

Mass Balance Concepts

By

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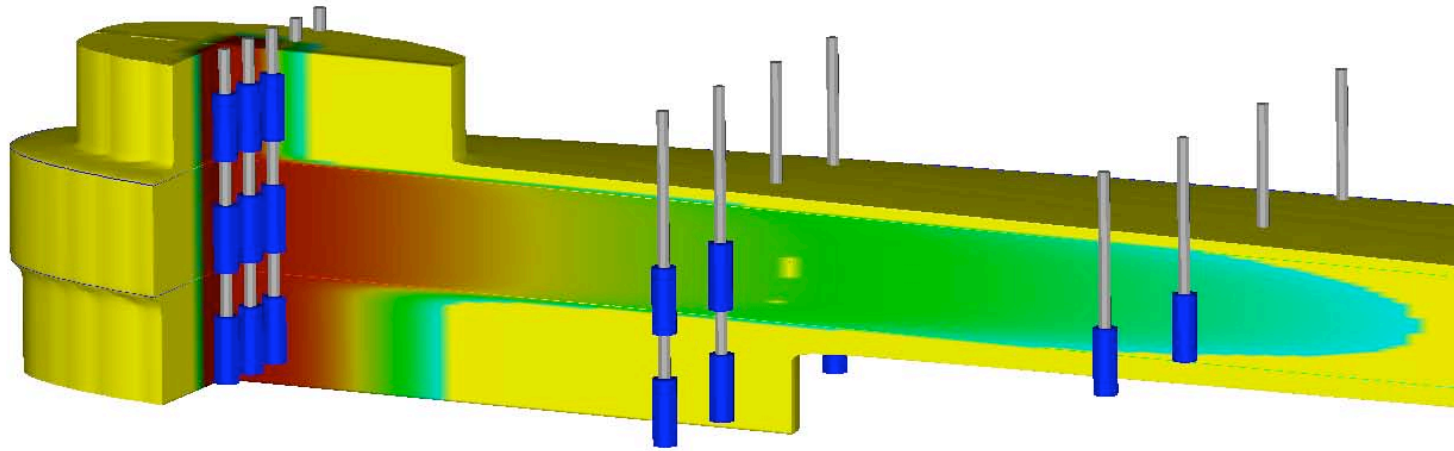
Dr. Ed McBean (University of Guelph)



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Introduction



- DNAPL challenges
 - Comparing timeframes, costs, benefits



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Outline

- Source Strength Trends
- NAPL Depletion Model
- Technology Comparison

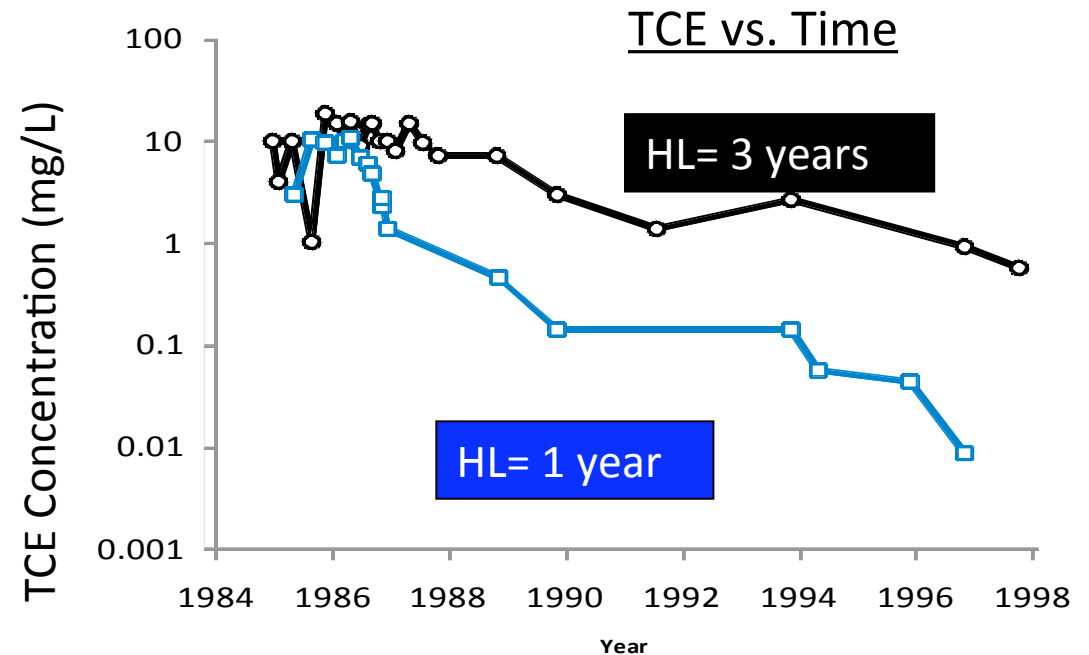
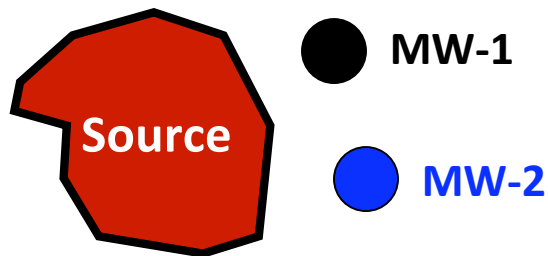


