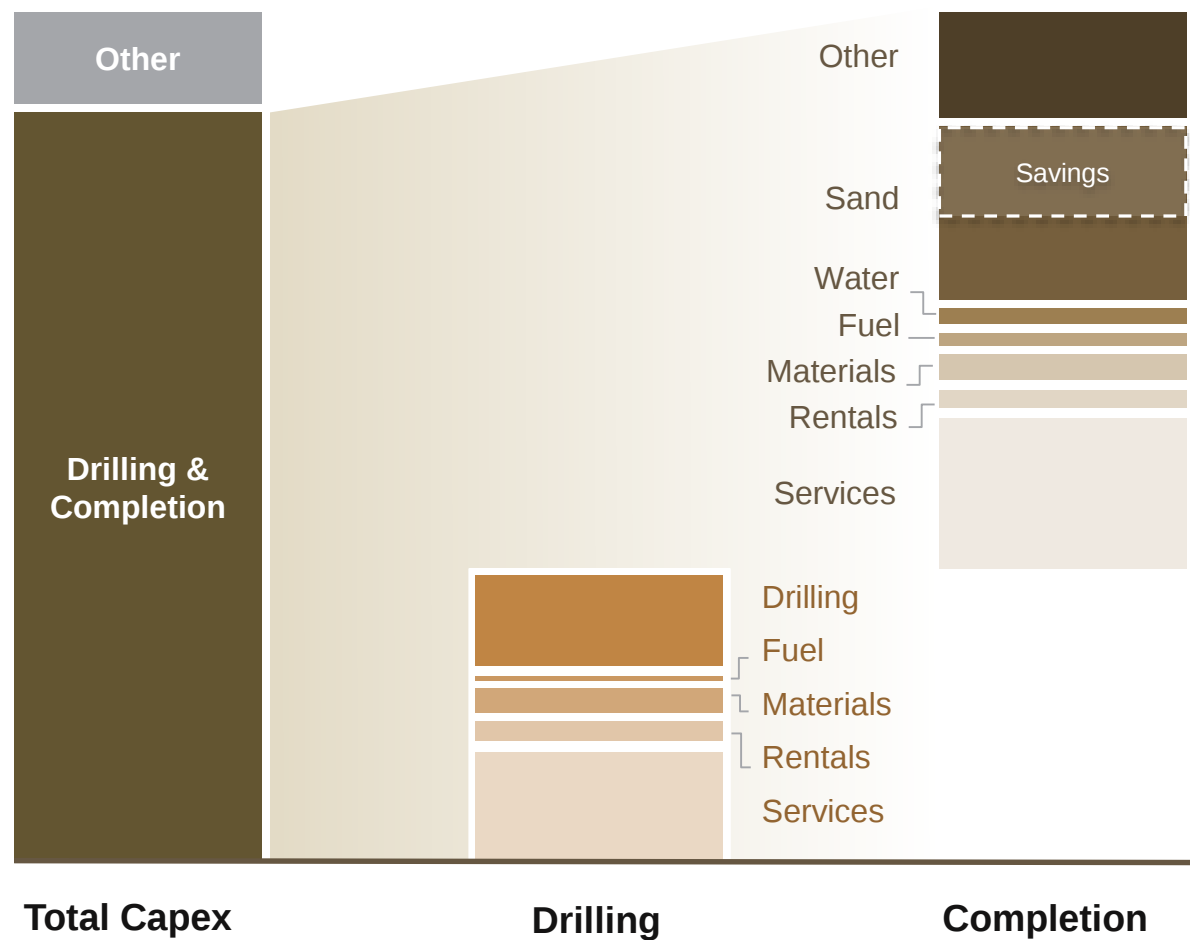


Permian in-basin Sand Discovery in 2017

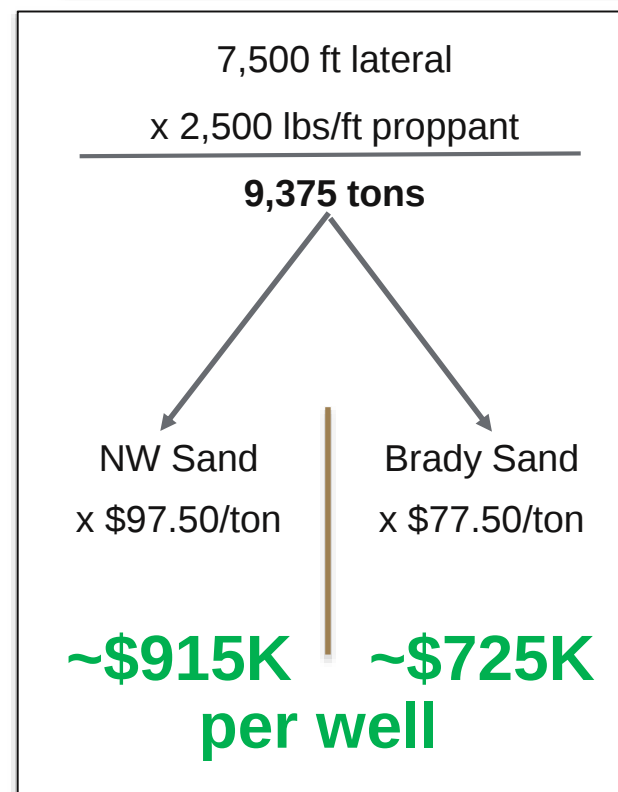
In-basin sand @
\$15 - \$20/ton



Value to Permian Operators



Sand is the single **largest component** of an AFE



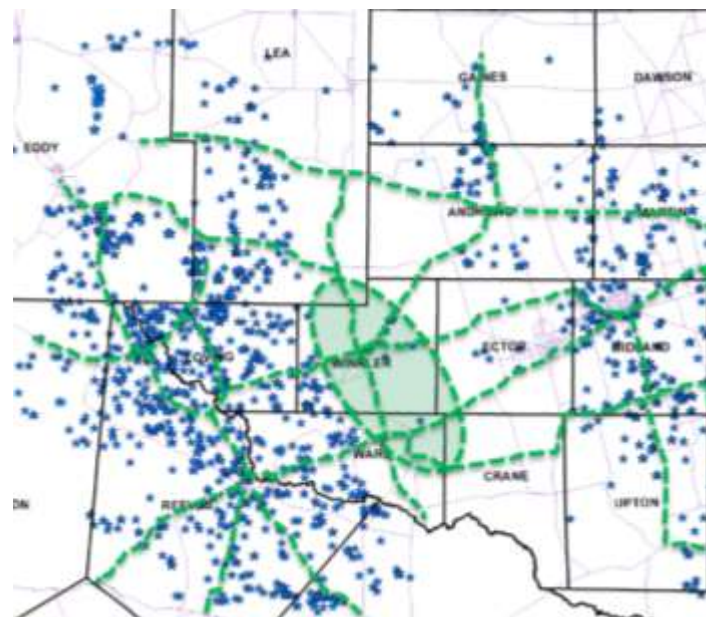
Value Added to the Permian as a Whole



2016 Permian Sand Sourcing

~70% of the sand sourced from NW

~30% of the sand sourced from Brady



Permian Sand Sourcing Today

(5,614 wells in 2019)

