Design Requirements for Commercial Sedimentary Geothermal Projects

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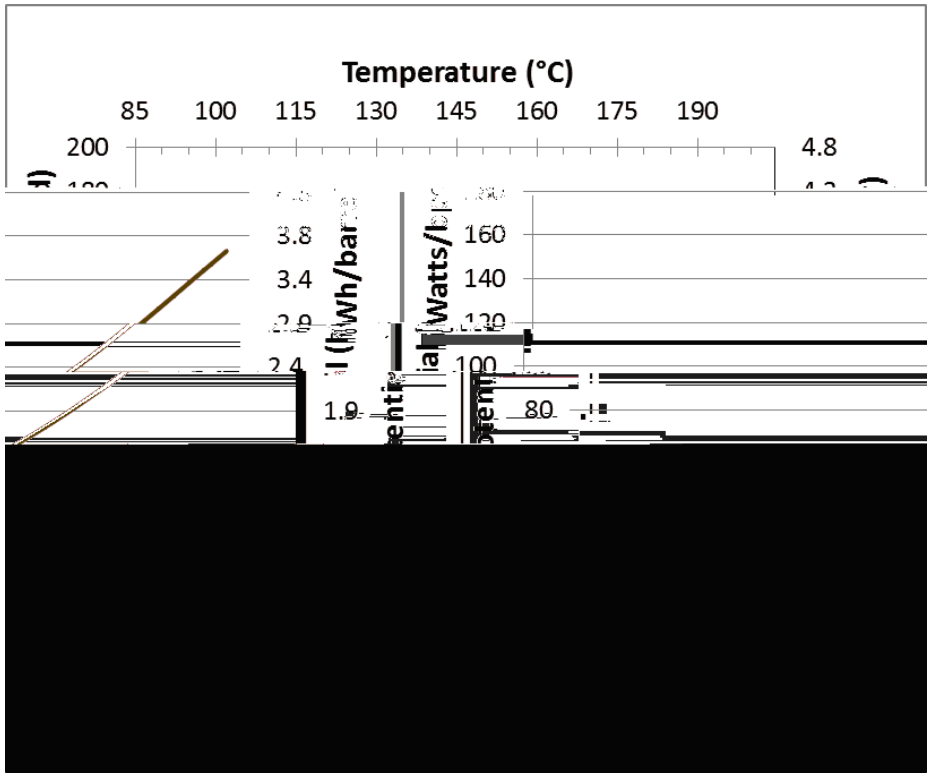
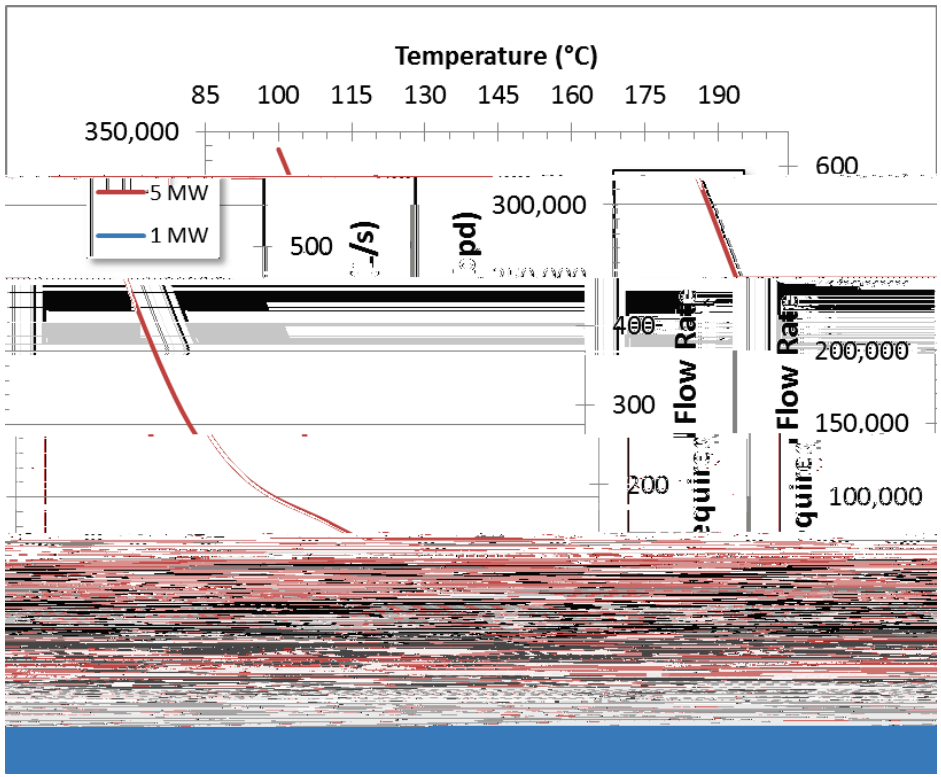
Geothermal vs. Petroleum – a Comparison

