The Role of Proppants
What They Are and How They Work
Benefits to America

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BACKGROUND
BACKGROUND

• Speaker Background
• Mining - Core Industry for ~30 years
  • Client and Industry Advocacy
  • Industry Association Support – (not just name on list)
    • IMA-NA, NISA, NSSGA, WISA, MAA, IAAP
    • Committees, Subcommittees, Task Forces – Chair and Support
    • Papers, Presentations, Training
• Proactive
• One Company
BACKGROUND

• Industry Advocacy
  • Annual DC Capitol Hill Visits
  • State Senate Testimony
  • IPCB and WDNR Testimony
  • Rule Making - MNSSRAP
  • Regulatory Agency Interaction
  • Draft Rule Making Review
BACKGROUND

• Industry Advocacy
  • Industry Group Presentations and Webinars
  • Stakeholder Presentations
    • National Transportation Safety Board (NTSB)
    • Society for Mining, Metallurgy & Exploration (SME)
    • American Planners Association
    • County Engineers, County Zoning Officials
PROPPANT

Ideally:
• Lighter Than Water
• Round as Marbles
• Strong as Diamonds
• Cheaper Than Dirt
PROPPANT - Sand
PROPPANT – Resin Coated

Uncoated
PROPPANT - Ceramics

Sources:
- Bauxite
- Kaolin
- Magnesium Silicate
- Fly Ash
PROPPANT

Hierarchy of Strength and Conductivity

- **Highest EUR, Production, IRR**
  - High strength
  - Uniform size and shape
  - Thermal resistant

- **Highest Conductivity**
  - Tier 1: High Conductivity Ceramic

- **Medium strength**
  - Irregular size and shape

- **Tier 2**
  - Medium Conductivity Resin-coated sand

- **Low strength**
  - Irregular size and shape

- **Tier 3**
  - Low Conductivity Sand
PROPPANT SOURCES
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PROPPANT USE
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Since 2013, Average Proppant lbs/ft has Doubled in Many of the Largest Producing Regions

Note: 2016 values includes data through August
Source: BTU Analytics, Updated 11/30/2016.

www.btumetrics.com
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PROPPANT BENEFITS
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World Petroleum Consumption
Top Consuming Countries, 1960-2008

Source: http://www.eia.gov/totalenergy/data/annual/archive/038409.pdf
PROPPANT BENEFITS

U.S. Crude Oil Production and Imports

Production
Net Imports

Million barrels per day
Million cubic metres per day

Year
1920 1940 1960 1980 2000 2020
PROPPANT BENEFITS

Daily Oil Production: Permian Basin, Eagle Ford and Bakken
January 2007 to August 2014 (est.)

Source: Energy Information Administration

Mark J. Perry
PROPPANT BENEFITS

US shale oil production by region

Source: EIA
PROPPANT BENEFITS

- From 2009 to 2012, production growth primarily attributable to increased vertical activity
- Post 2012, production growth expected to be driven by horizontal activity

Source: IHS Energy through May 2013 for the Spraberry, Crades East, Garden City South and Lin Fields.
PROPPANT BENEFITS

Bakken Oil Production in North Dakota, 2004-2013

Barrels of Oil Per Day

Year and Month

Jan-04 Jan-05 Jan-06 Jan-07 Jan-08 Jan-09 Jan-10 Jan-11 Jan-12 Jan-13
PROPPANT BENEFITS
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• Sand is the Primary Proppant
• Supply is High and Growing
• New Mines Under Development in WI, IL, TX, OK, and Elsewhere
RESEARCH

Policy Studies Addressing the Impacts of Industrial Sand Mining

Policy Study
The Heartland Institute
No. 127 - May 2015
Environmental Impacts of Industrial Silica Sand (Frac Sand) Mining
By Isaac Orr and Mark Krumweide

Policy Study
The Heartland Institute
No. 138 - June 2015
Economic Impacts of Industrial Silica Sand (Frac Sand) Mining
By Isaac Orr and Mark Krumweide

Policy Study
The Heartland Institute
No. 143 - February 2016
Social Impacts of Industrial Silica Sand (Frac Sand) Mining: Land Use and Value
By Mark Krumweide and Isaac Orr

Policy Study
The Heartland Institute
No. 142 - December 2016
Comprehensive Regulatory Control and Oversight of Industrial Sand (Frac Sand) Mining
By Mark Krumweide and Isaac Orr

Policy Study
The Heartland Institute
No. 158 - September 2015
Roadway Impacts of Industrial Silica Sand (Frac Sand) Mining
By Isaac Orr and Mark Krumweide

Policy Study
The Heartland Institute
No. 144 - April 2017
Air Quality and Industrial Sand (Frac Sand) Mining
By Isaac Orr and Mark Krumweide
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