$0.7 \times 5,614 = 3,930$ wells
@ ~\$915K per well = **\$3.6 Billion/yr**

$0.3 \times 5,614 = 1,684$ wells
@ ~\$725K per well = **\$1.22 Billion/yr**



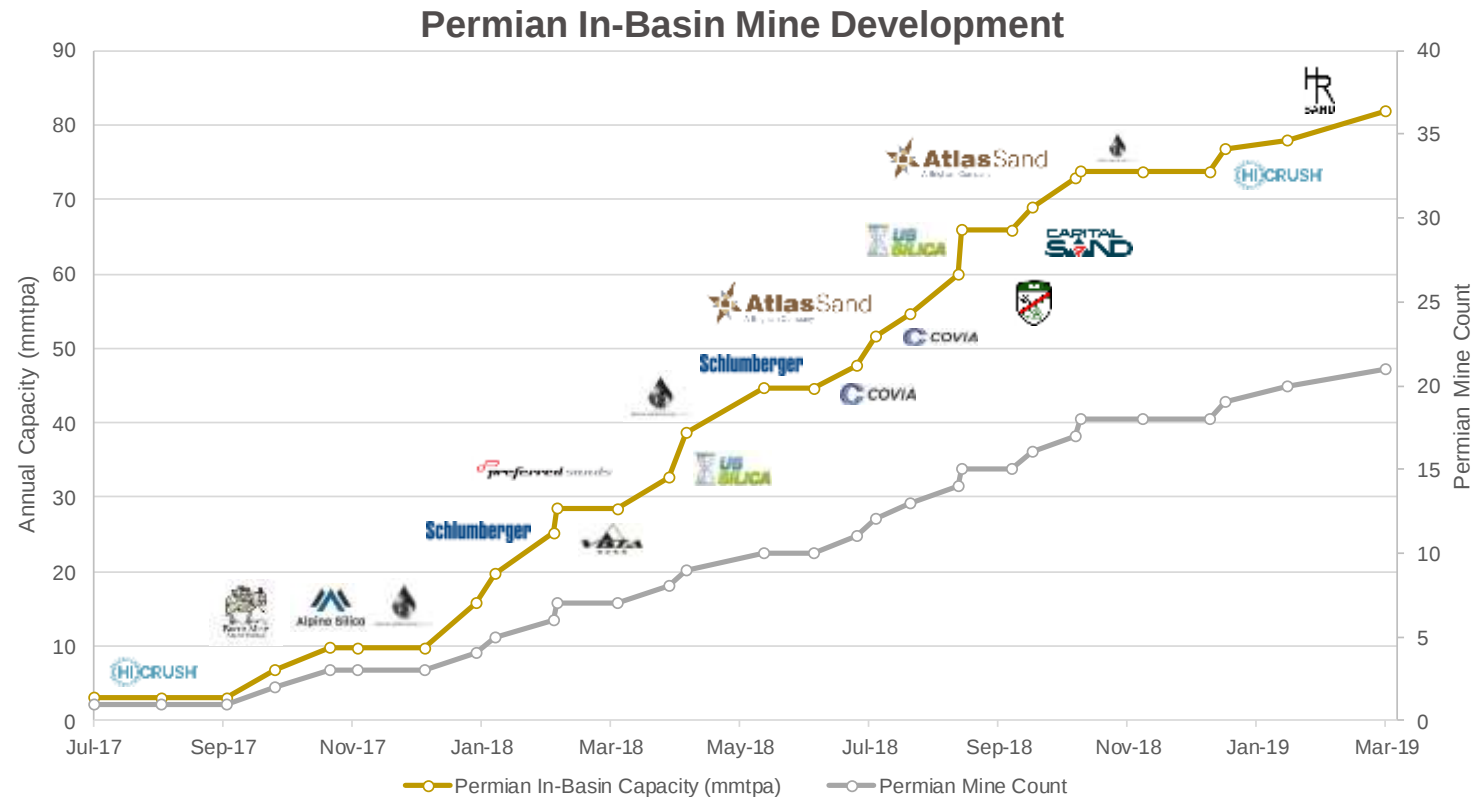
\$4,820,000,000 in annual value to the Permian Basin

The Permian In-Basin Gold Rush



Source: Infill Thinking, MSHA data, Management estimates.

Since Early 2017, Several Frac Sand Mines Have Opened in West Texas, Creating Significant Economic Opportunity...