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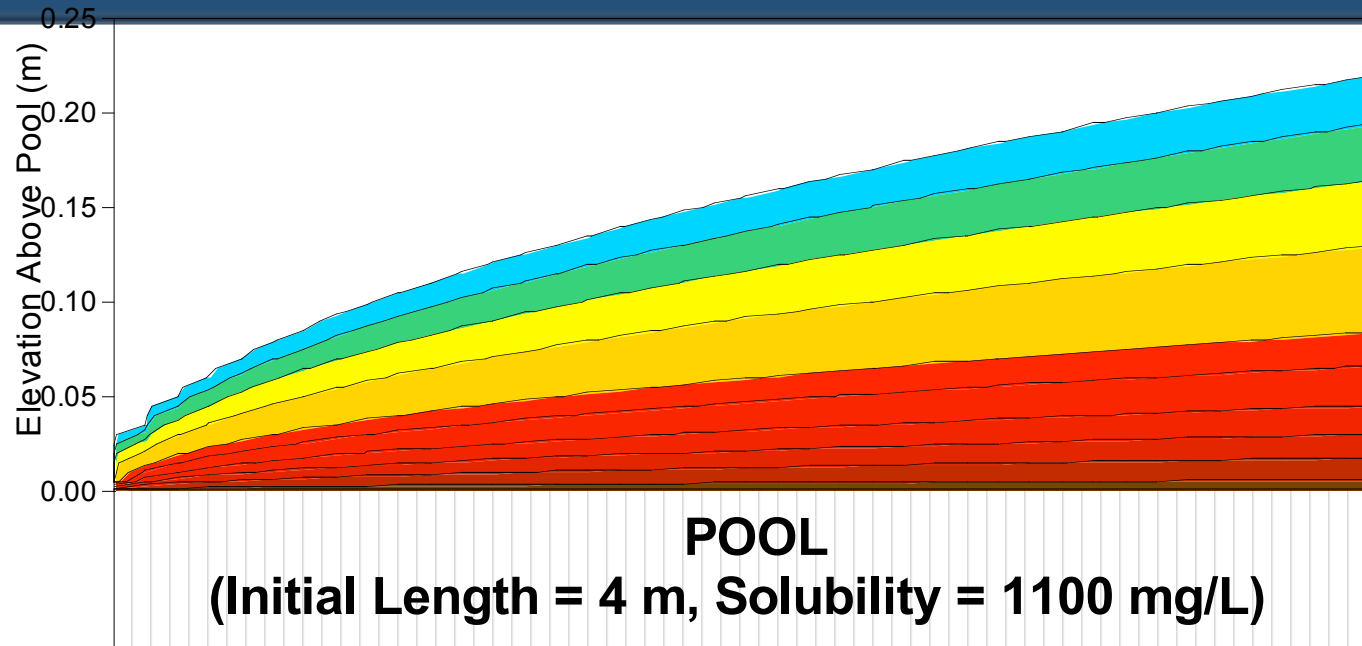
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DNAPL Source Dissolution

