

SCALE ASPECTS OF LNAPL TRANSMISSIVITY AT THE PROJECT, PROGRAM AND MANAGEMENT LEVELS



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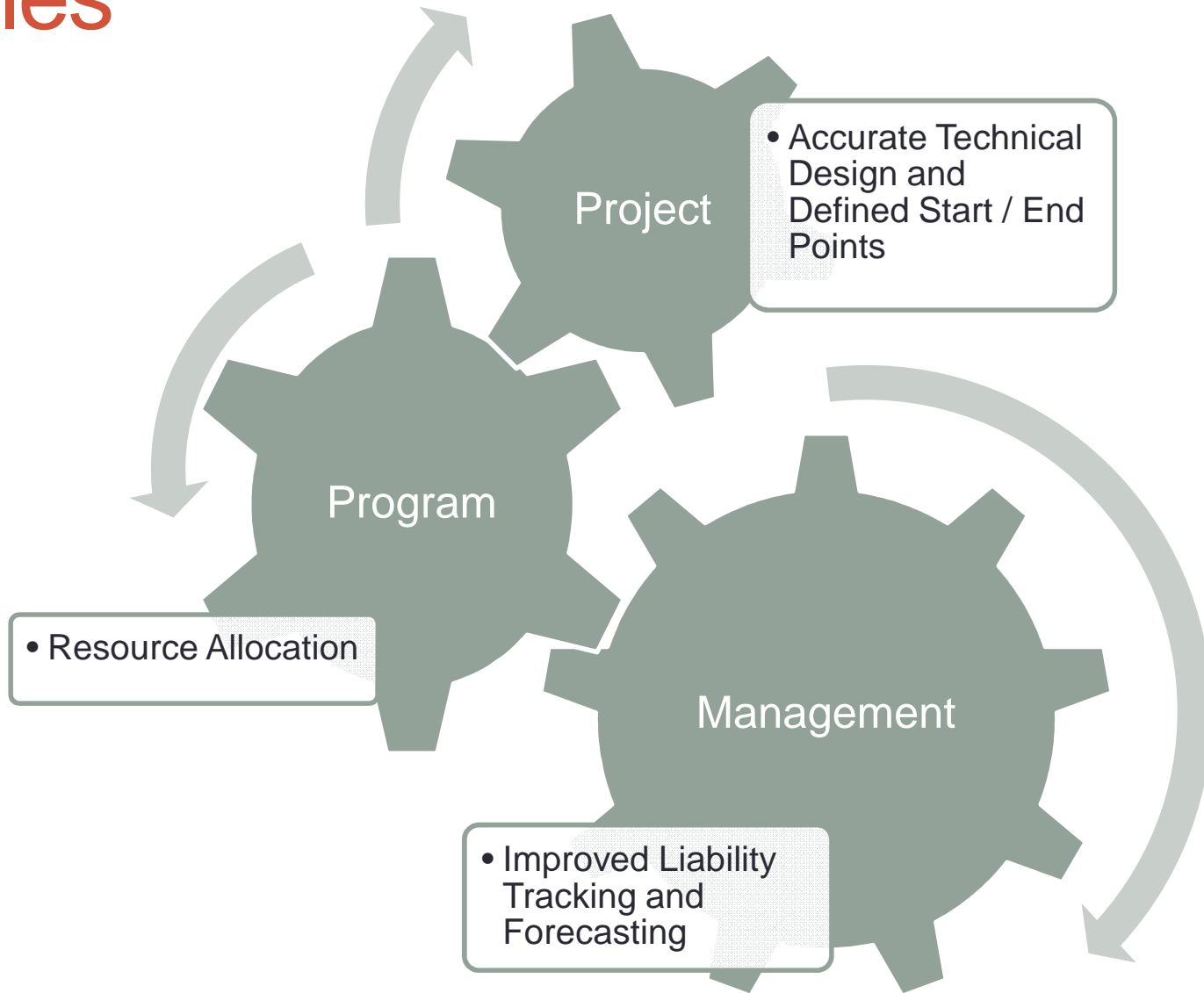
INTRODUCTION

