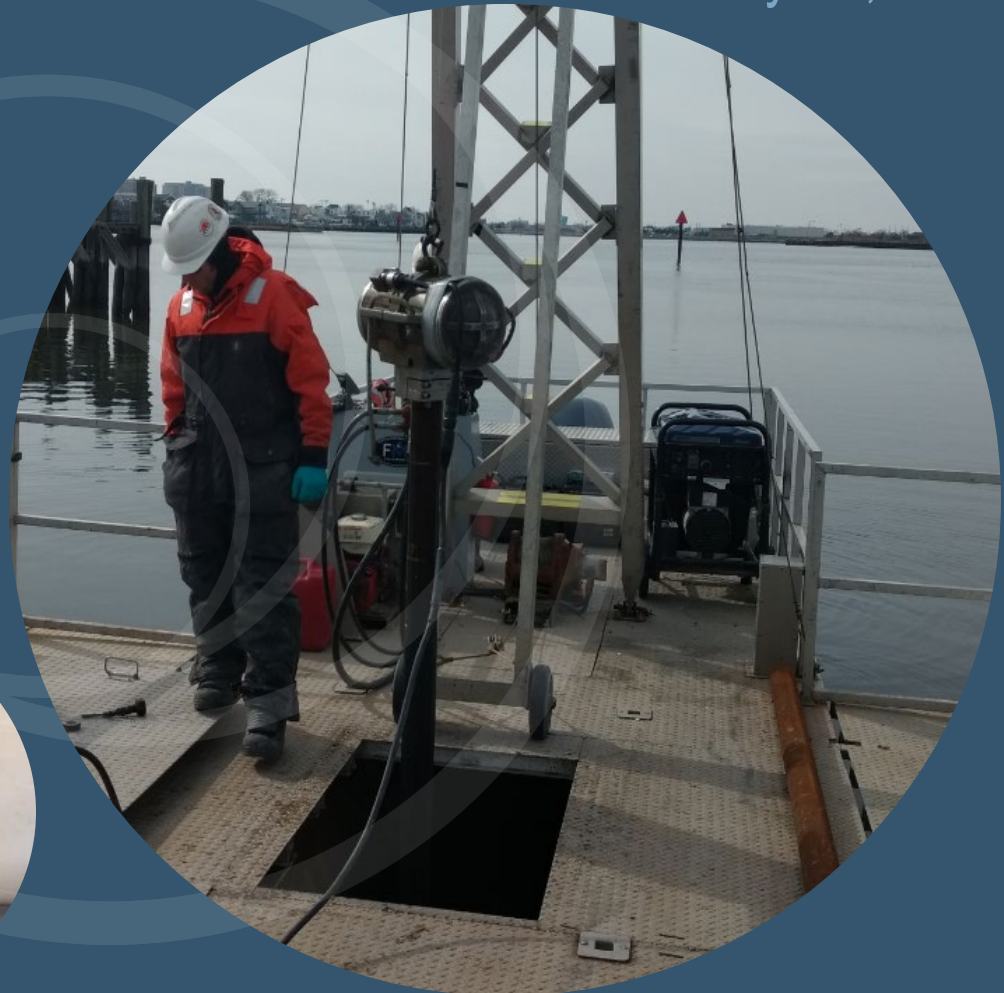


SOLIDIFICATION OF MARINE SEDIMENTS



At a New Jersey MGP Site

February 14, 2019



