

Impact of Hydraulic Fracturing

Presentation to Scientific Inquiry into Hydraulic Fracturing in the Northern Territory

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HALLIBURTON

Solutions and Services for Shale Developments

Drilling & Evaluation

Seismic	FX™ Drill Bits	DFG™	GeoForce®	MaxForce®-FRAC Perforating Charges	DynaMem® Electronic Memory Gauges
					
Landmark Software & Services	Drill Bits & Services	Baroid	Sperry Drilling	Wireline & Perforating	Testing & Subsea
					
Resolve® Software	RockStrong™	ShaleDri®	LithoSCAN®	ShaleXpert™	DynaLink™

Completion & Production

WellLock™	Pinnacle Microseismic	Coil Tubing	Rapid Suite™ System	ESP	H ₂ Zero®
					
Cementing	Production Enhancement	Boots & Coots	Completion Tools	Artificial Lift	Multi-Chem
					
iCem® Service	Frac of the Future	SIMO Manifold	SwellPacker®	ESP	Production Chemicals

Consulting & PM

Reservoir Assessment	Wellsite Management
	
Consulting	Project Management
	
Engineering Development	Asset Management







Exploration

Development

Decommission

Halliburton in Australasia

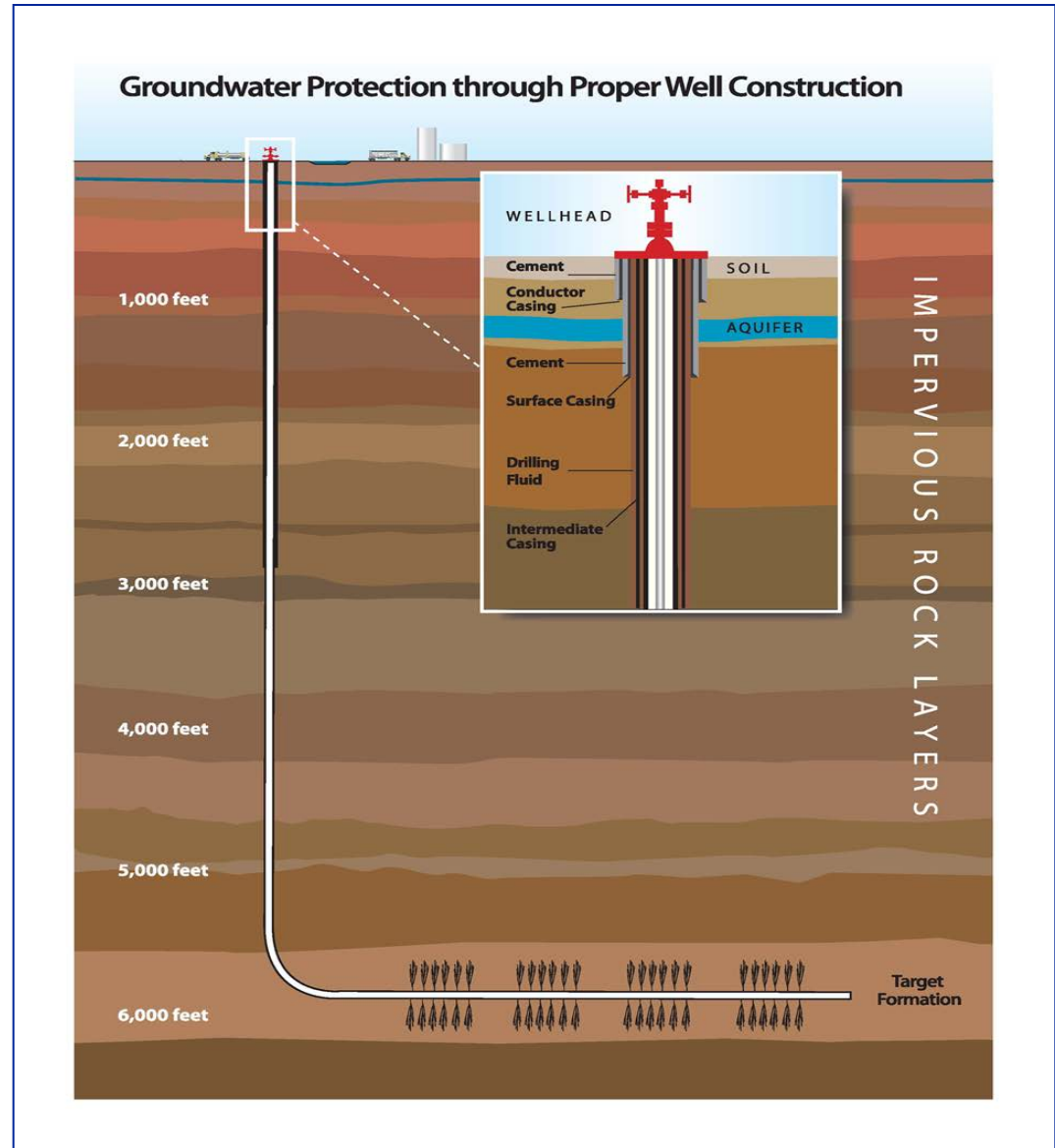


 Founded:	 Employees	 Vendor Spend	 Headquarters	 Frac Market Share	 Improved Technology Delivers
1958	Around 600 (2017)	\$43 million, 600 Australasian suppliers (2016 figures)	Perth	>70%	Greener footprint Increased production

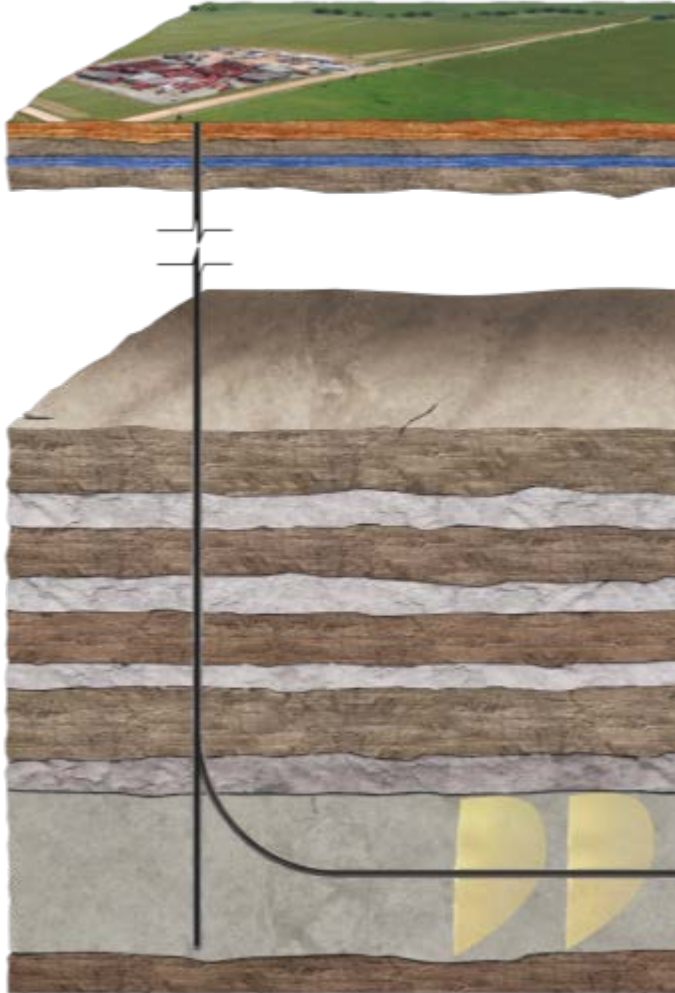
Well Construction – Protecting Ground Water