Scales

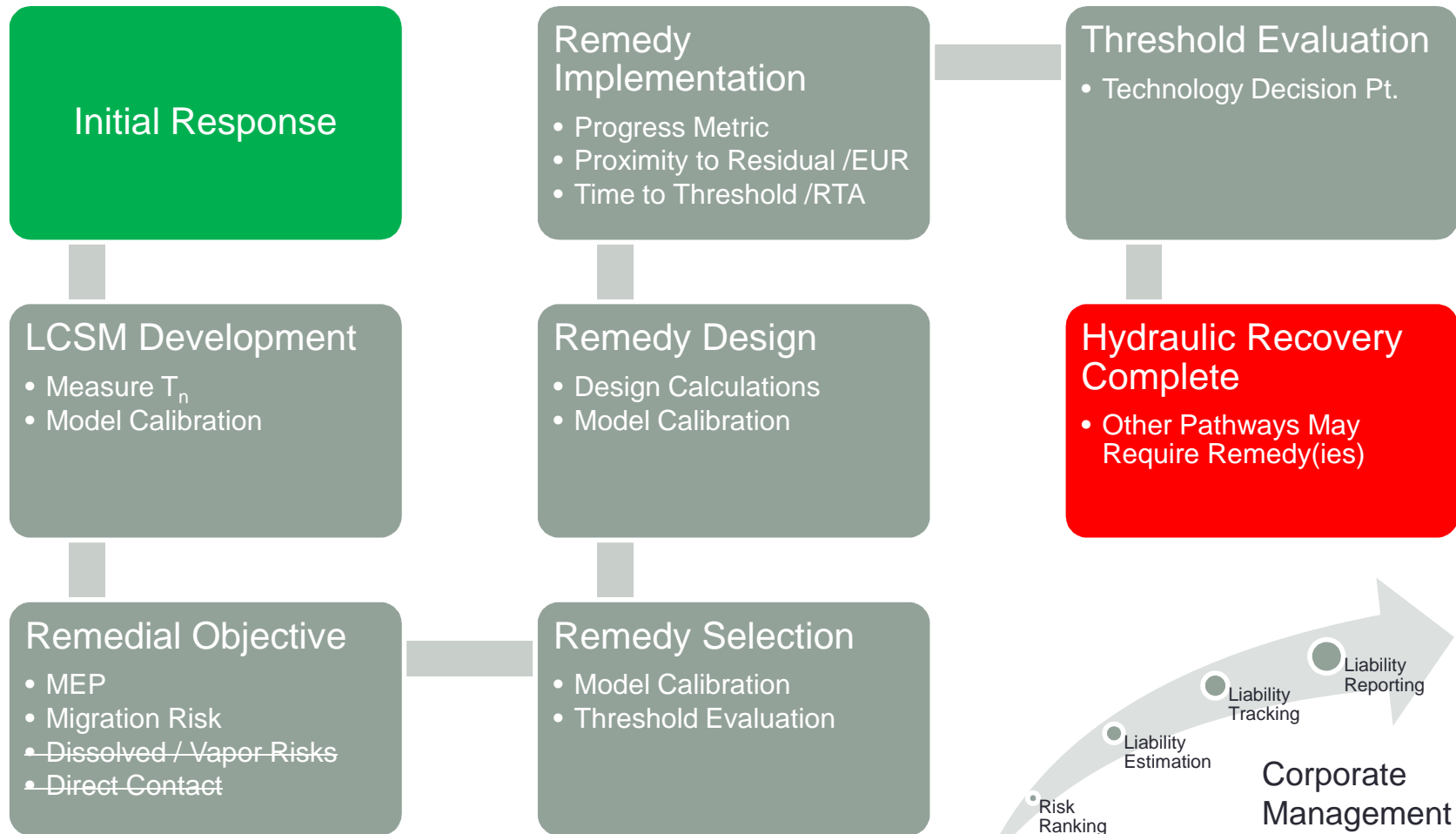
Applications of LNAPL Transmissivity



Scales



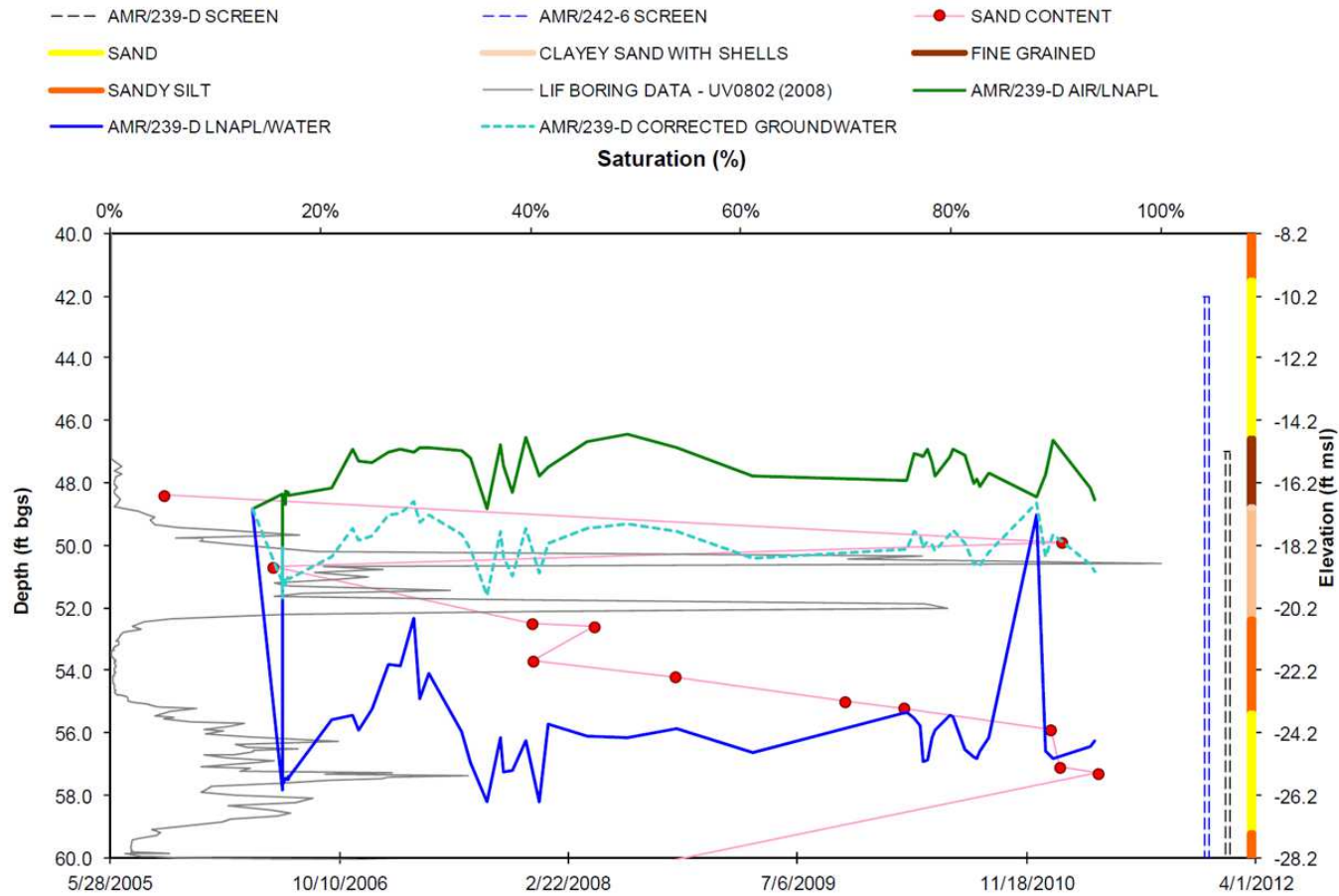
LNAPL Transmissivity Uses



PROJECT SCALE

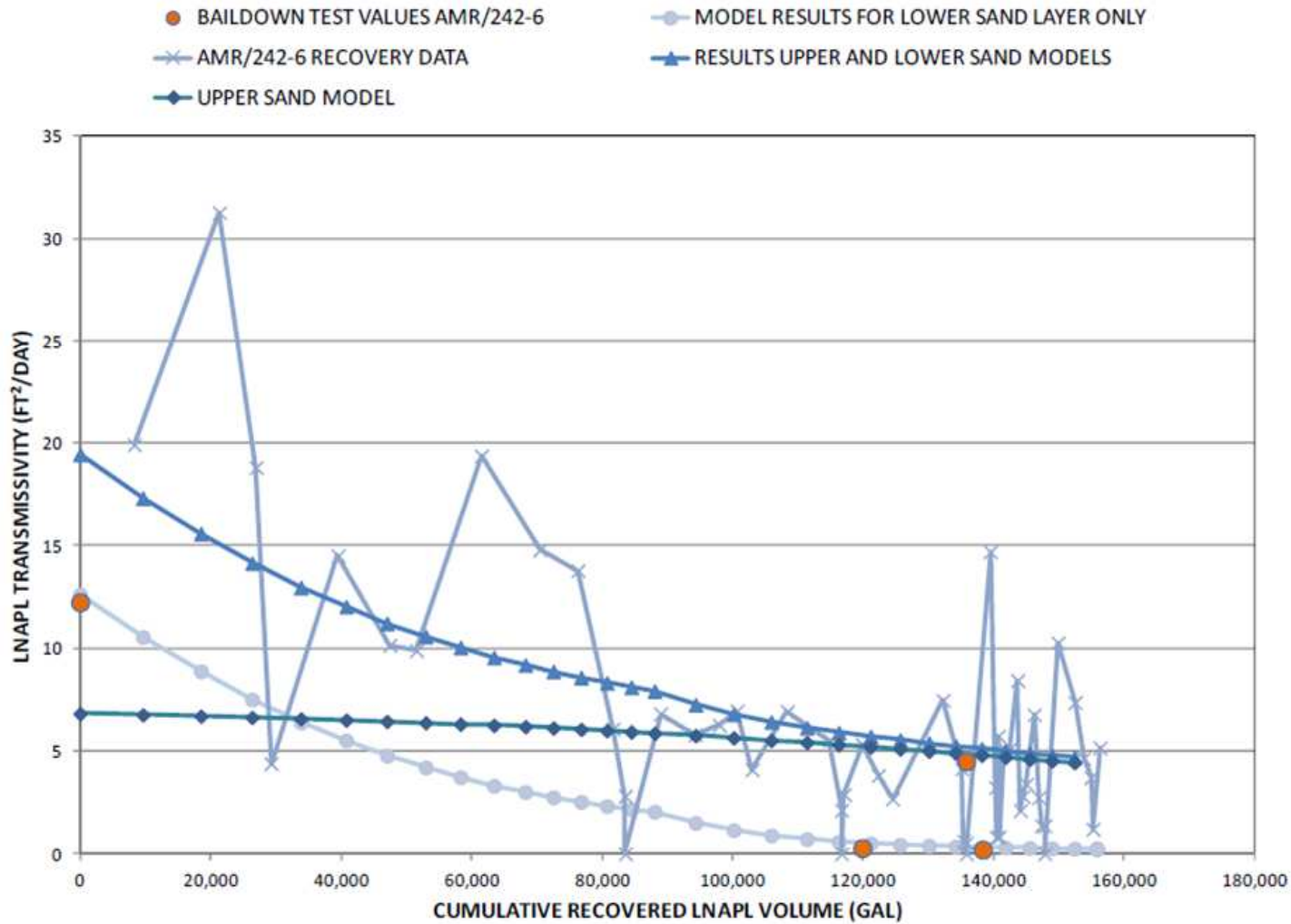