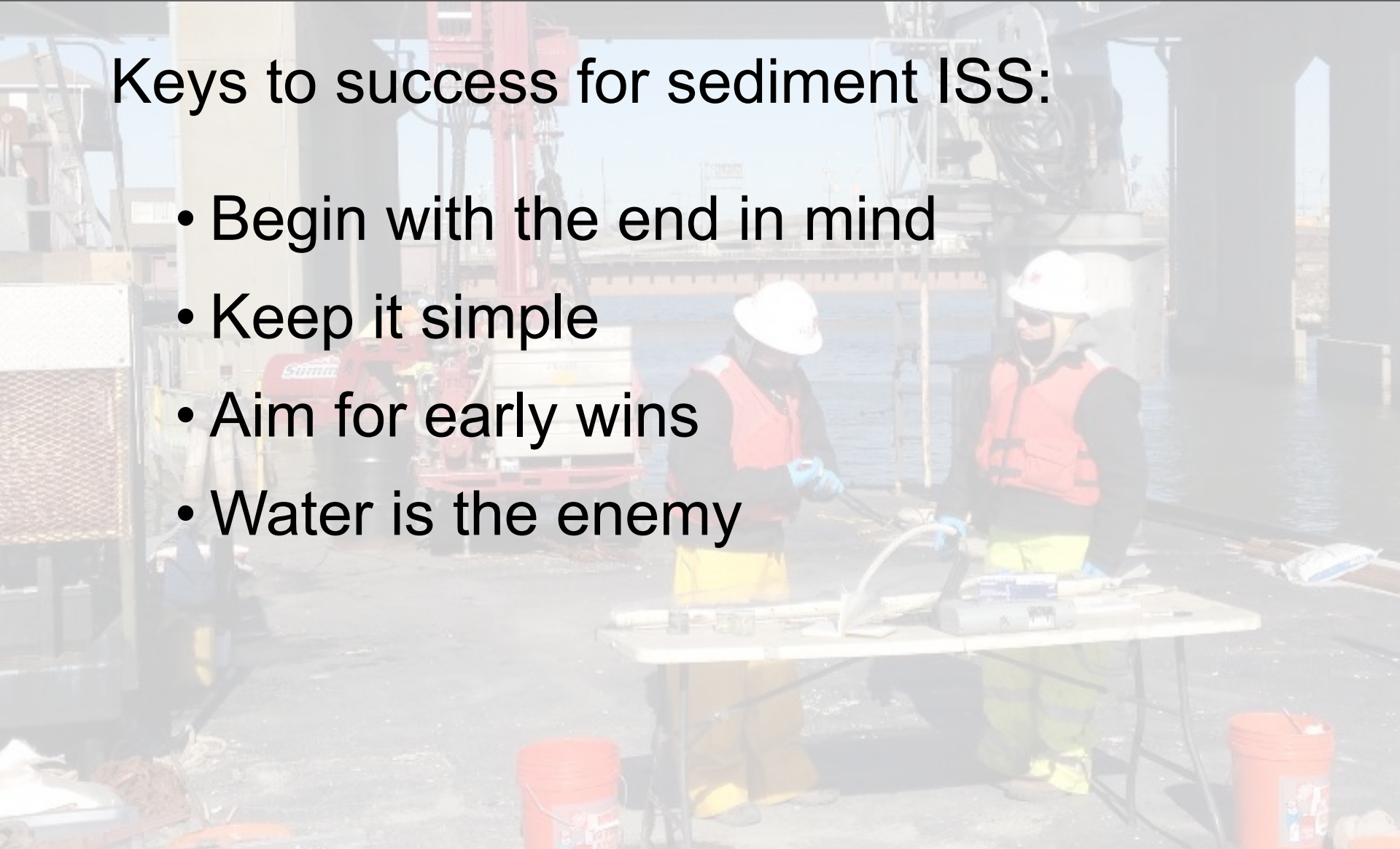
Jon Williams, PE
George Onorato, PE
and Barry Raus, PG
GEI Consultants, Inc.



TAKEAWAYS

Keys to success for sediment ISS:

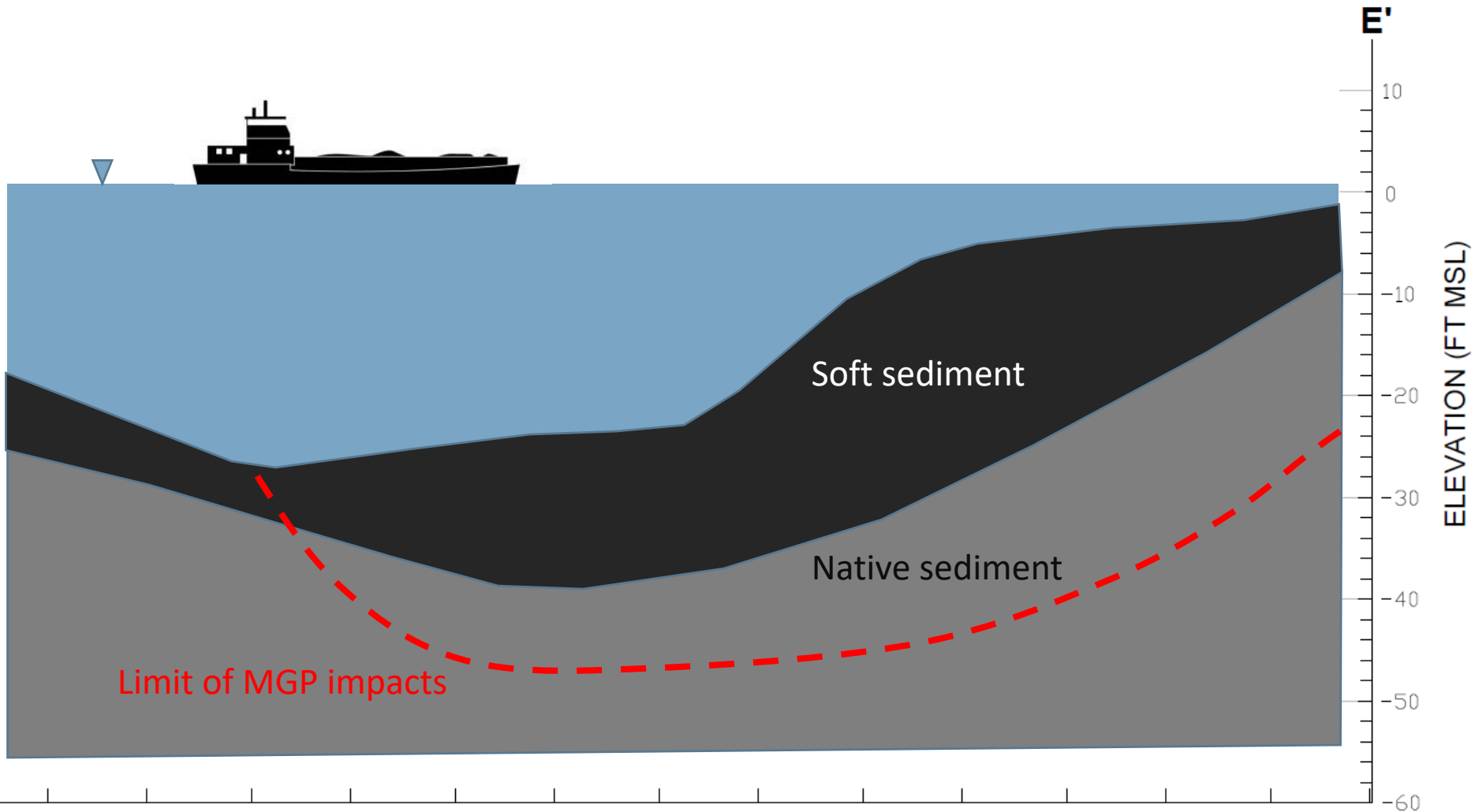
- Begin with the end in mind
- Keep it simple
- Aim for early wins
- Water is the enemy



STRUCTURE OF THIS TALK

- Site context and field methods
- Sediment composite attributes
- Reagent selection and dosing
- Performance data (strength, K, leach)
- Scaling it up to the field

SITE CONTEXT



BEGIN WITH THE END IN MIND



- Prove the concept
- Estimate reagent demand
- Estimate swell volume

Limit of MGP impacts

E'

10

0

-10

-20

-30

-40

-50

-60

ELEVATION (FT MSL)