Petroleum		Geothermal
	Temperature	
	Flow Rates	*average*

Temperature is important, but is not enough…



Electricity Generation vs. Temperature

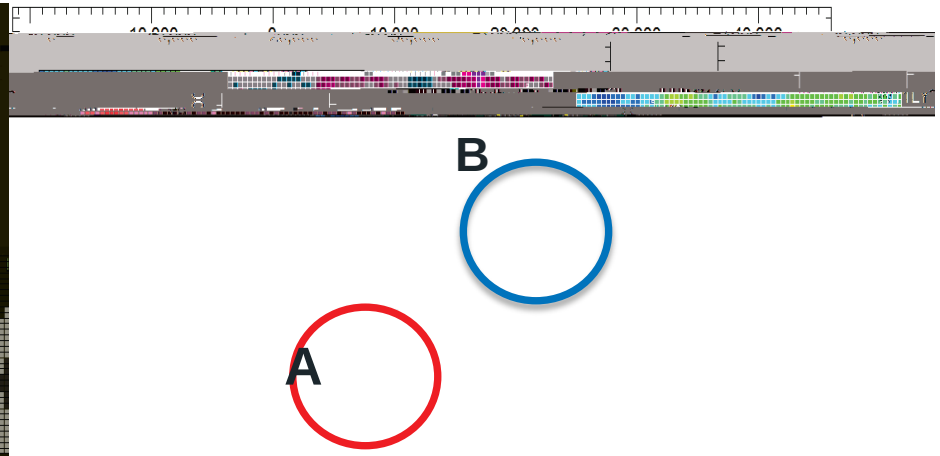


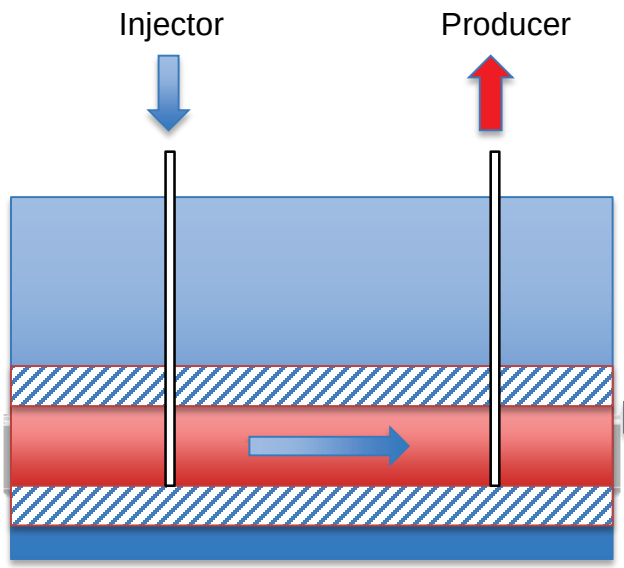
Flow Rate Requirements vs. Temperature

-
-
- ϕ

  k ϕ k
- **Area B is selected due to its higher porosity (hir.1( ) pe16.7(e)-.6(dmT0.30540 r**

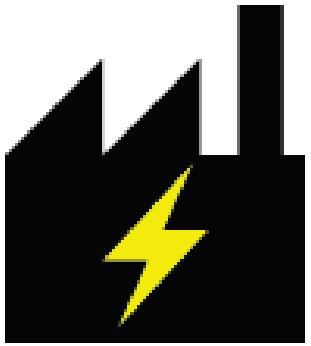
Temperature Distribution





Temperature

Sedimentary Geothermal Reservoir Requirements



Utility-Scale Electricity Generation

Flow Capacity ( )