Model Calibration - LCSM



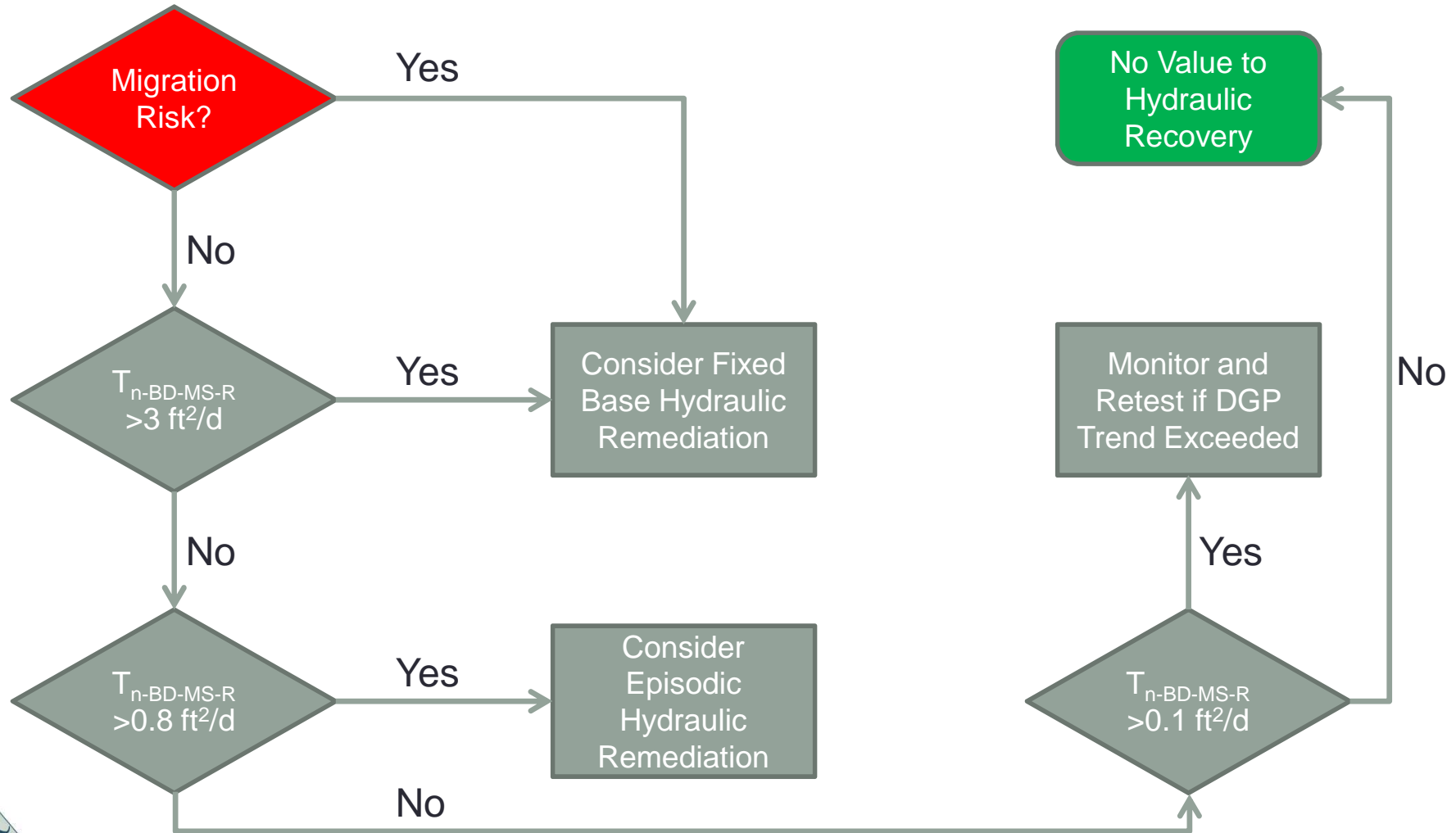
Source: API/Kirkman 2013

Model Calibration - LDRM



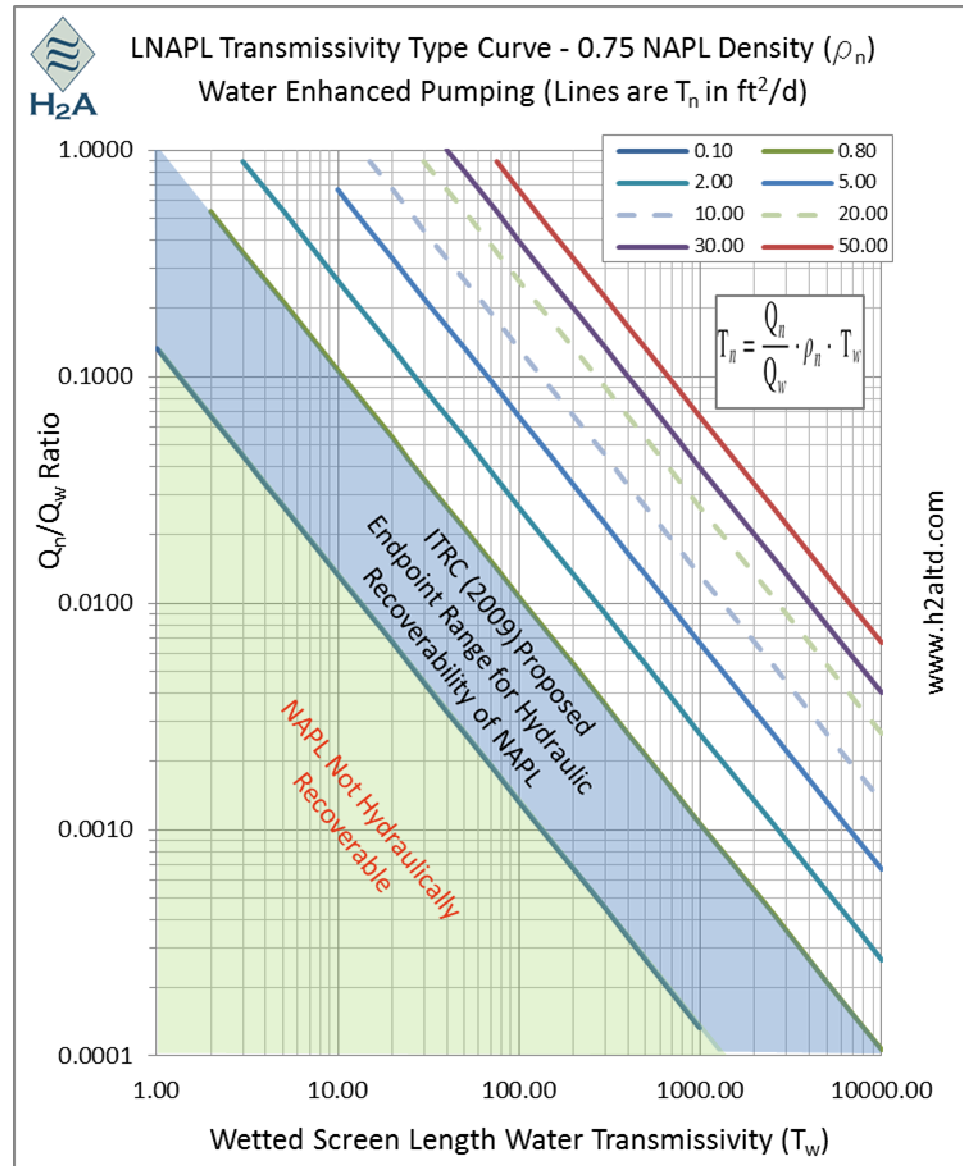
Source: API/Kirkman 2013