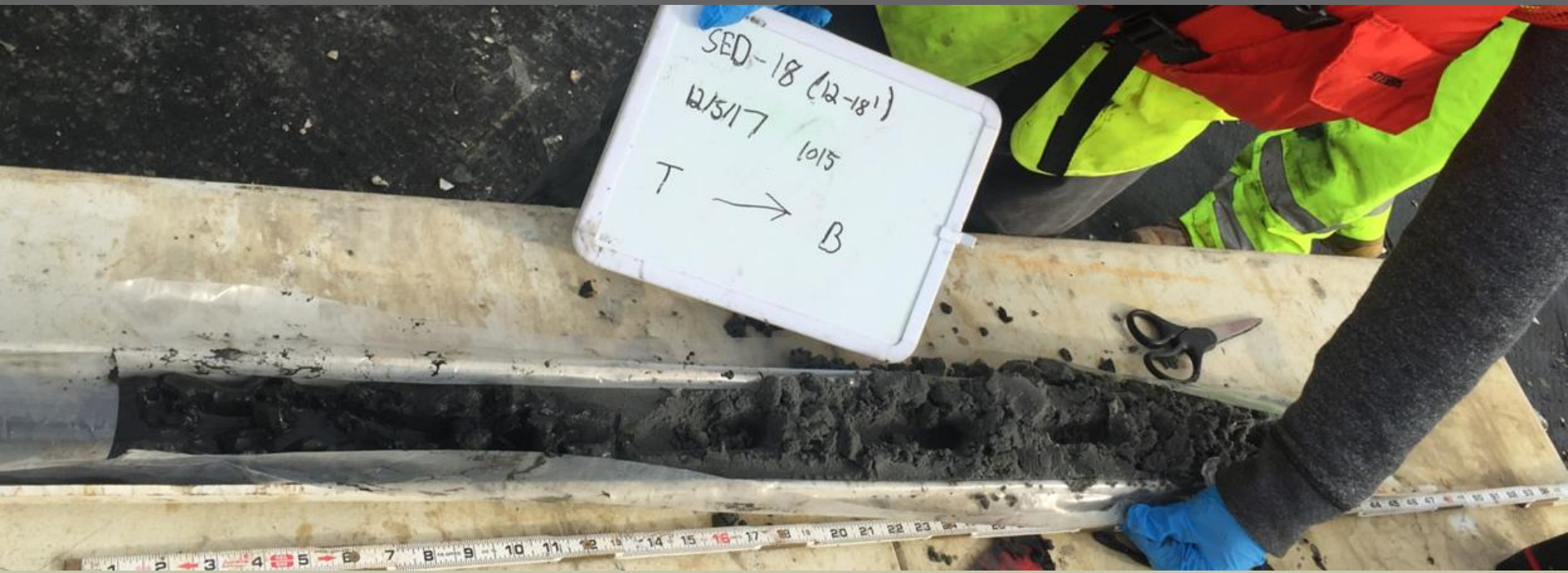
FIELD METHODS



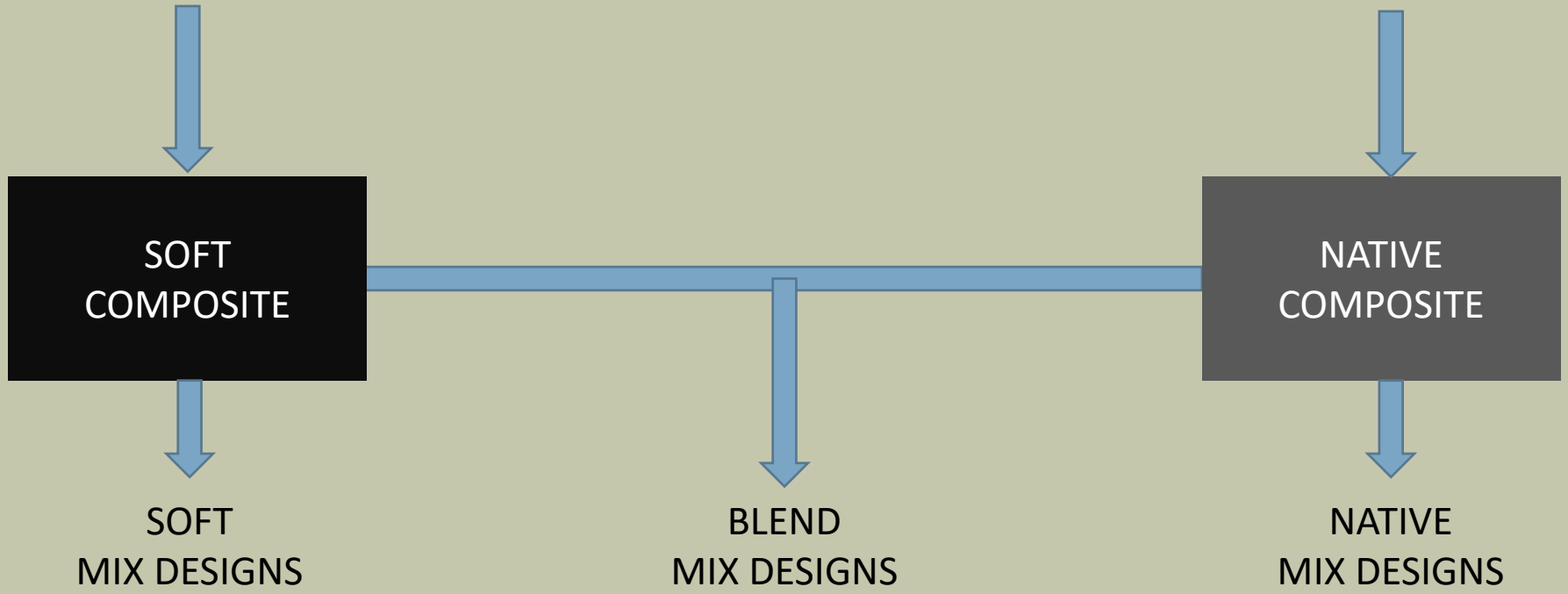