k

h

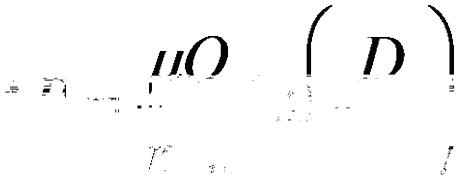
Reservoir Volume

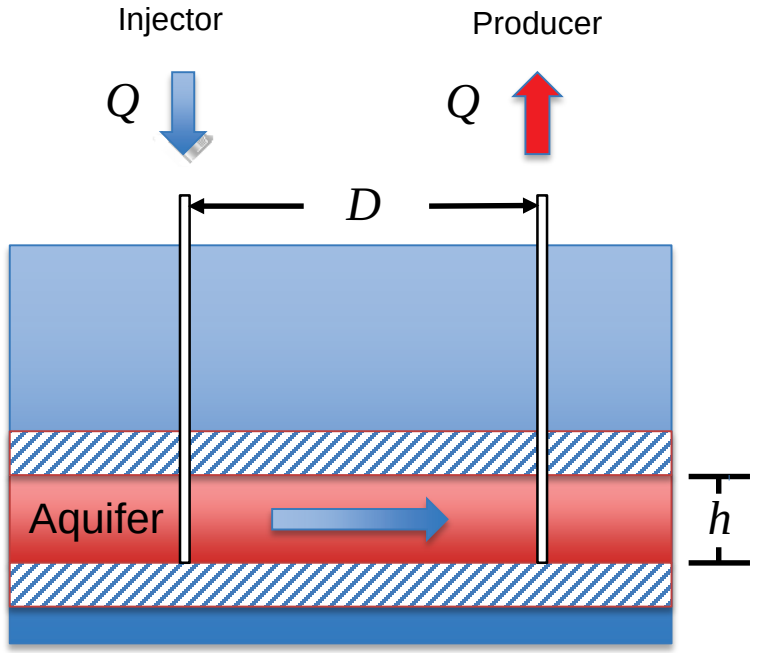
Sedimentary Geothermal Doublet – Analytic Model

- Time for **thermal breakthrough** at production well (Gringarten, 1979)

$$\Delta t = \left[\phi + (1-\phi) \frac{\rho_r C_{p\,r}}{\rho_w C_{p\,w}} \right] \frac{\pi}{Q} D\ h$$

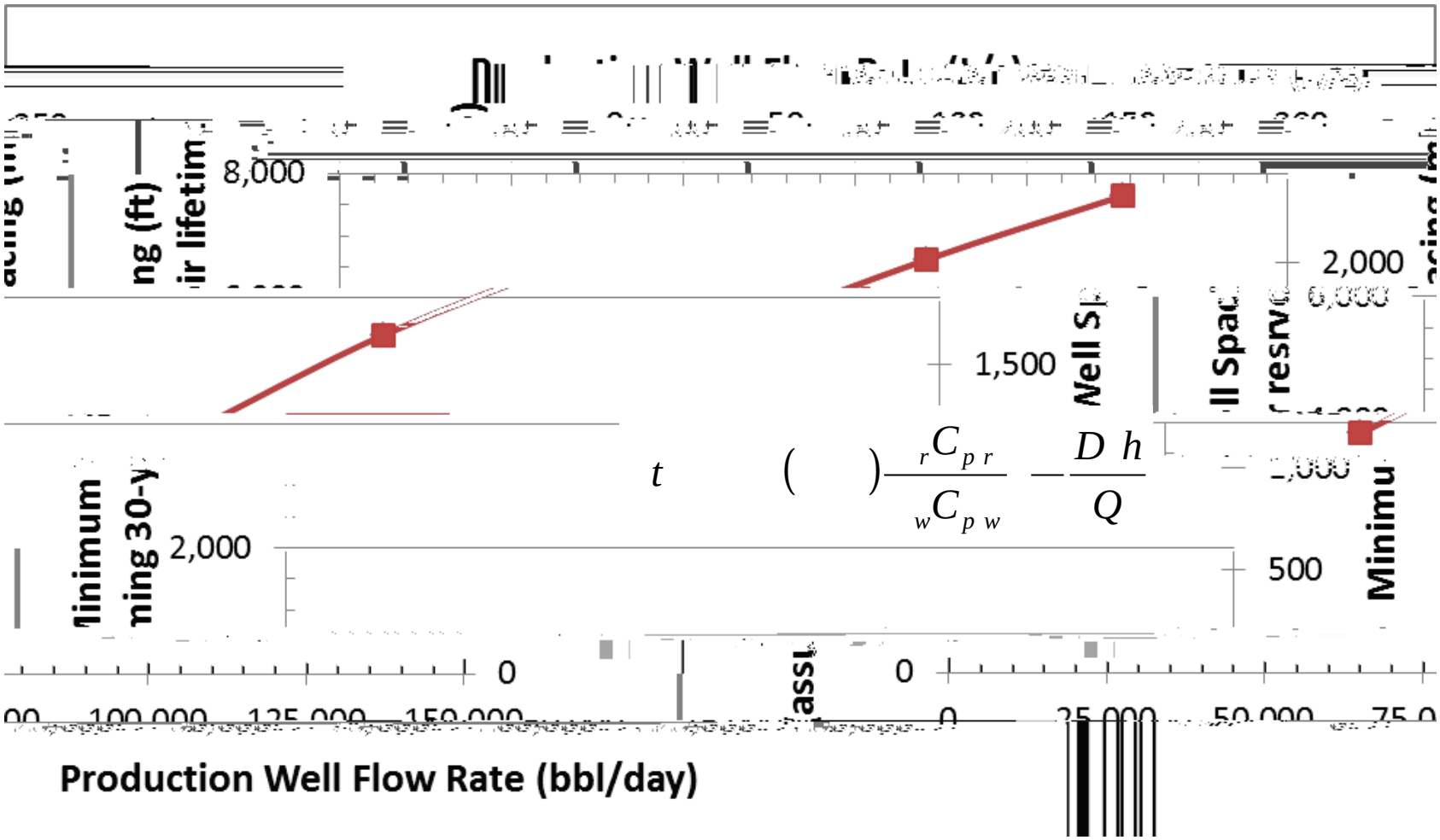
- **Pressure difference** between injection and production wells (Gringarten, 1979; Muskat, 1939)