Due to the development of 21 Permian mines¹ from July 2017 to February 2019:

- **+1,750 WTX jobs** have been created from sand production alone
- **An estimated \$2.5 billion** of Capital Deployed
- **5 new entrants** to the sand industry

Additional jobs have certainly been added due to the influx of population across a broad range of industries including hospitality, food service, construction, etc.

(1) Twenty-second operating Permian sand mine expected to begin operating 4Q 2019.

Source: Infill Thinking, MSHA Labor Data



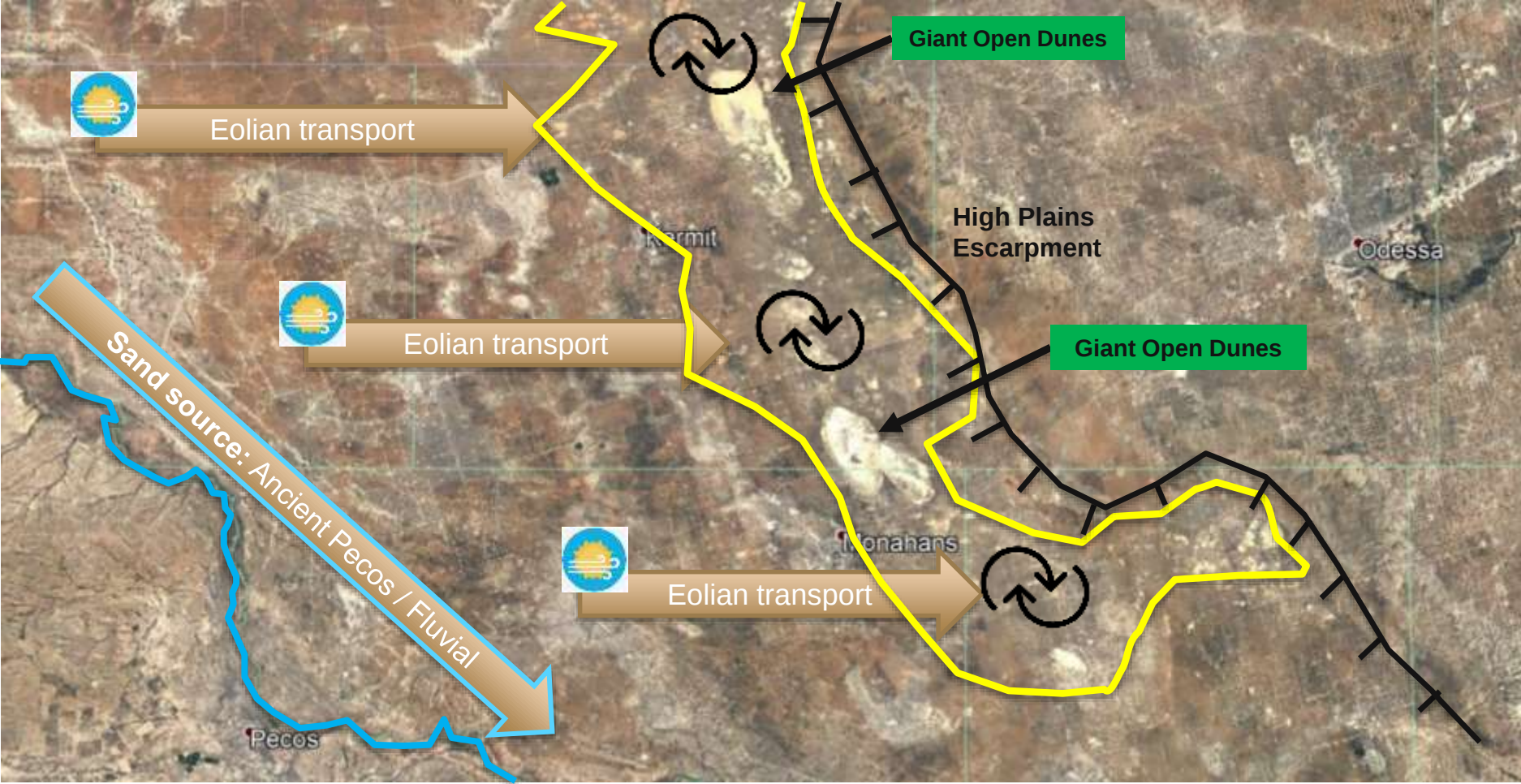
Geology of the Permian Sand Deposit



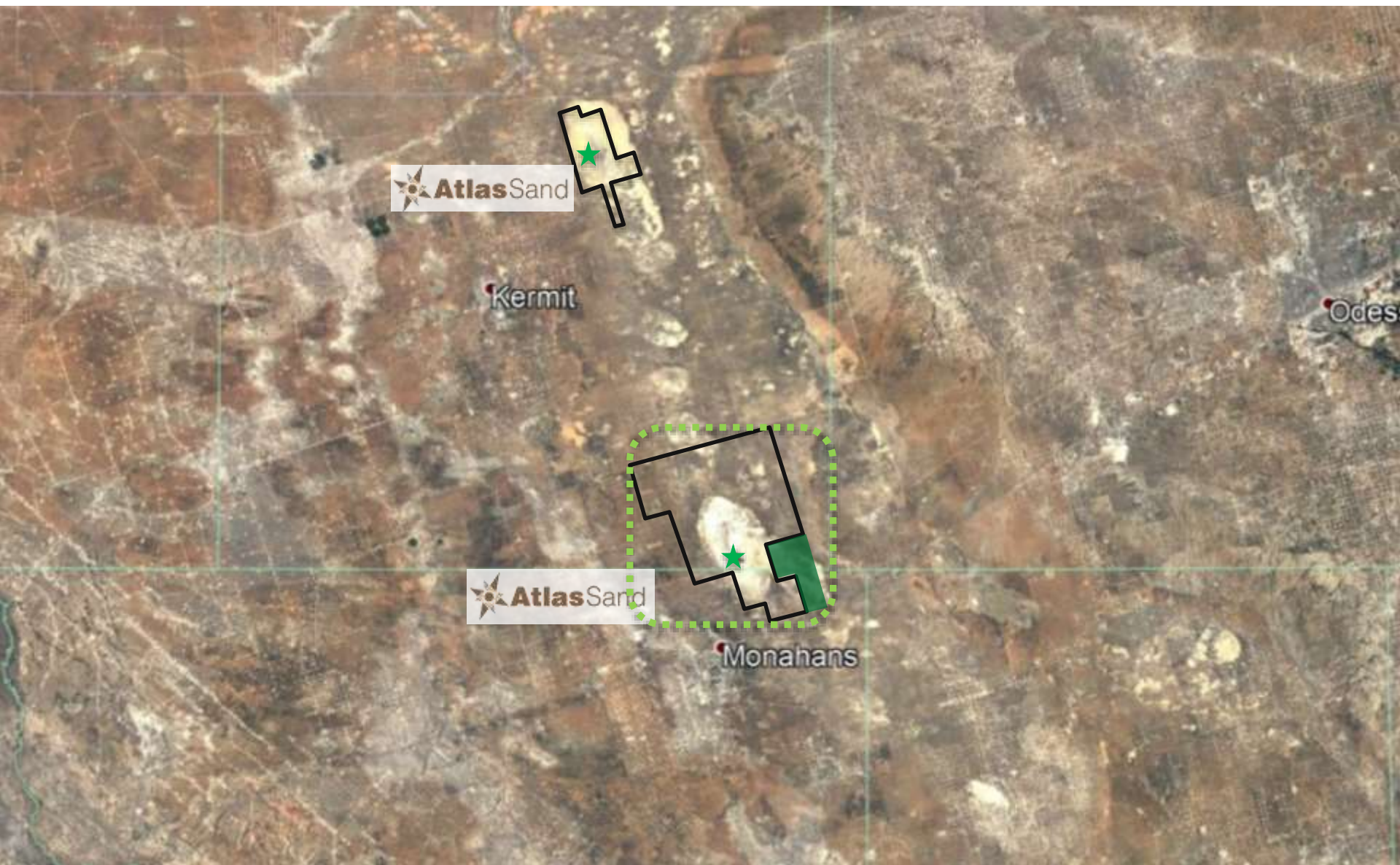
Permian Sand – A Quick Depositional History

Finding The Sweet Spots: Exploration Model

Winkler Trend/Monahan's Dune Complex – Quaternary olian system at southern limit of the Great Plains filled with multiple successions of dunes & buried soils horizons



Atlas Sand Controls the Vast Majority of the Open Dunes



Atlas Sand

Kermit

Odes

Atlas Sand

Monahans

Source: Infill Thinking, MSHA data, Management estimates.