- DNAPL dissolves over time
 - In-situ → Accelerate dissolution



Pool Dissolution



Source Strength

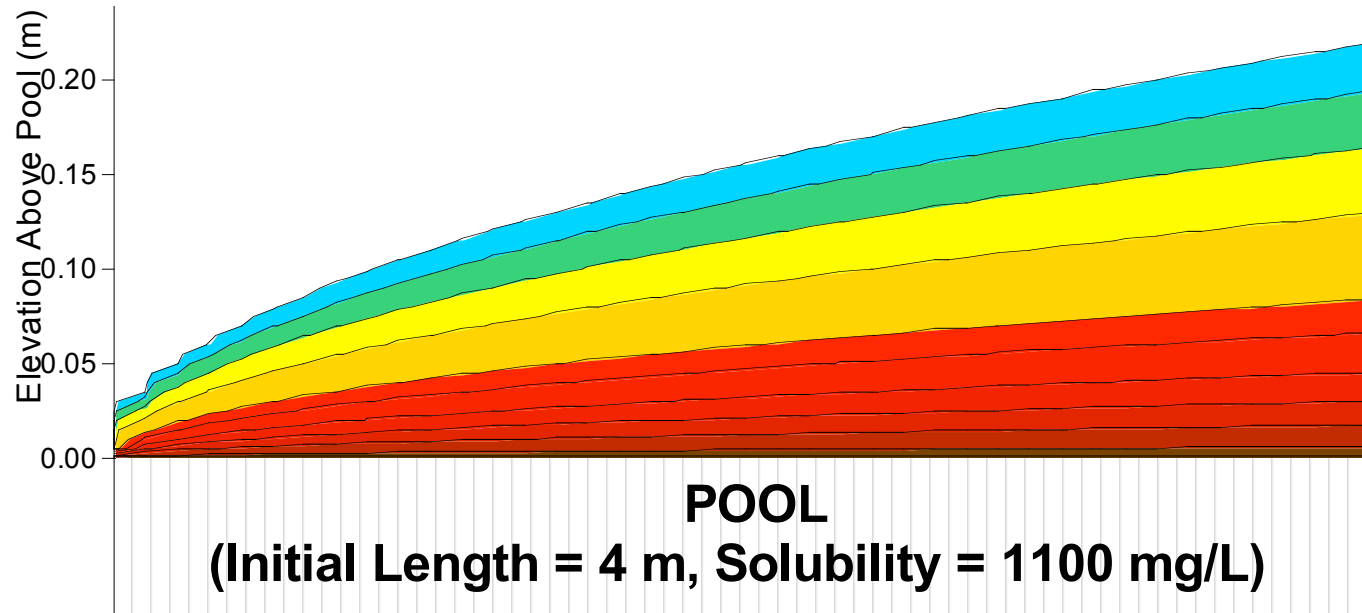


$M_d = 1.4 \text{ kg/y}$
per metre width



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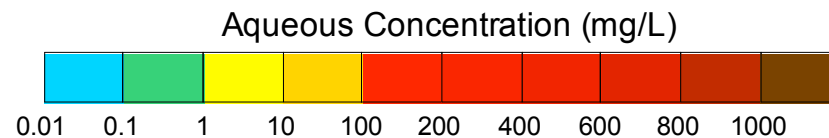
Pool Dissolution