FIELD METHODS



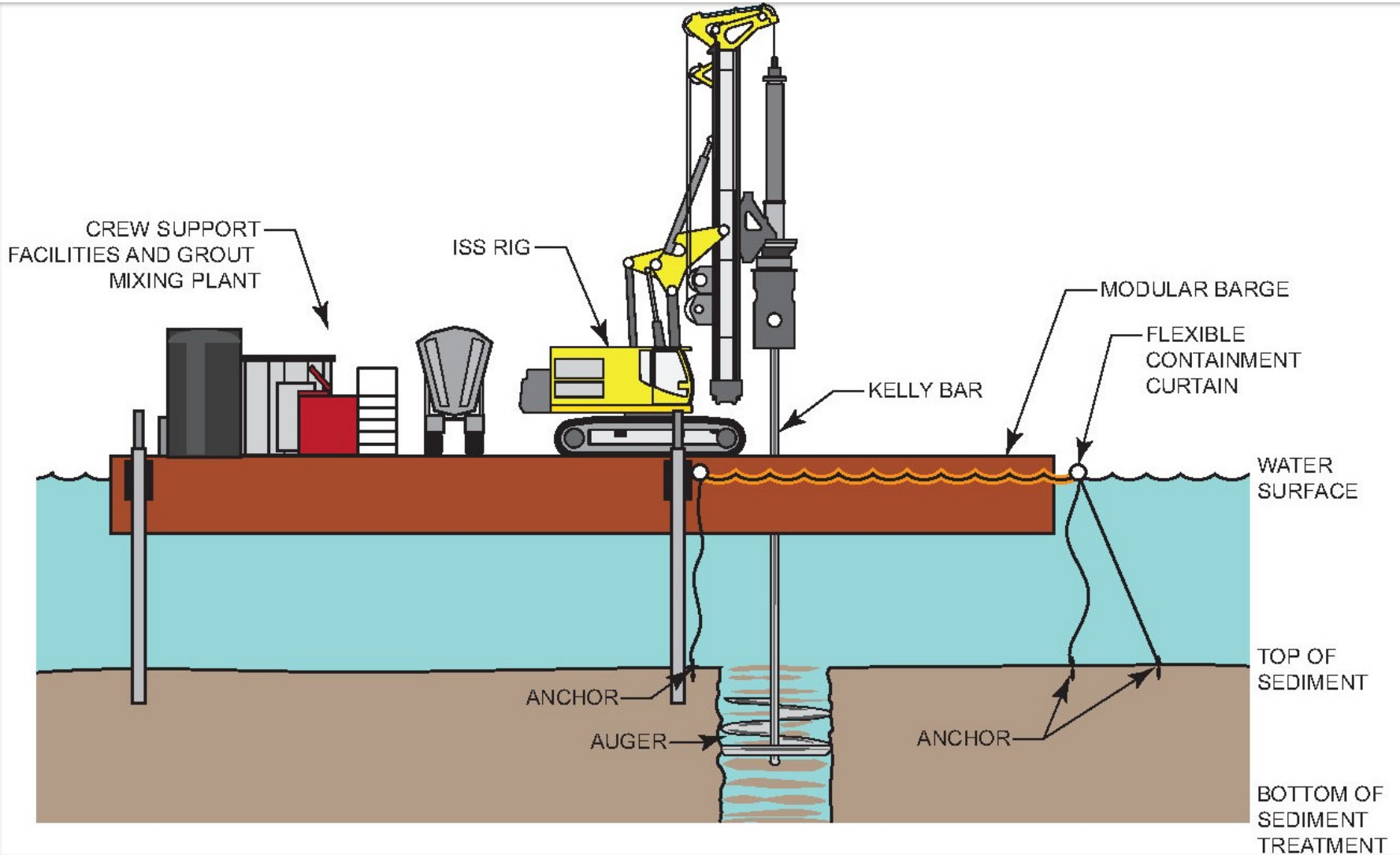
SEDIMENT CORES