Monahans Dune Core & Mapping Work

Industry leading research program to target the very best reserves in the trend

Consortium Research Project Participants



Bud Brigham
Founder



Griffin Money
Senior Geologist



Dr Steve Forman
Professor



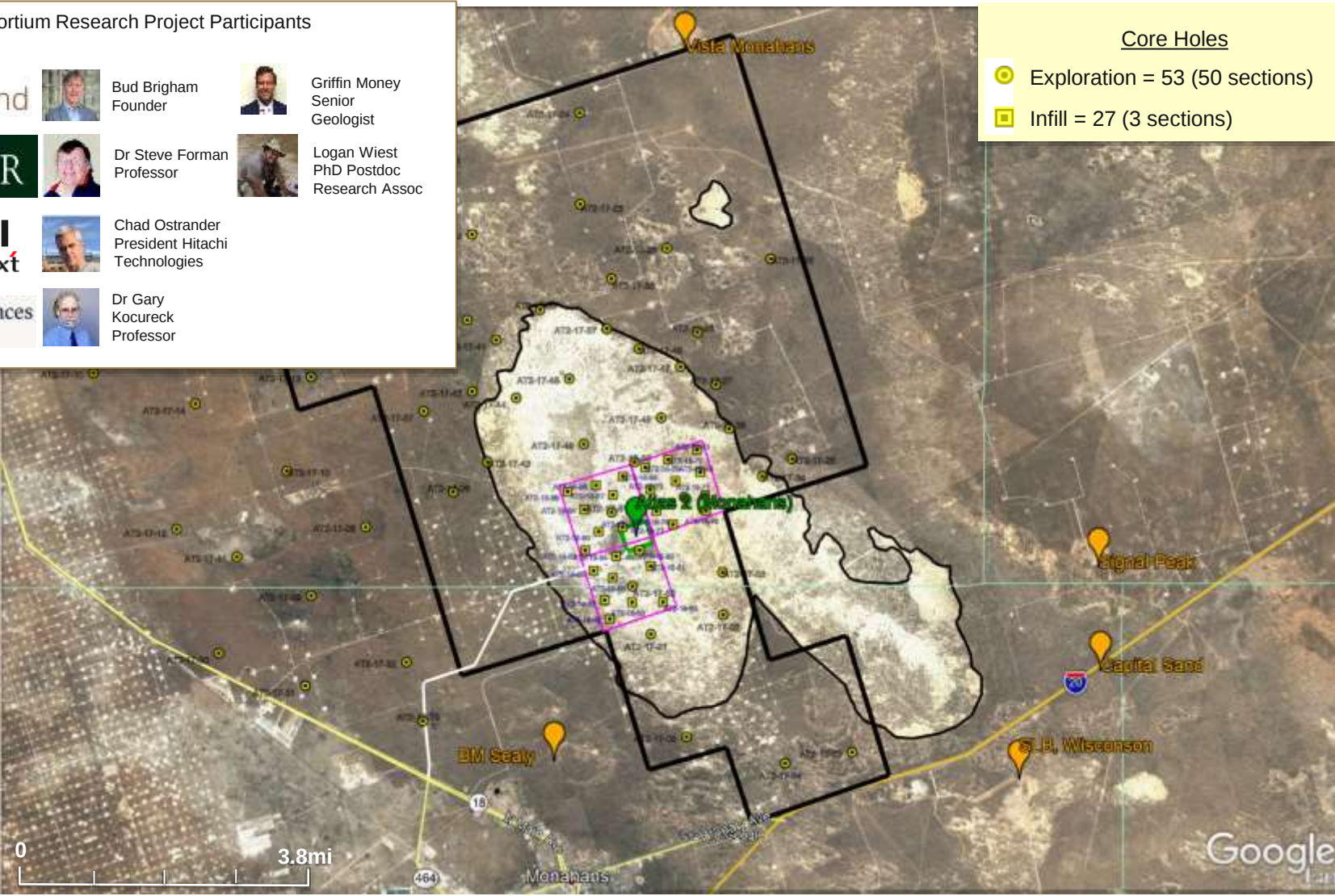
Logan Wiest
PhD Postdoc Research Assoc



Chad Ostrander
President Hitachi Technologies

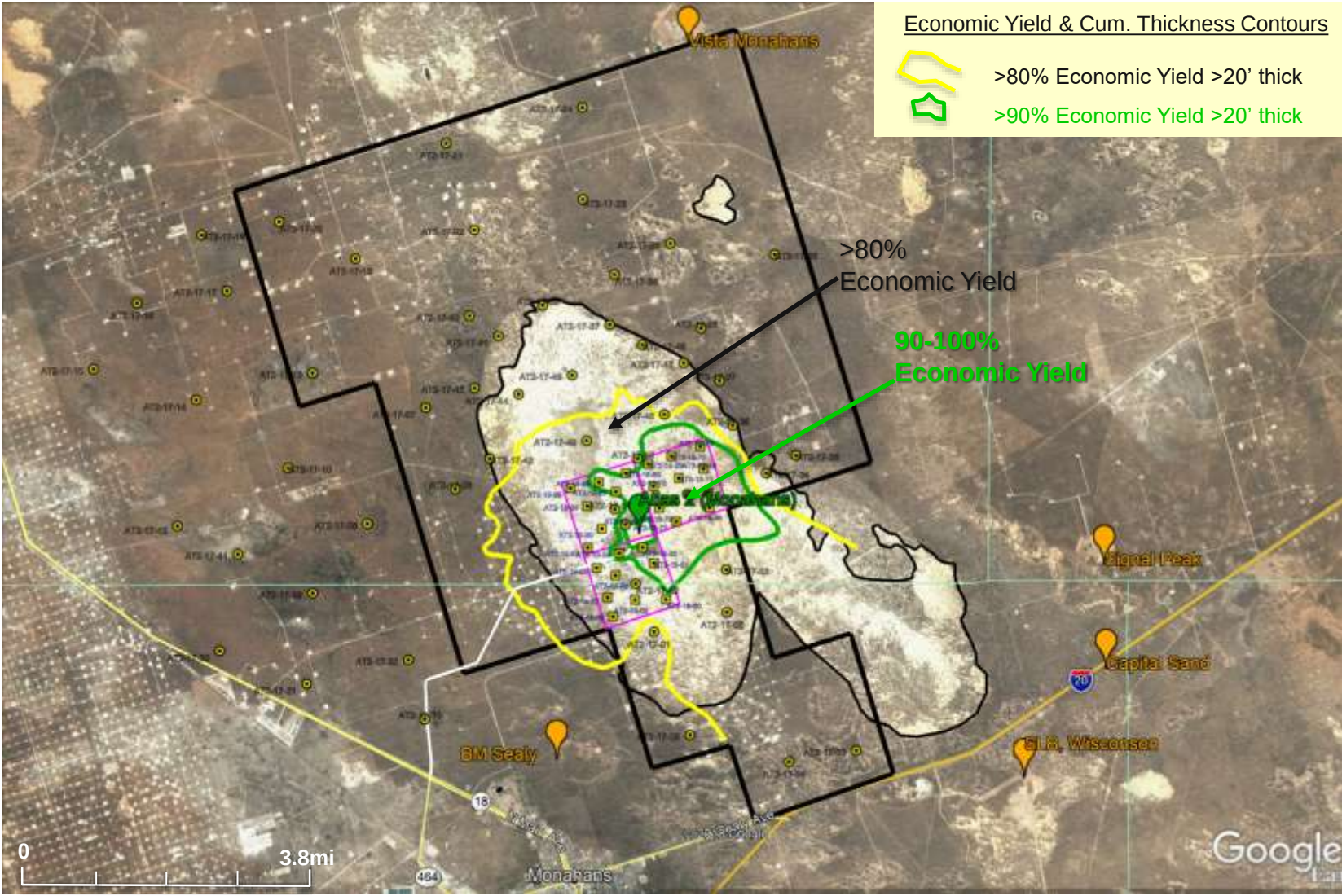


Dr Gary Kocureck
Professor



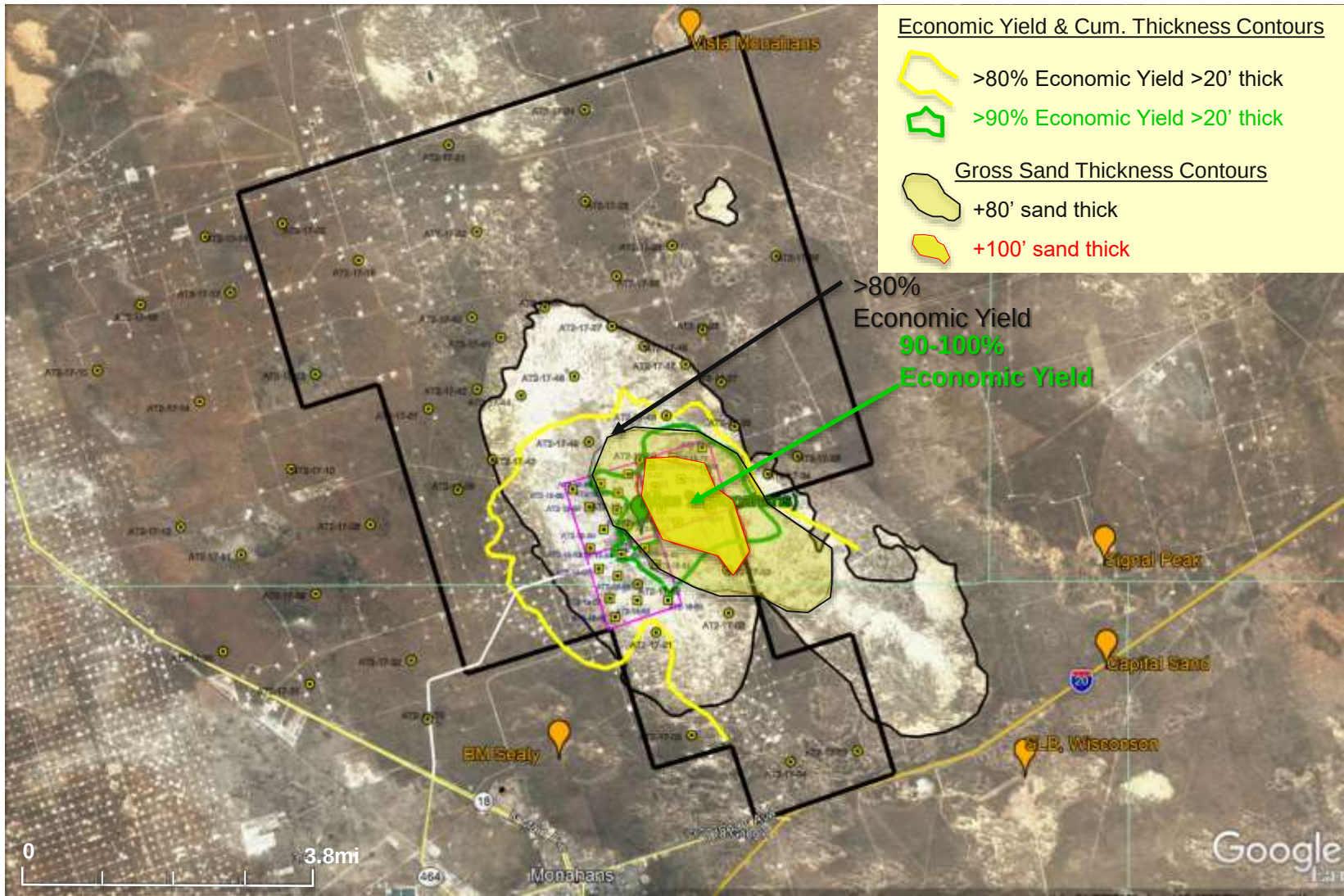