Source Strength



$M_d = 1.4 \text{ kg/y}$
per metre width



Source Strength is proportional to velocity

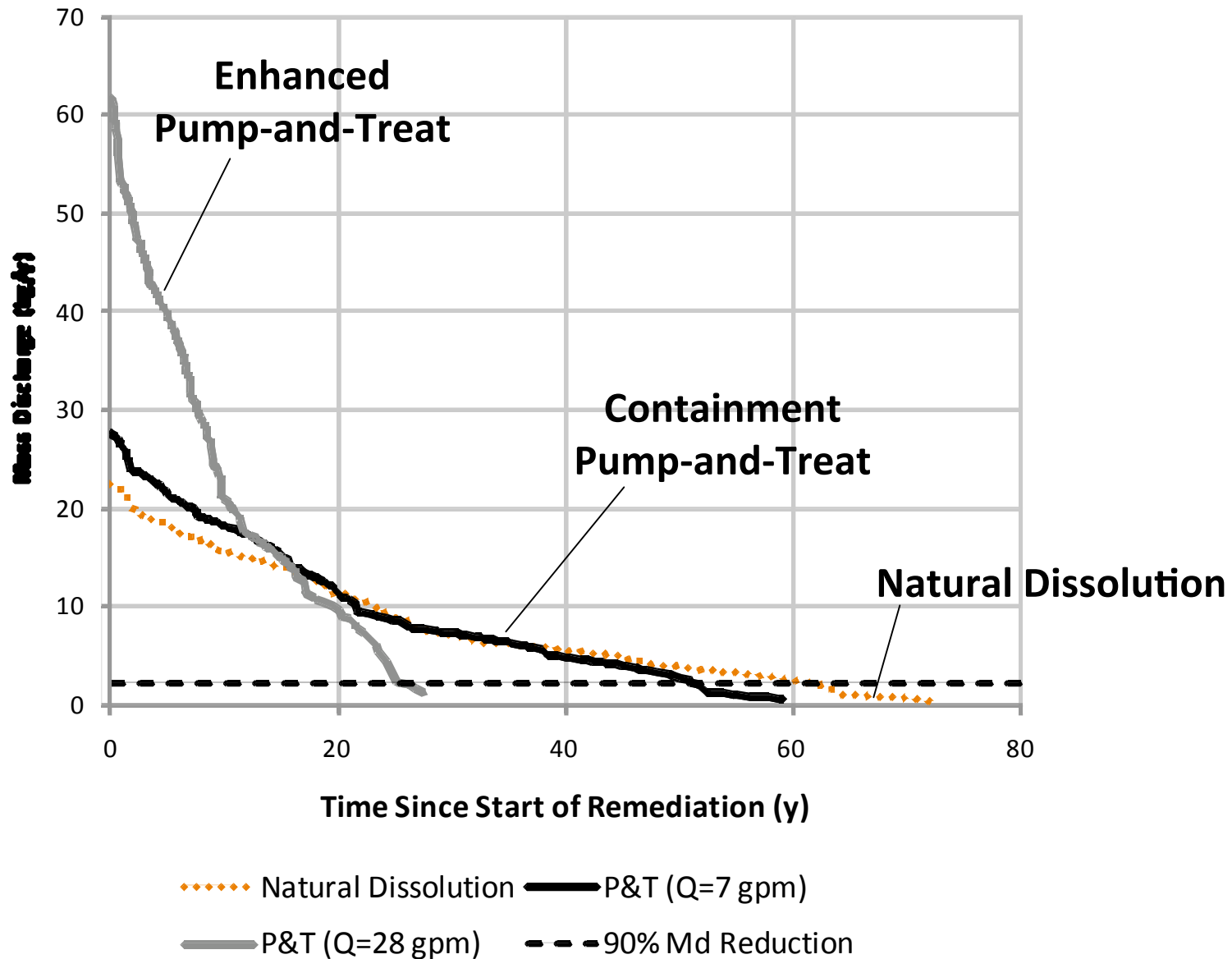


NAPL Depletion Model