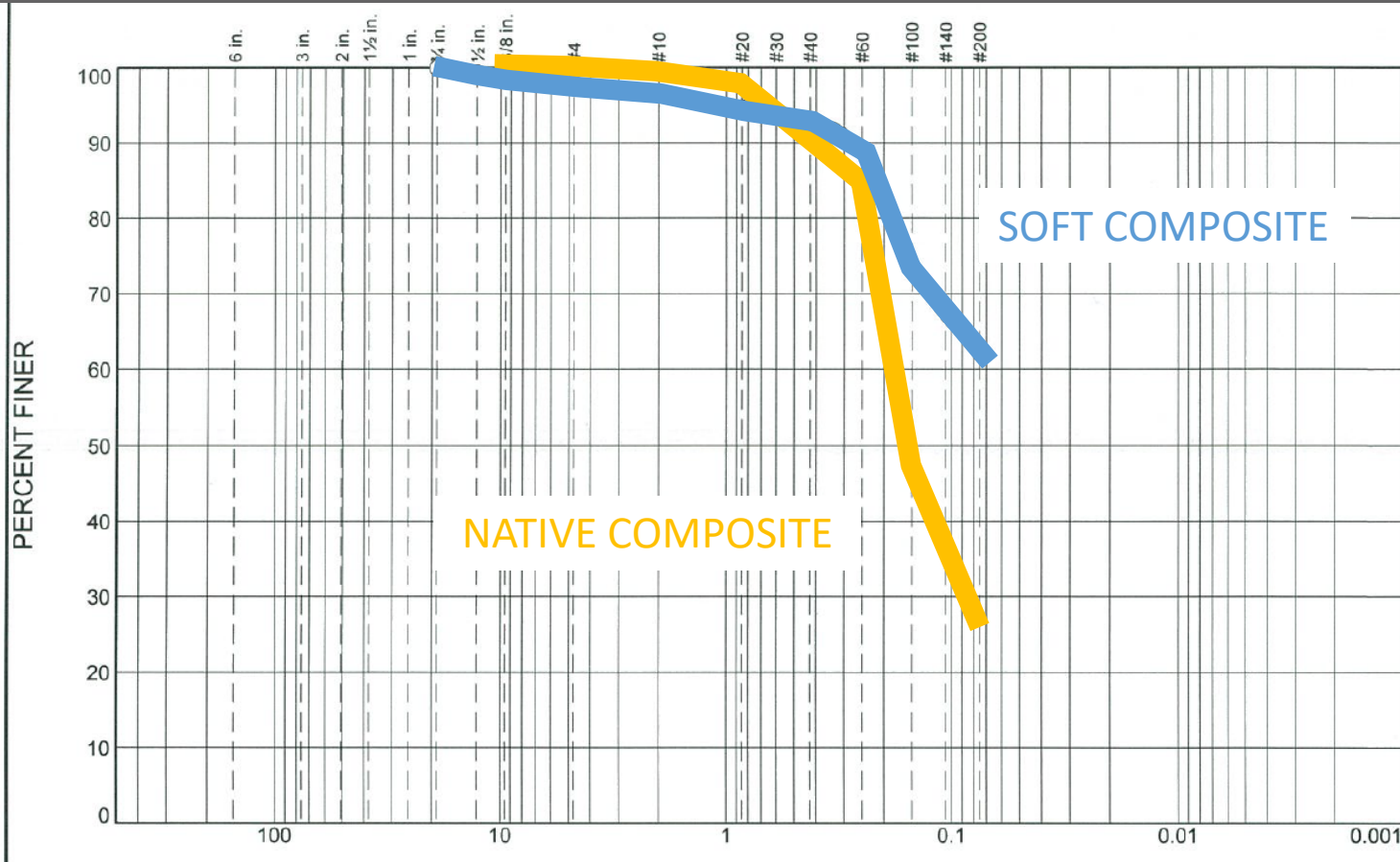
KEEP IT SIMPLE: COMPOSITING



BUT NOT TOO SIMPLE...