Monahans Dune Core & Mapping Work

Economic Yield Sweet Spots



Monahans Dune Core & Mapping Work

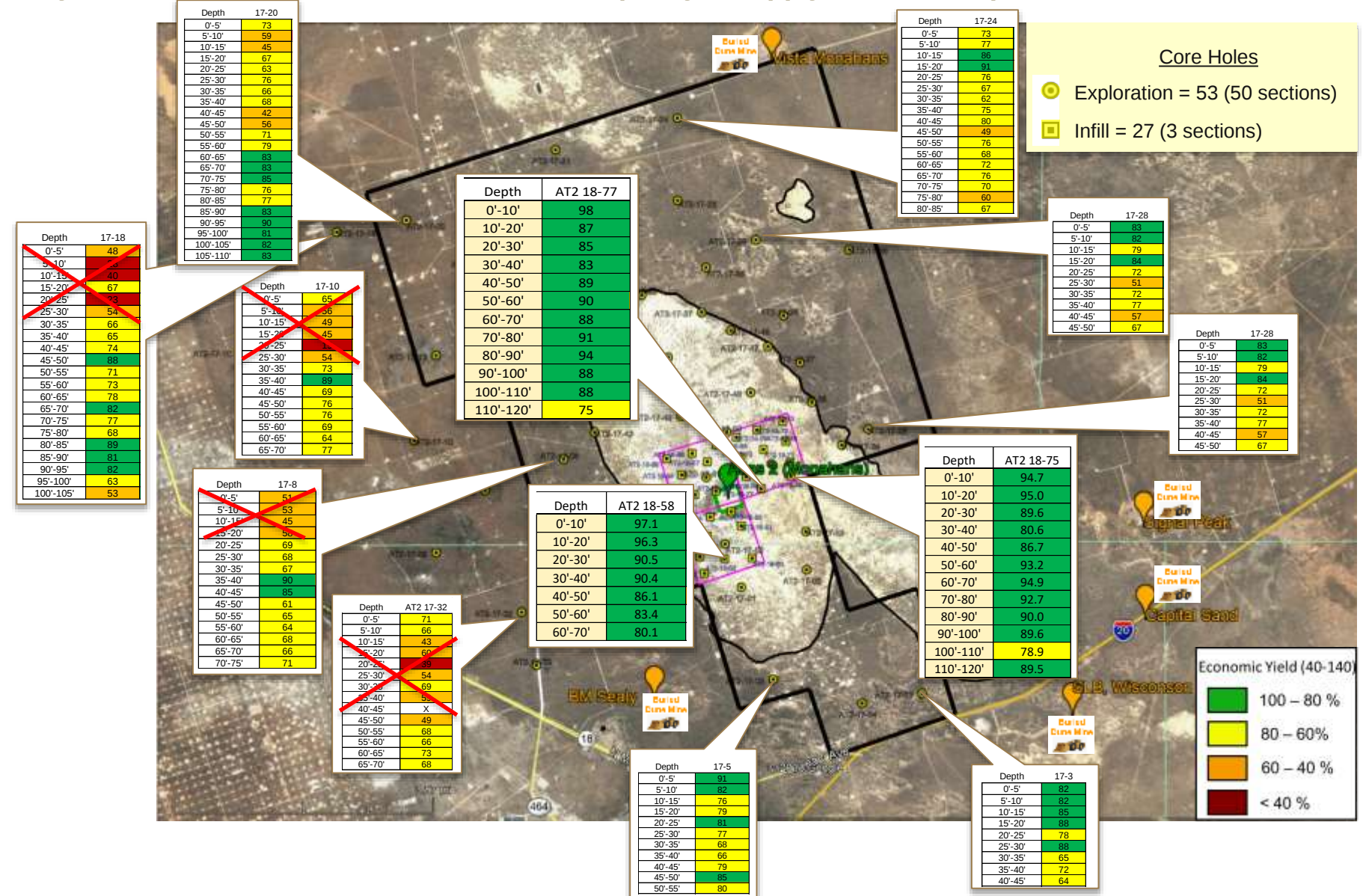
Economic Yield sweet spots concurrent with thickest reserves ≈ 50+ years proven currently