Simplistic Go / No-Go Threshold Range Evaluation

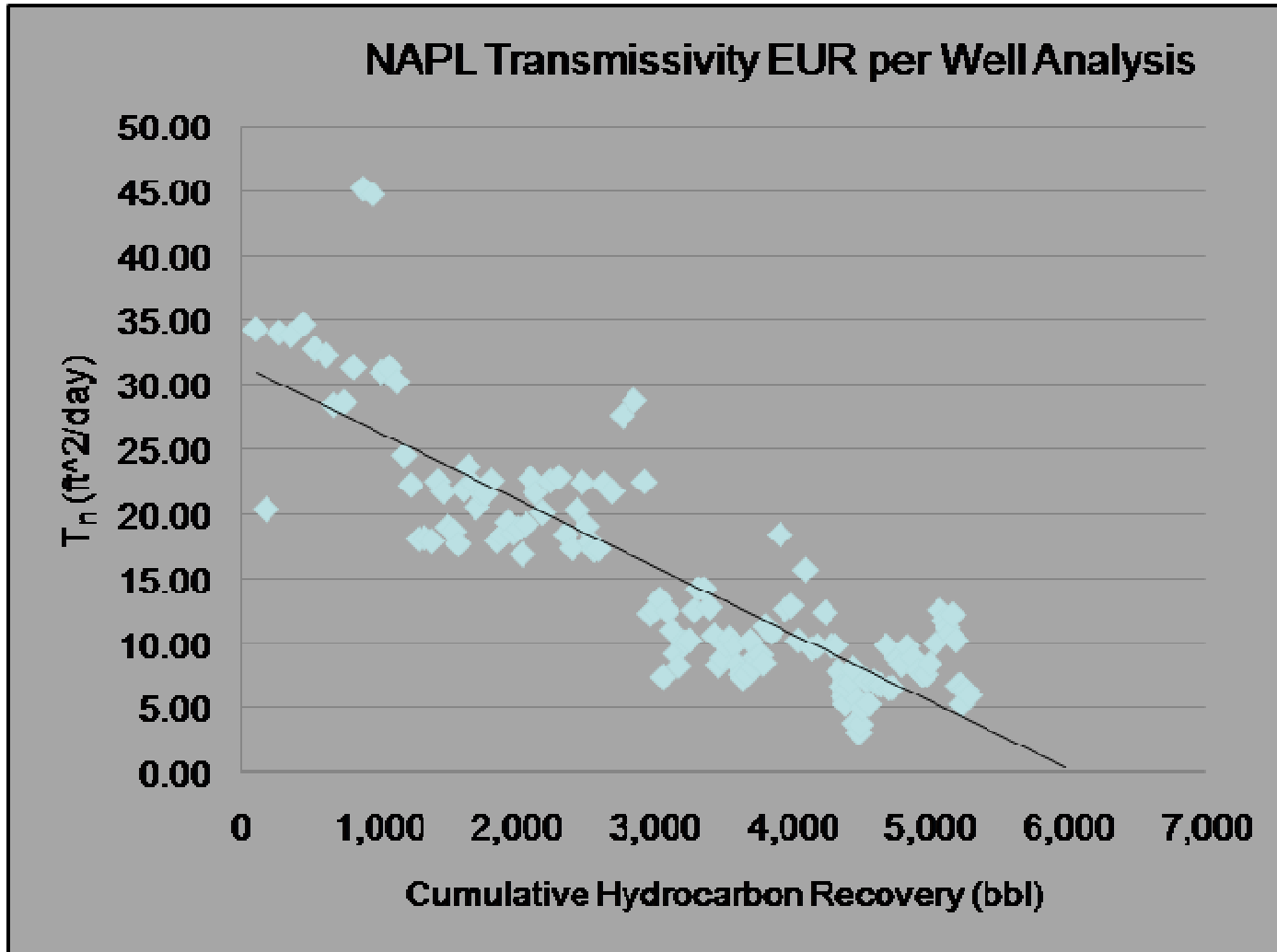


Hydraulic Remedy Design

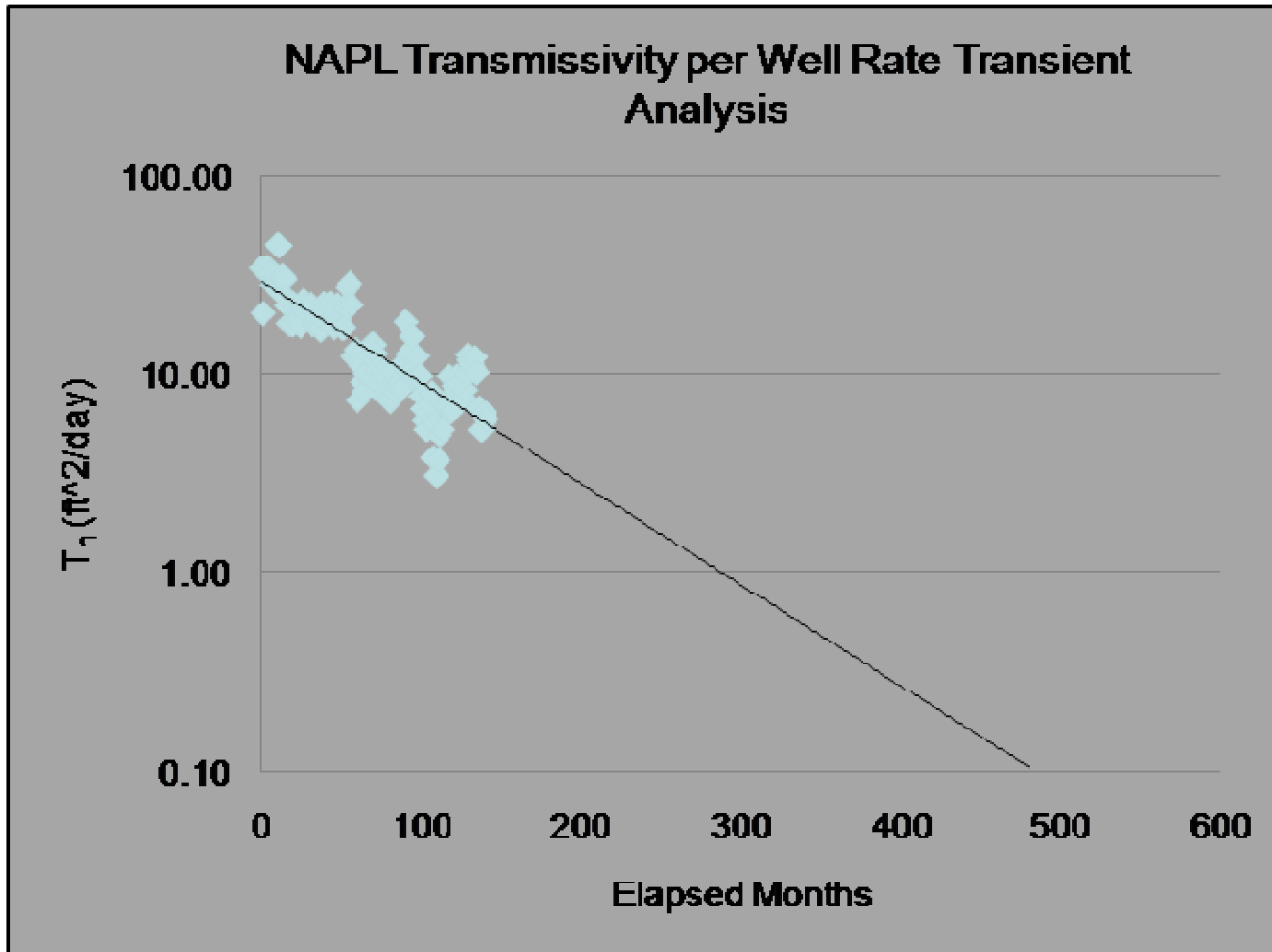
- Manually calculate recovery rates (or use type curves)
- Use LNAPL transmissivity thresholds to help select between differing technologies
- Size pumps, tanks, lines
- Accurately predict recovery volumes for waste management
- Accurately predict recovery lifetimes for project / budget management