Multiple layers of cement and steel casing

- Protect ground water
- Constrains fluid movement between formations

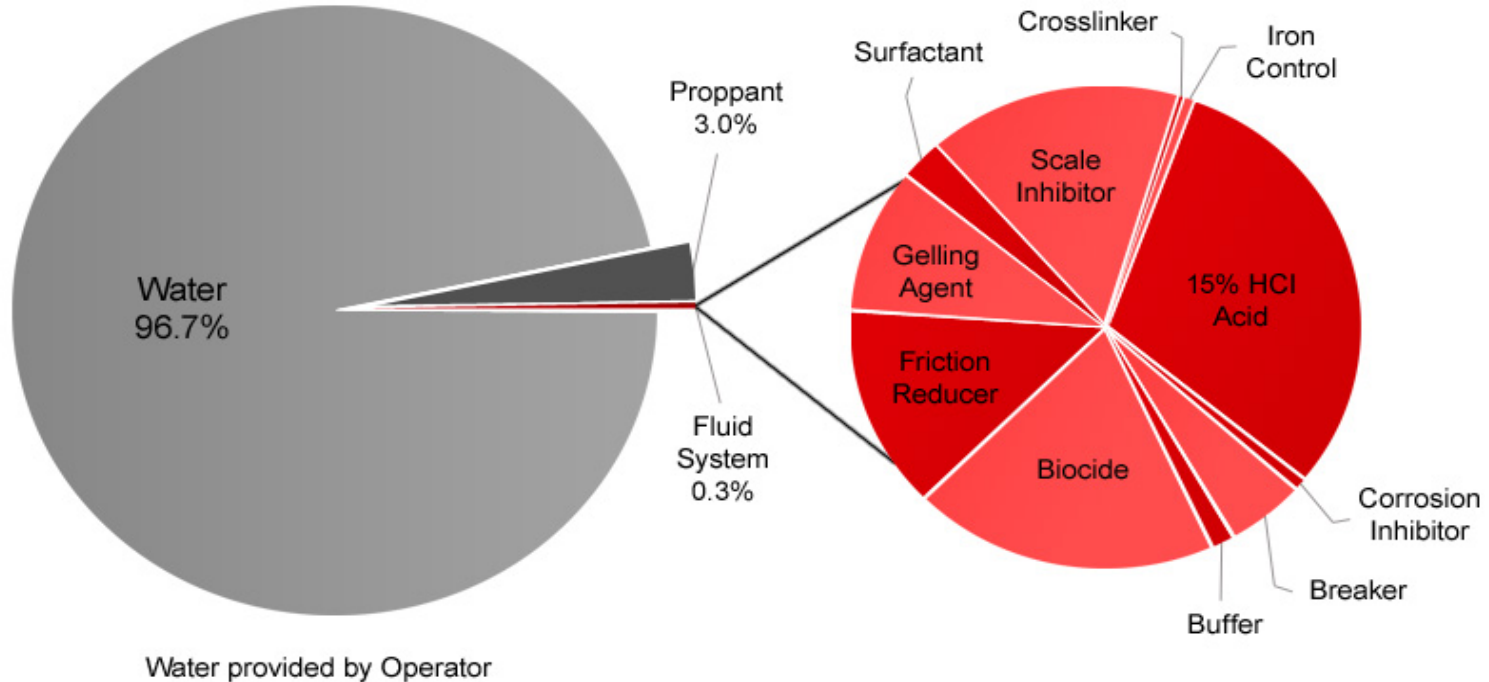


What is “Hydraulic Fracturing?”