Giant Open Dune Advantages

Largest Reserves of Highest Quality Sand & Lowest Cost to Produce

Very best reserves in the trend → consistent quality & supply with less impurities & variation

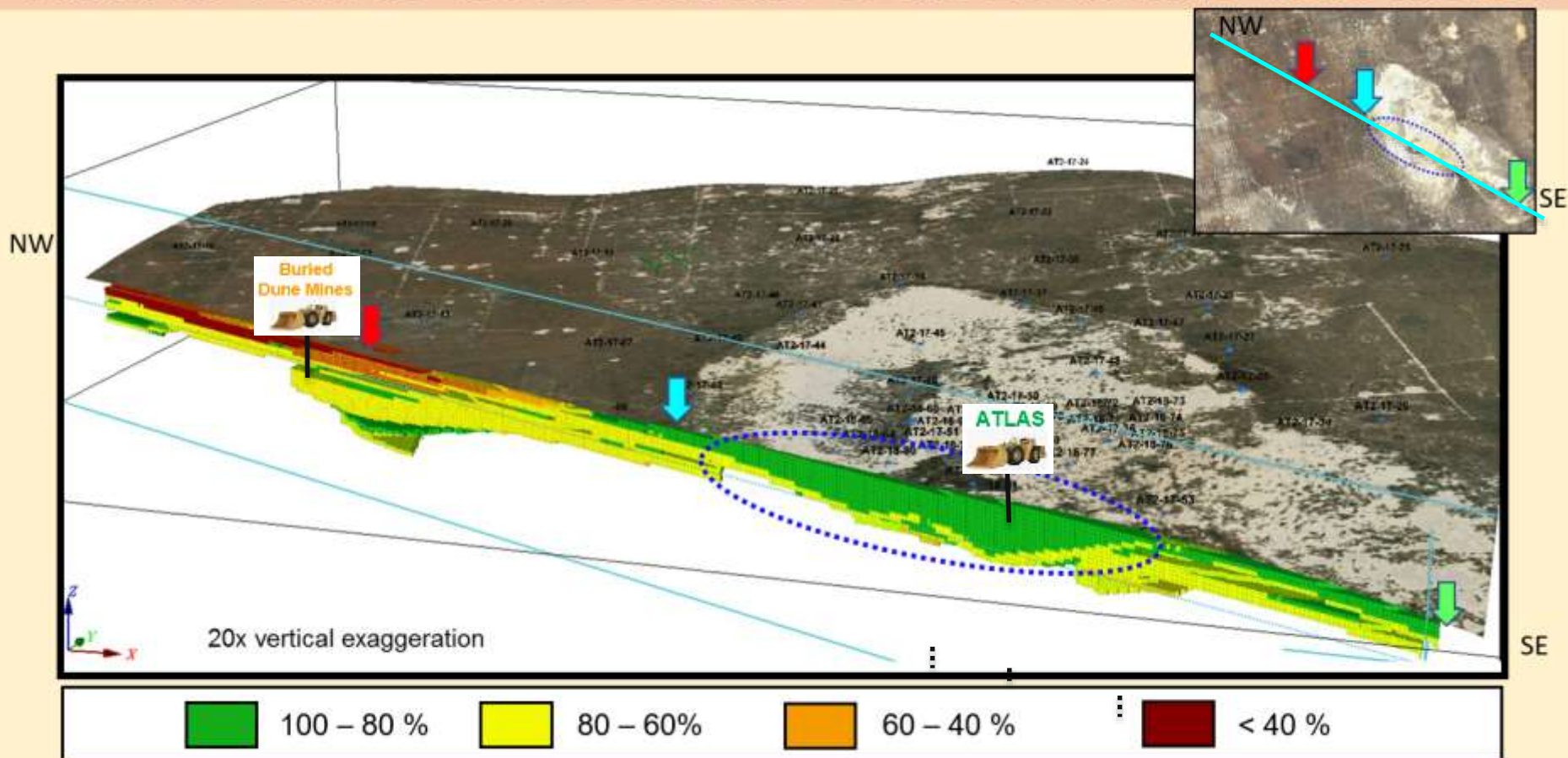


Giant Open Dune Advantages

Largest Reserves of Highest Quality Sand & Lowest Cost to Produce

Economic Yield sweet spots concurrent with thickest reserves $\approx 50+$ years proven currently