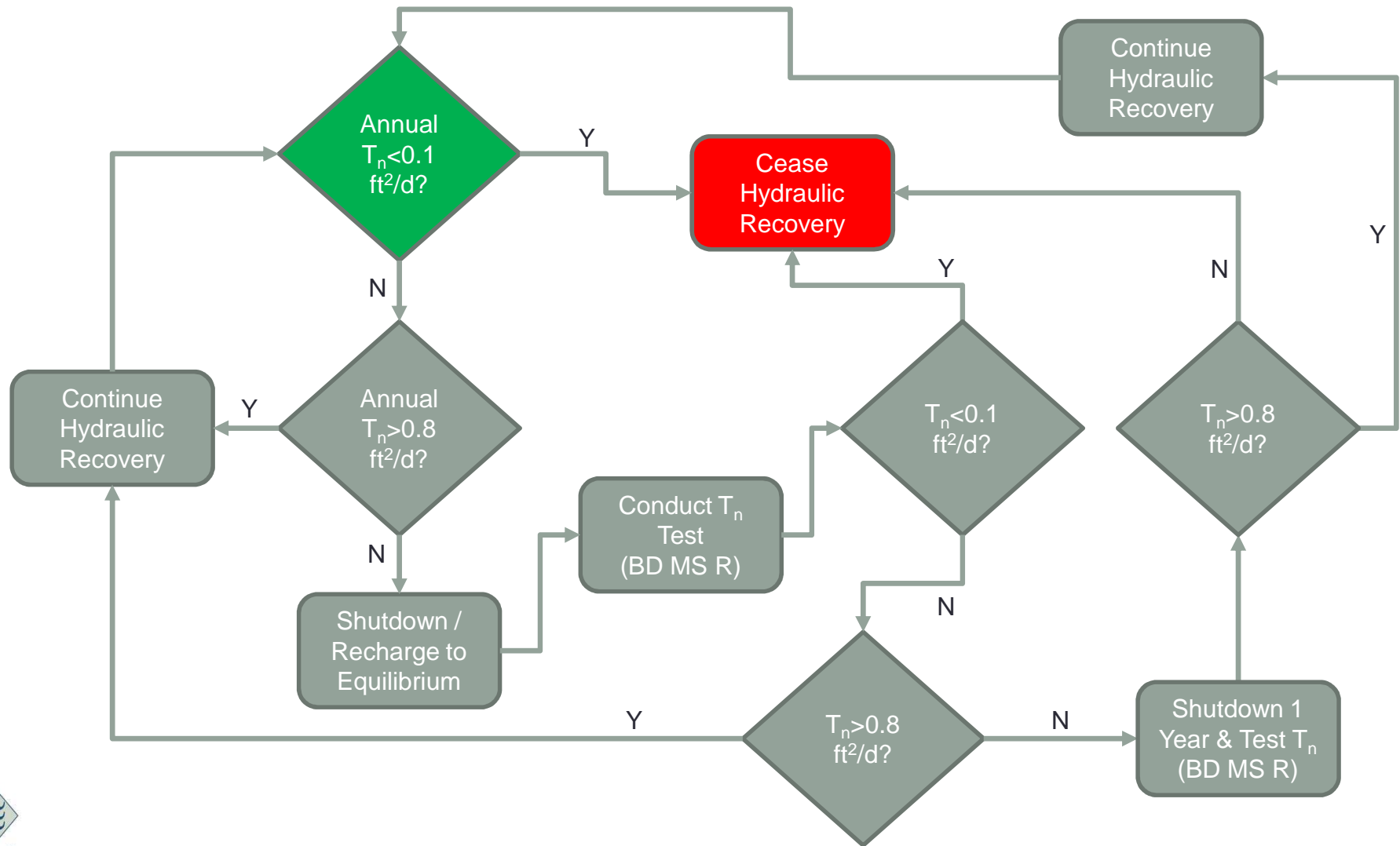
Proximity to Residual /EUR



Time to Threshold /RTA



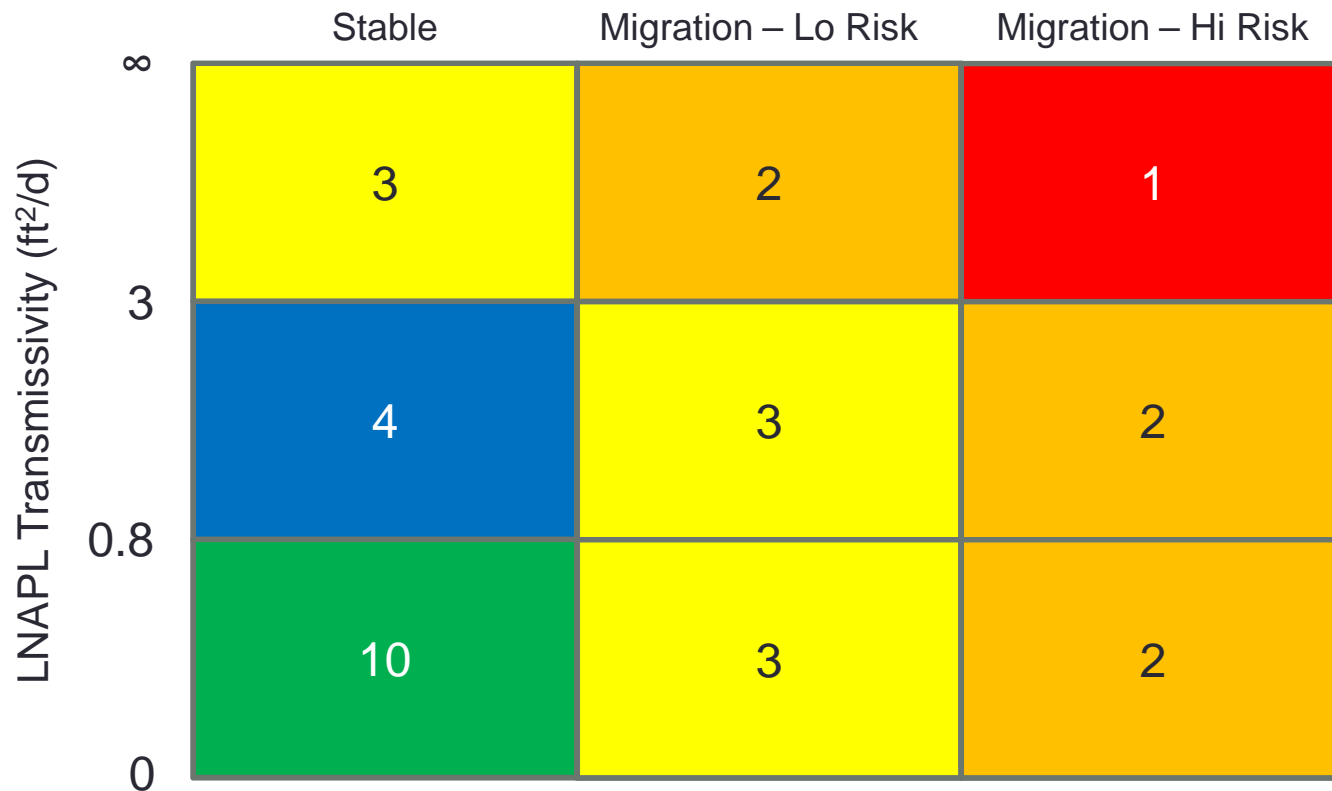