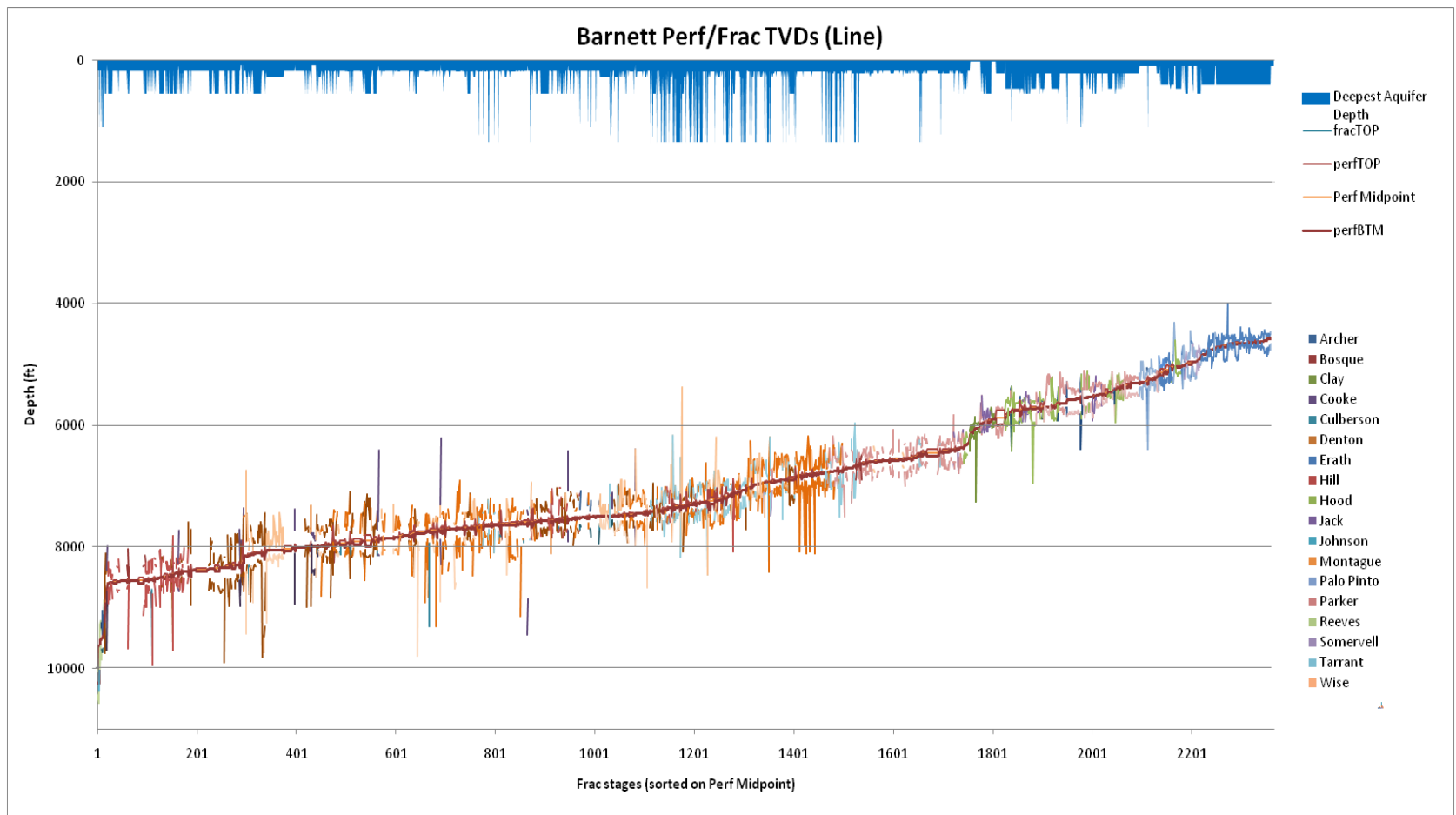
- Hydraulic Fracturing:
 - The use of fluids to create a pathway to the wellbore
 - The placement of small granular solids into the pathway to ensure that it remains open after the hydraulic pressure is removed
- Objective:
 - Increase the rate at which the well is capable of producing oil or gas
 - Increase the economically recoverable reserves for a well