PART II: Various cross sections of the Economic Yield model



Giant Open Dune Advantages

On Dune Reserves	Off Dune Reserves	On Dune Benefits
Yields of 80%-90%+	Yields of 60%-80%	• Removes variability in product quality • Reduces stress on equipment & operations • More dependable / predictable production plan
Low turbidity	Increased turbidity	• Atlas <35 NTU • Diminished impact of organics on fluid system and production • Reduced stress on equipment & operations
Consistent reserve mix & quality	Inconsistent reserve mix & quality	• Open dunes have less variation and increased quality due to geologic processes • More dependable / predictable production plan
Avg reserve depth 80'-100'	Avg reserve depth 20'-60'	• Consistent quality & supply with less impurities • Reduces stress on equipment & operations



The Dune Sagebrush Lizard



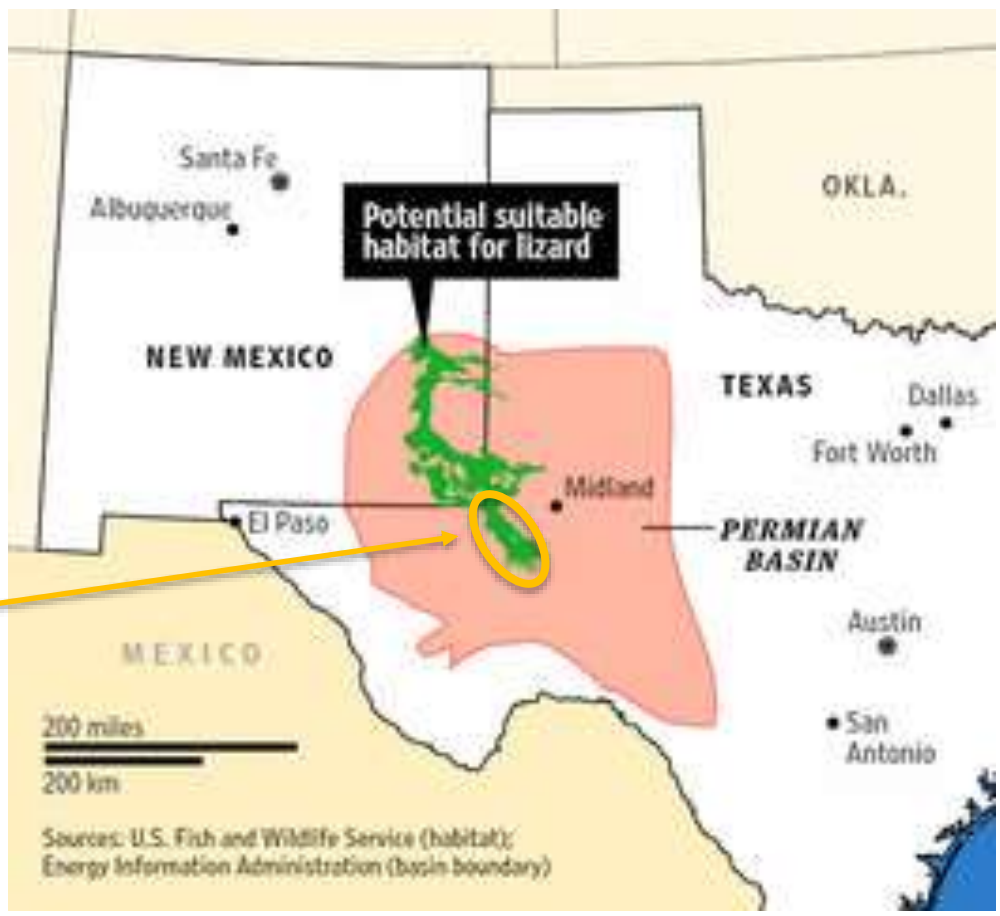
Dunes Sagebrush Lizard

The Dunes Sagebrush Lizard (DSL) is a small lizard that lives in west Texas and southeast New Mexico. Much of its habitat overlaps the Permian Basin oil & gas activity.

Certain interest groups have been trying to push for listing and other protections of the DSL since the 1990's.

Sand mining in west Texas is a new activity that overlaps with some of the potential suitable habitat for the DSL.

Winkler Sand Trend



Atlas' Plan to be Good Stewards with Respect to the DSL

- **Atlas believes that it is every sand miners' responsibility to develop a thoughtful plan to develop their assets in a manner consistent with best practices**
 - This means investing in science and real site-specific surveys to determine whether and where the dunes sagebrush lizard may exist on each company's property
 - Reliance on historical maps produced at a desktop level are not sufficient evidence of the presence or absence of the species – on the ground work is required
- **The Atlas management team has a history of good stewardship and giving back to the community**
- **We have voluntarily adopted industry-leading best practices around conservation of the DSL:**
 - Avoidance of shinnery oak habitat that is known to be home to the DSL where possible;
 - Moving slowly across the landscape with our mining activities, allowing for potential DSL habitat restoration projects as part of the reclamation process wherever this opportunity exists
 - Including substantial DSL habitat set asides. Atlas plans to voluntarily set aside as much as **17,000 acres** of its currently held 38,000 acreage position
 - Making investments in science and conservation research
- **Atlas has already done significant scientific work to assess the risk of disturbance of DSL habitat on our acreage; with our Kermit environmental assessment complete, our independent biologists have found no evidence of the presence of DSLs on the open dunes, and no DSL habitat**

New Project Teaser

Traffic and more importantly traffic accidents and deaths are a major problem in the Permian.

Atlas has been working on a project for a little over two years to remove a massive amount of trucks from the roads. This project will:

- Remove ~700,000 truck loads from the roads per year
- Remove ~34,800,000 truck miles from the roads per year
- Remove ~14,000 metric tons of CO2 emissions per year
- Reduce traffic accidents and fatalities significantly – **conservatively estimated to save 30 to 50 lives annually**