Individual Well Shutdown Evaluation



PROGRAM SCALE



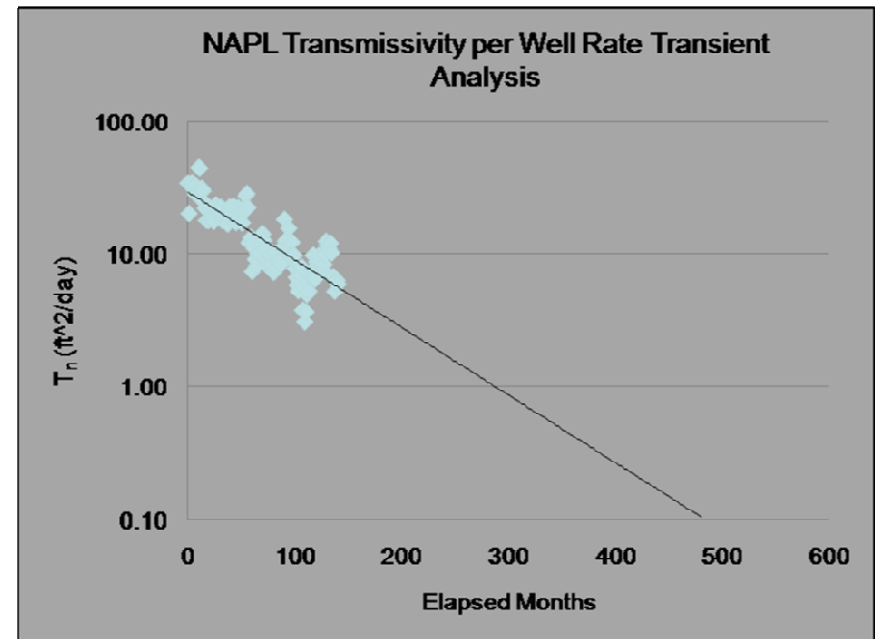
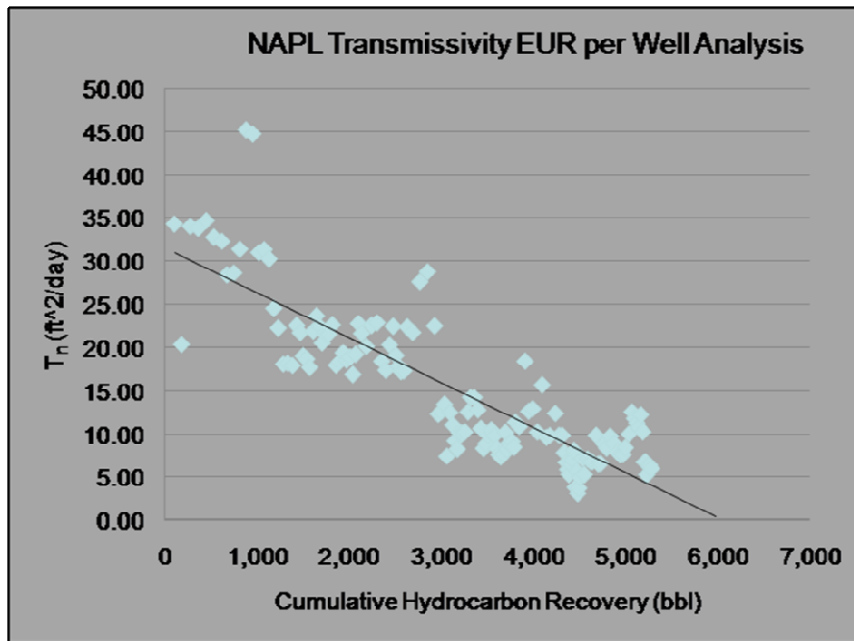
Risk Ranking / Resource Allocation