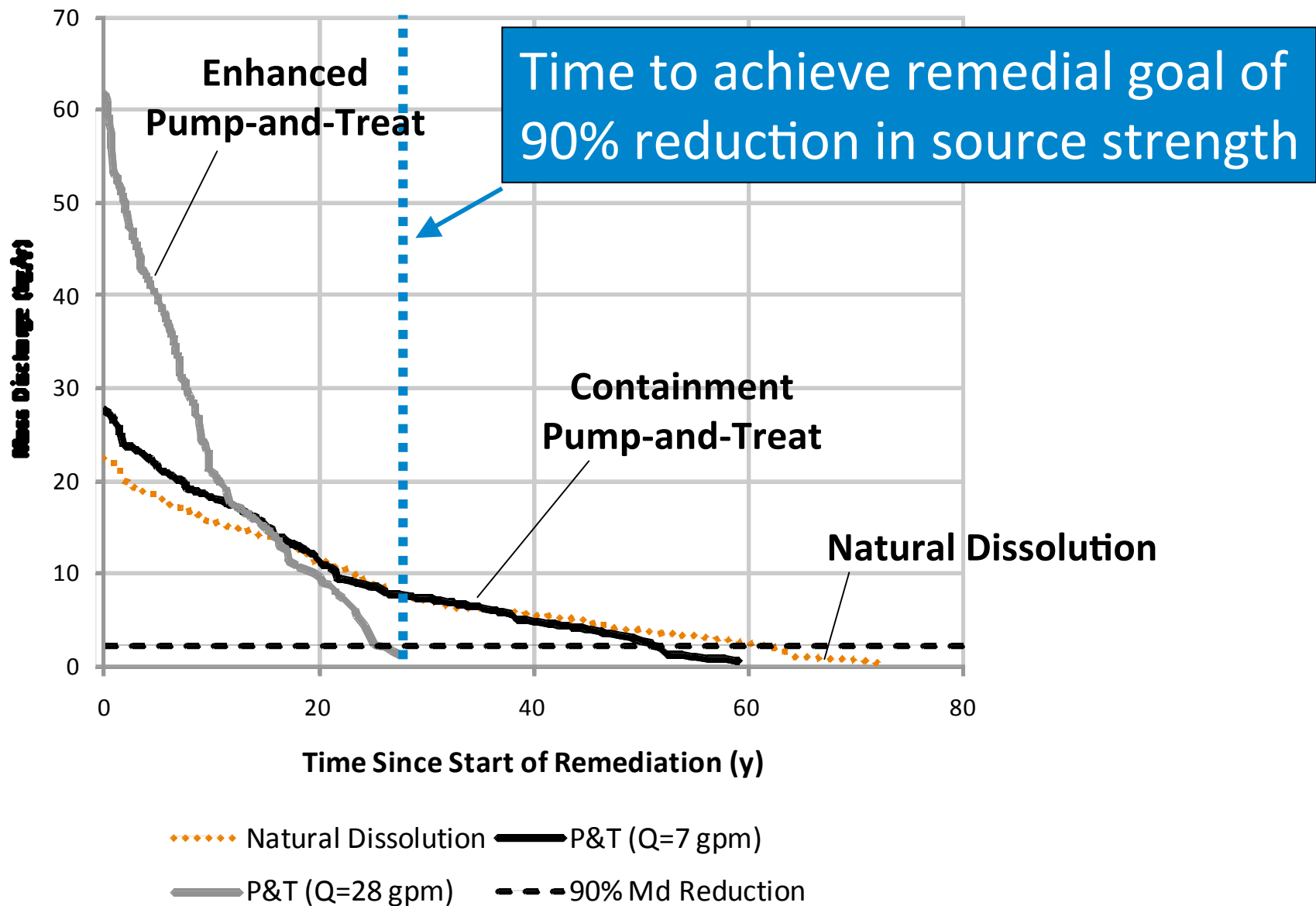
- Aged sources: pools vs. ganglia
- Response to remediation:
 - Source strength vs. time
 - Source longevity
- Compare technologies