Fracturing Fluids



- www.fracfocus.org
- www.halliburton.com/hydraulicfracturing

Separation Between Aquifer and Fractures



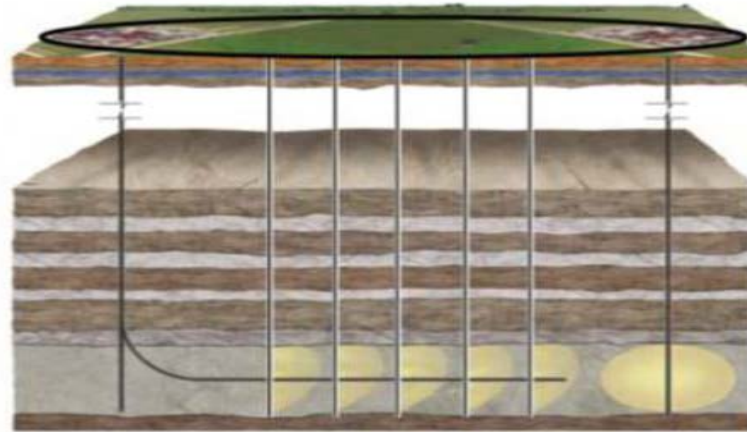
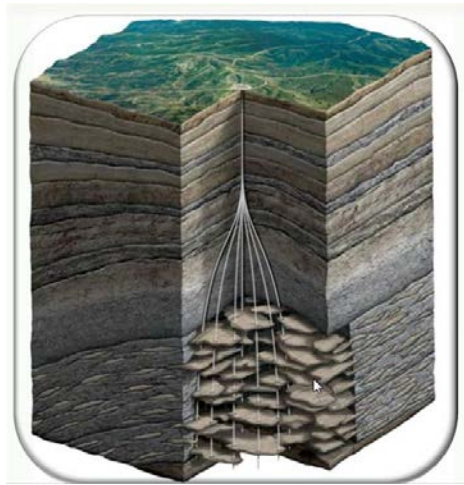
Fracture growth does not approach groundwater.

Fracturing Technology

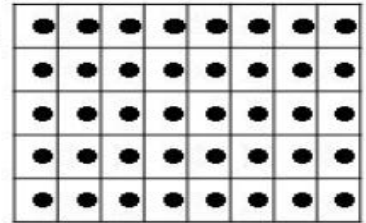


- Reduced number of wells due to technological advances
- Reduced and cleaner additives
- Decreased well-site size
- Dry-blending to reduce spill risk
- Recycling of fluids and 'produced' water
- Reduced greenhouse gas emissions

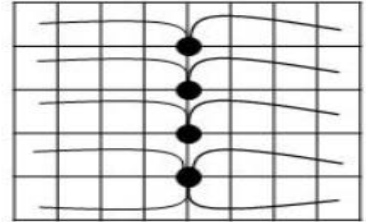
Multi-well Pads and Horizontal Wells Reducing Footprint



Vertical Wells



Horizontal Wells



Benefits of Shale Gas / Hydraulic Fracturing

- Major benefits in U.S. over recent years:
 - » Major reduction in gas and oil prices
 - » Enhanced energy security
 - » Major manufacturing sector investment
 - » Job creation: 1 in 9 jobs created in US in 2012
- Hydraulic fracturing is the technological key to unlocking shale gas

Northern Territory Opportunity and Context

- Onshore gas is a major opportunity for the Northern Territory:
 - » Substantial potential resources: Macarthur, Bonaparte, Beetaloo, Georgina and Amadeus basins
 - » Significant local employment and revenue potential
 - » Growing markets for LNG and domestic gas, facilitated by pipeline connection to eastern Australia
 - » Energy security for the Northern Territory
- Significant existing body of work, particularly Hawke Review
- Robust regulatory framework introduced in 2016; disclosure models
- Halliburton keen to assist Inquiry with technical/industry information

THANK YOU