MANAGEMENT SCALE



Corporate Environmental Liability Estimation, Tracking & Reporting



Capture Formulas for
Pivot Table Database
Projections



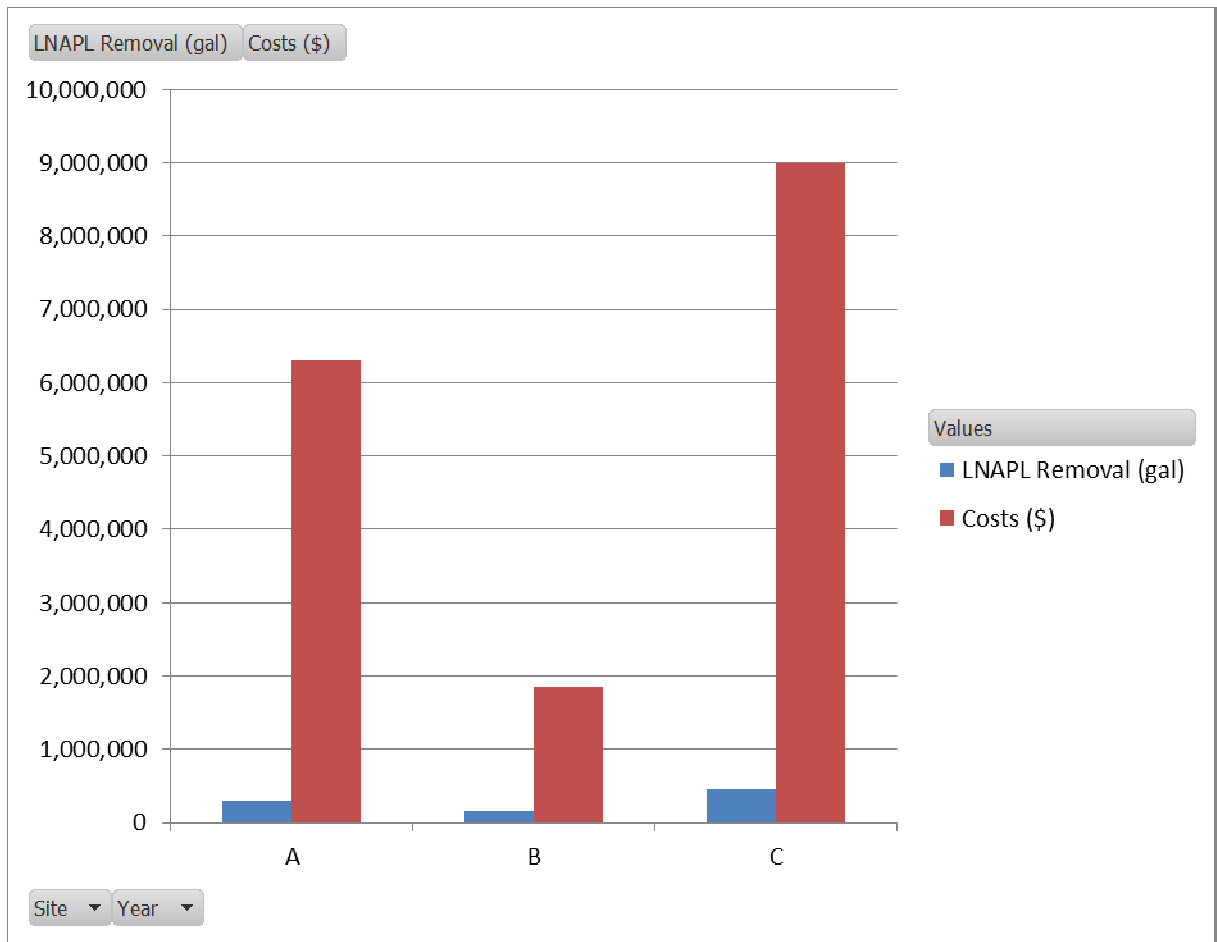
Pivot Table Database – Simple Example

Site	Year	LNAPL Removal	Budget
A	2006	24,000	1500000
A	2007	45,000	400000
A	2008	75,000	400000
A	2009	55,000	400000
A	2010	39,000	400000
A	2011	27,000	400000
A	2012	17,000	400000
A	2013	9,000	400000
A	2014	3,000	400000
A	2015	2,000	400000
A	2016	1,800	400000
A	2017	1,700	400000
A	2018	1,500	400000
B	2002	12,000	350000
B	2003	22,500	125000
B	2004	37,500	125000
B	2005	27,500	125000
B	2006	19,500	125000
B	2007	13,500	125000
B	2008	8,500	125000
B	2009	4,500	125000
B	2010	1,500	125000
B	2011	1,000	125000



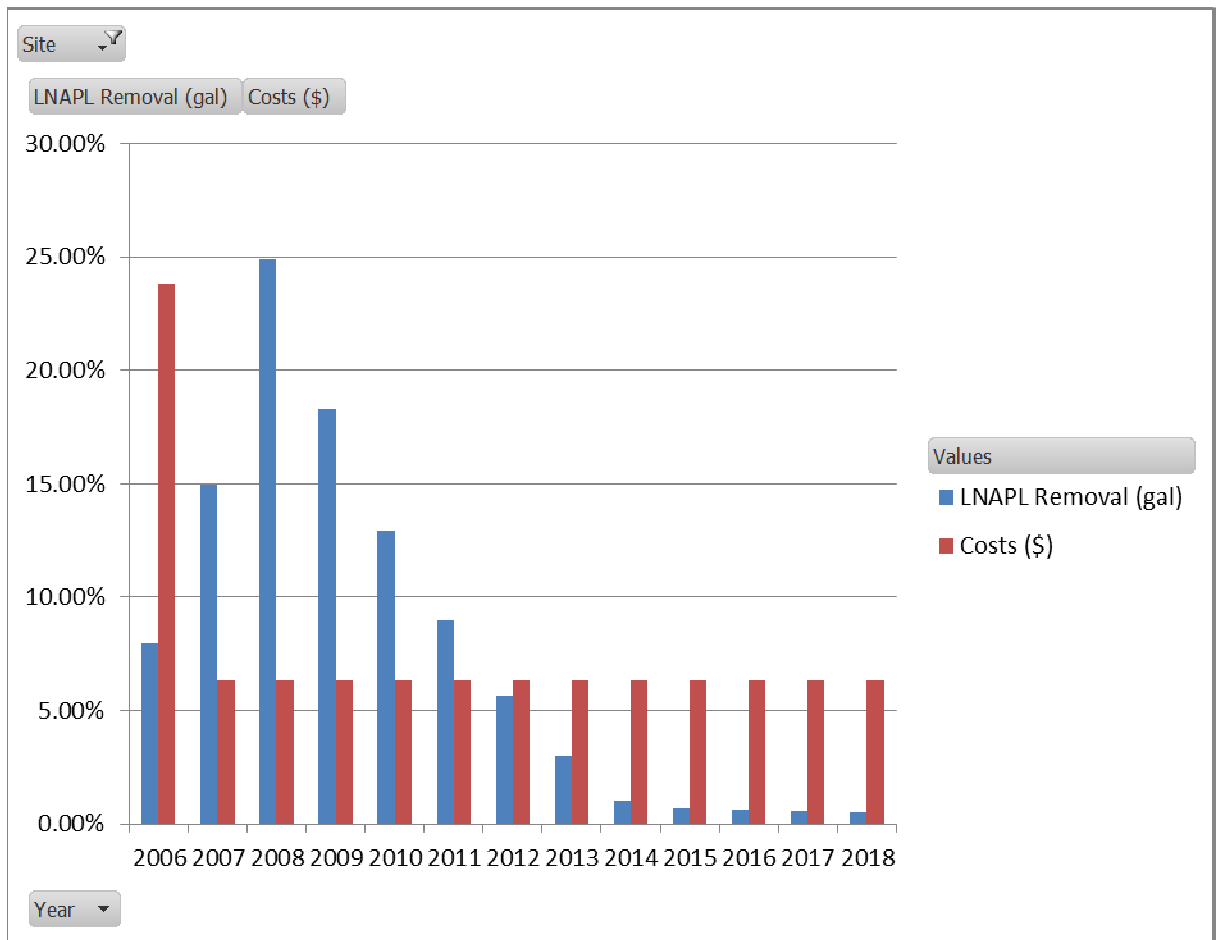
Cost Projections – All Sites Lifetime

Site	LNAPL Removal (gal)	Costs (\$)
A	301,000	\$6,300,000
B	150,500	\$1,850,000
C	451,500	\$9,000,000
Grand Total	903,000	\$17,150,000



Site A – Lifetime Recovery & Costs

Site	A	
Site	LNAPL Removal (gal)	Costs (\$)
2006	7.97%	23.81%
2007	14.95%	6.35%
2008	24.92%	6.35%
2009	18.27%	6.35%
2010	12.96%	6.35%
2011	8.97%	6.35%
2012	5.65%	6.35%
2013	2.99%	6.35%
2014	1.00%	6.35%
2015	0.66%	6.35%
2016	0.60%	6.35%
2017	0.56%	6.35%
2018	0.50%	6.35%
Grand Total	100.00%	100.00%



SUMMARY



Summary and Conclusions

- LNAPL transmissivity can be used at multiple scales