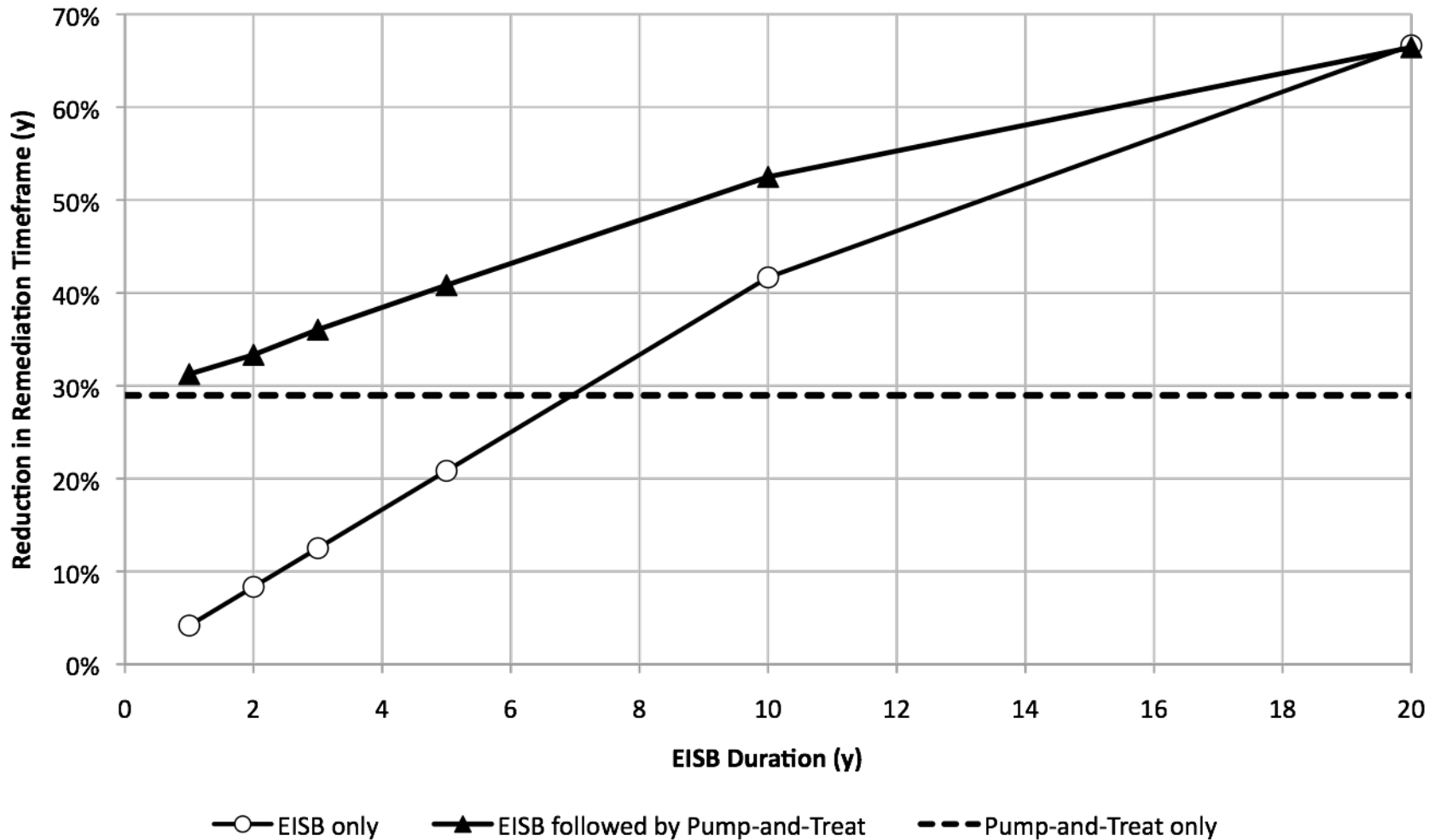
Technology Comparison



Technology Comparison



EISB vs. Pump-and-Treat



Findings

- Heterogeneous pools
 - exponential source strength reduction
- Enhanced P&T → treatment benefit



Conclusions

- Transient reduction in NAPL-water interfacial area affects technology comparison
- Flux through pool layers accelerates source depletion