GRAIN SIZE

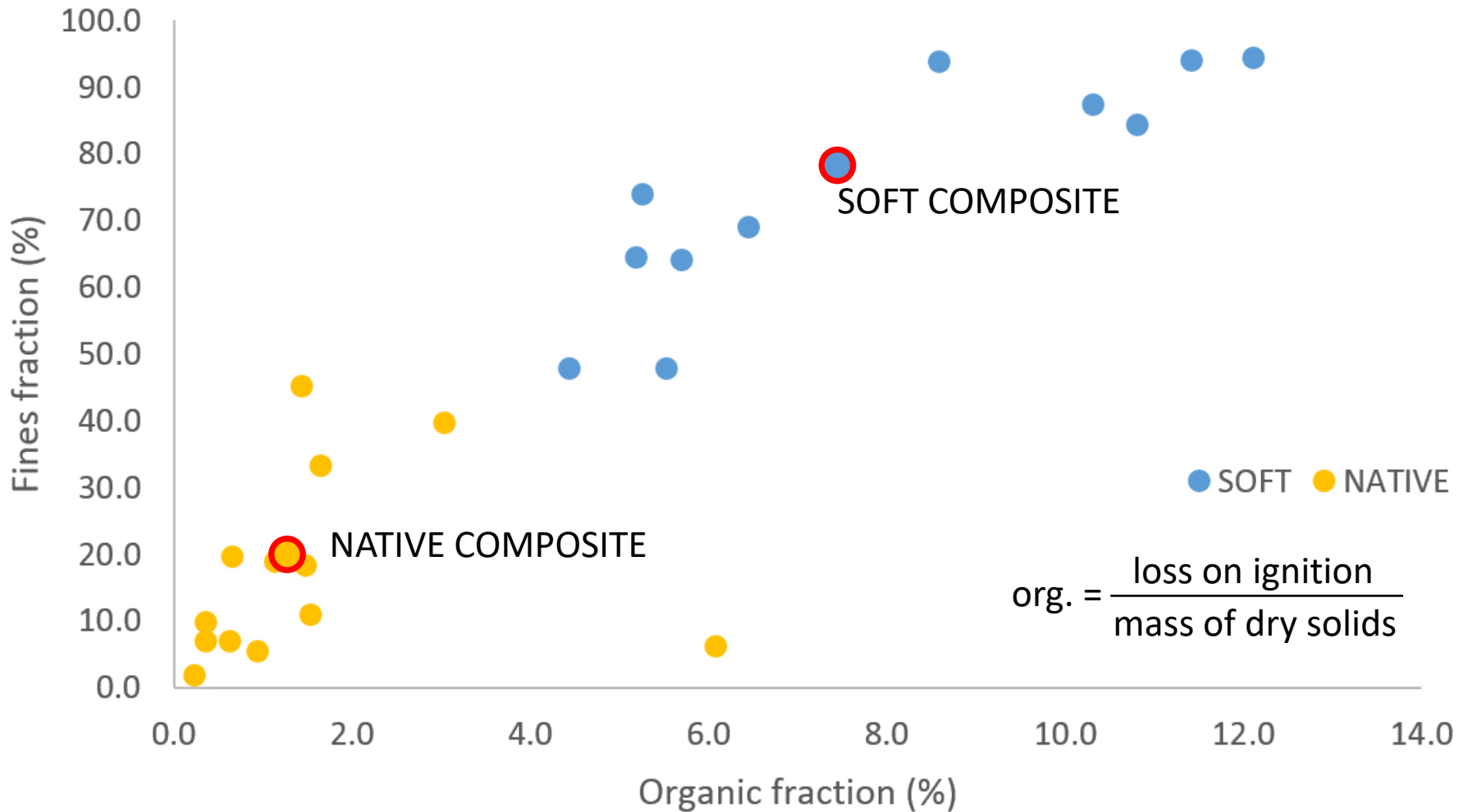


% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.2	1.3	3.5	30.7	62.3	

% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.2	0.7	8.6	63.5	27.0	

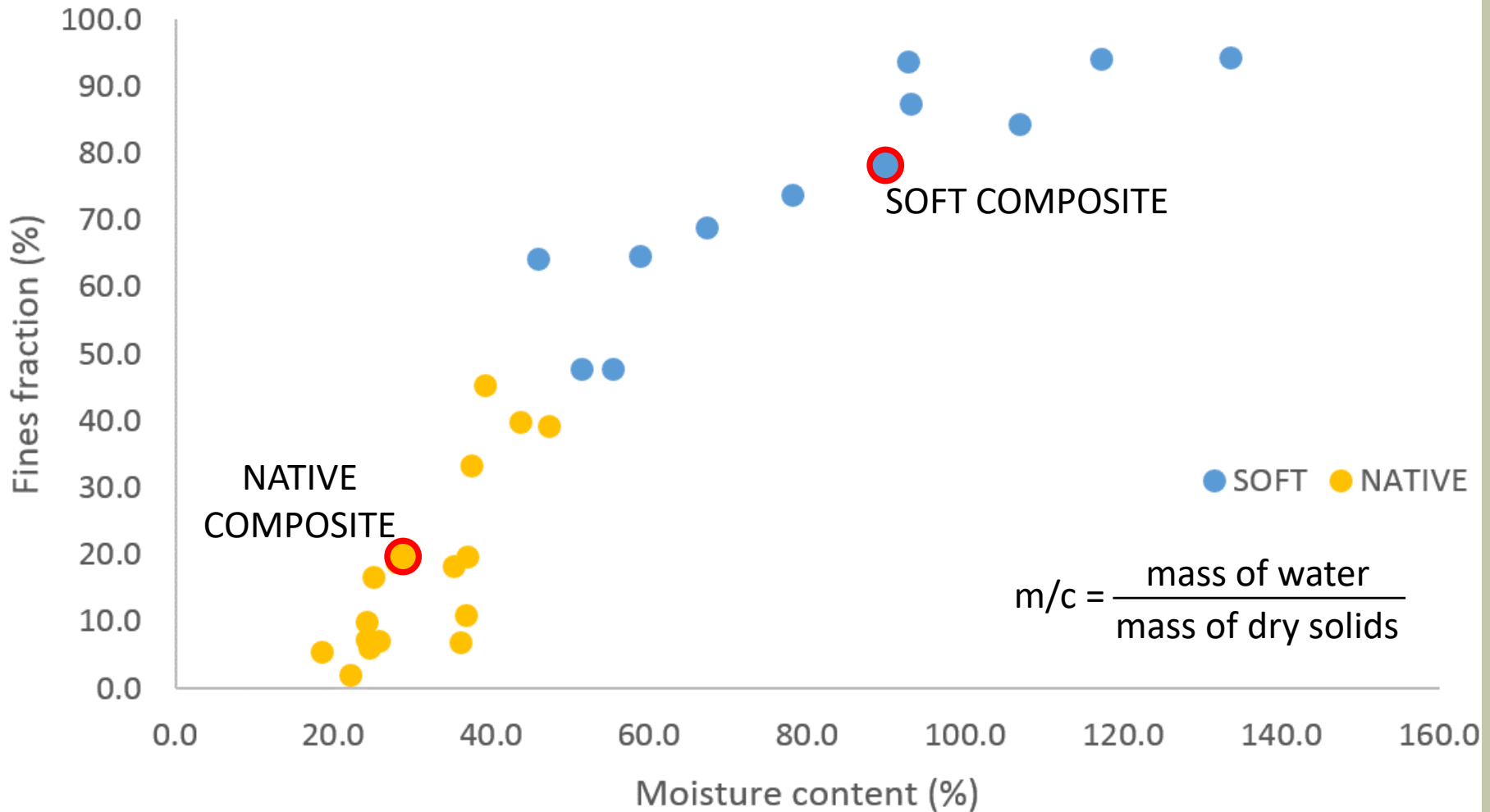
ORGANICS CONTENT

Organics vs Fines



MOISTURE CONTENT