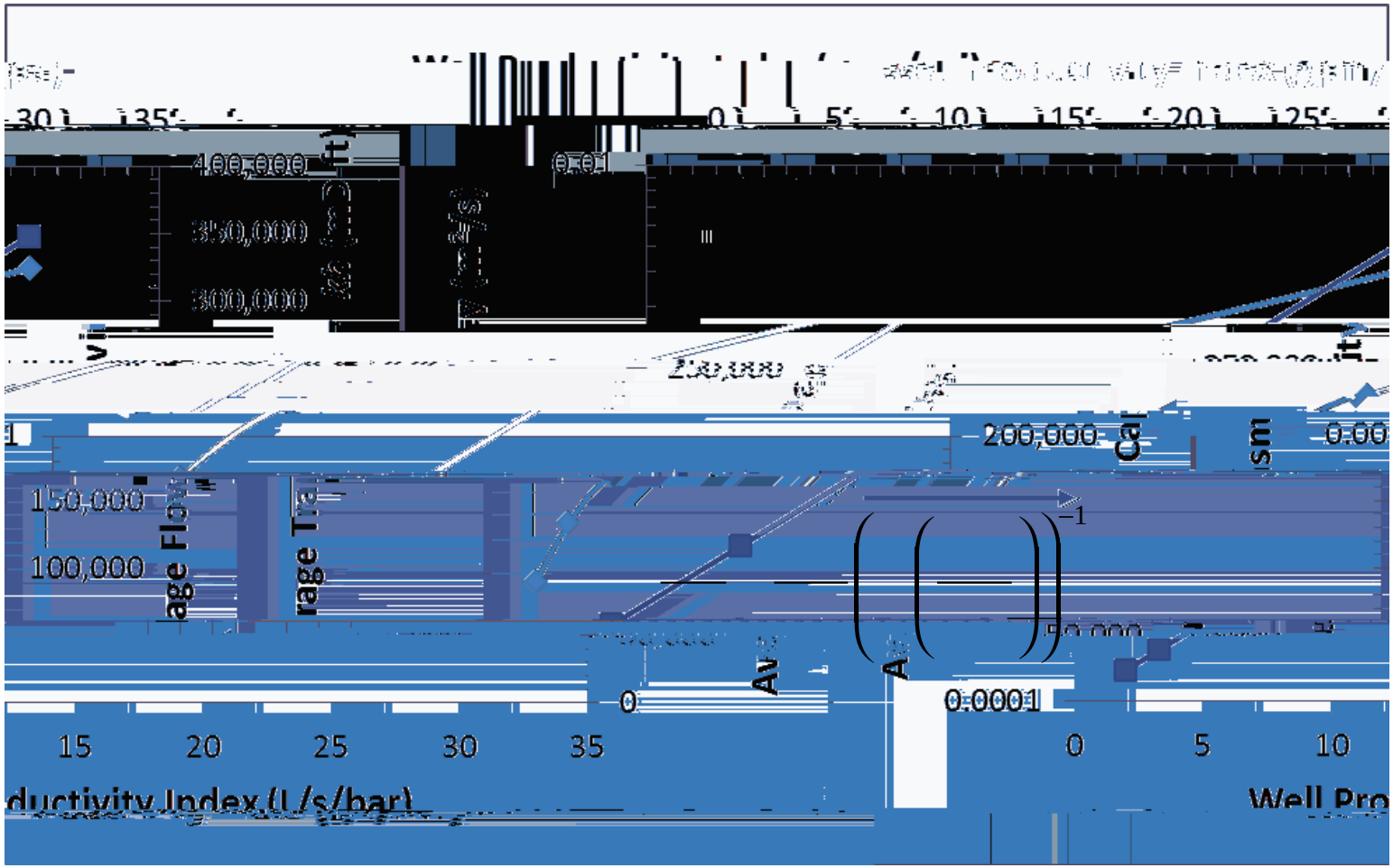
Parameter	Value
ϕ	0.15

Reservoir Lifetime and Well Spacing



- Well spacing on the order of 4,000-6,000 ft (1-2 km)

Well Productivity



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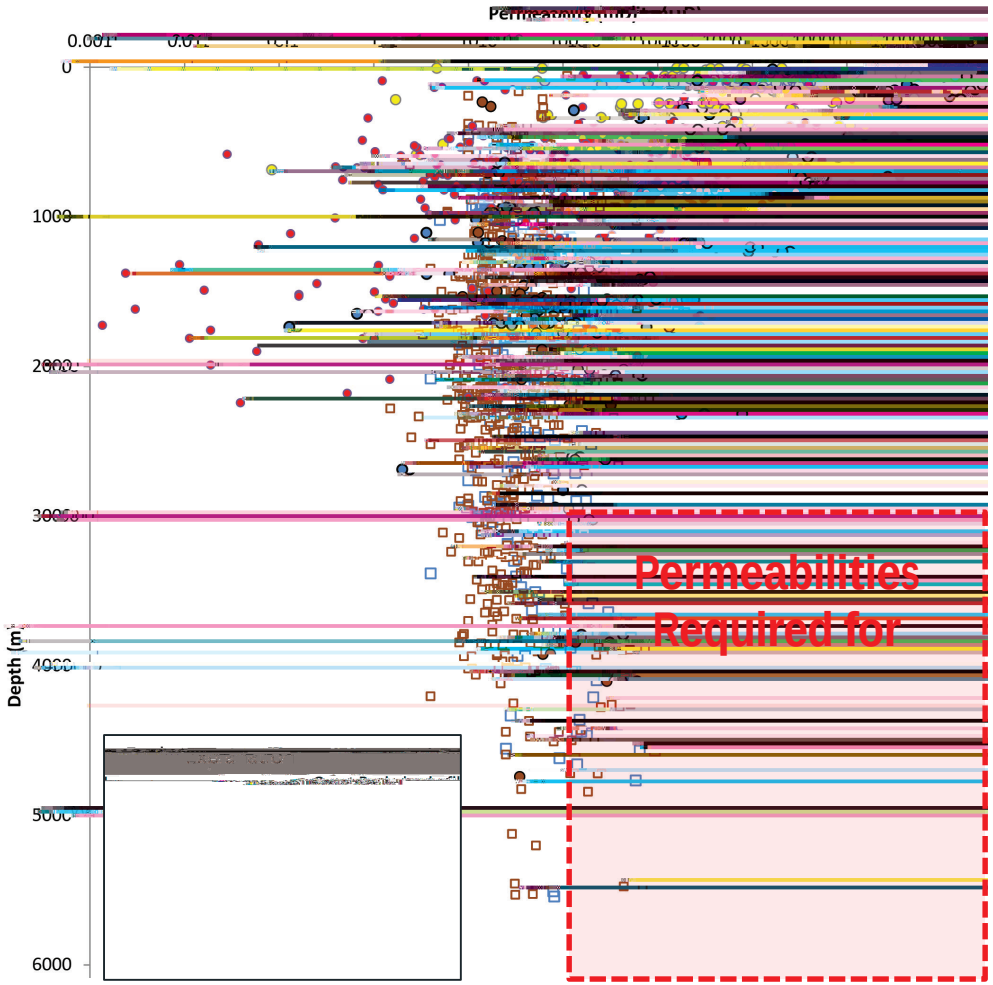
- reservoir permeabilities of hundreds to thousands of mD

Sedimentary Geothermal Doublet – Analytic Model



Can Reservoir Performance Be Improved?

- Studied impact of well-configurations on well productivity
- Found that use of horizontal wells and fracturing can increase well productivity by factor of 3-5

Questions?

Contact Info:

Citations

- *Geothermal Resources Council Transactions*
- *Geothermal Resources Council Transactions*
- *Optimization of Well Configuration for a Sedimentary Enhanced Geothermal Reservoir.*