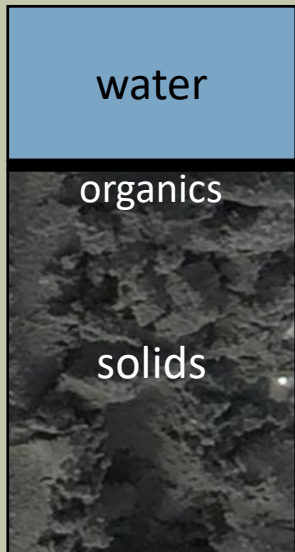
Moisture vs fines



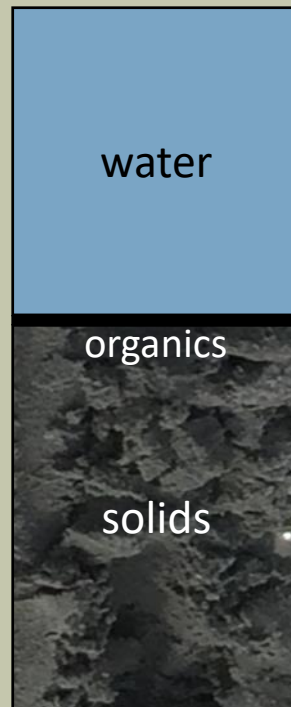
WATER IS THE ENEMY

For a constant volume of dry solids, this is the accompanying volume of water:

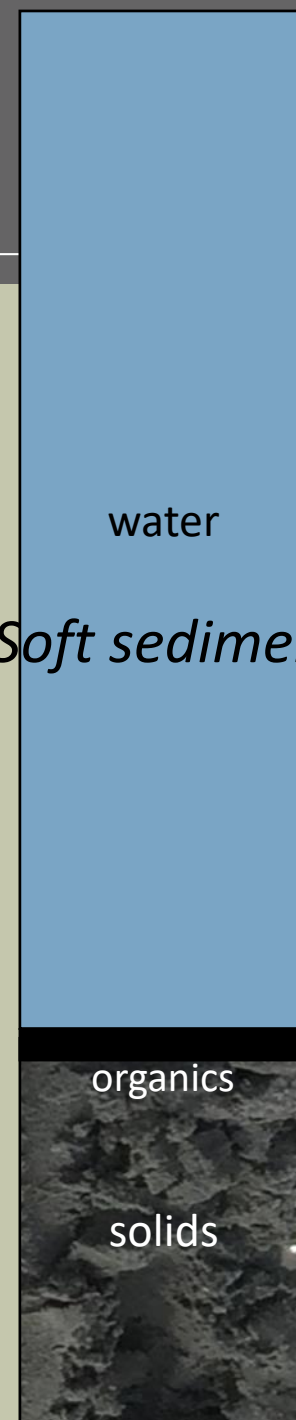
Uplands soil



Native sediment



Soft sediment



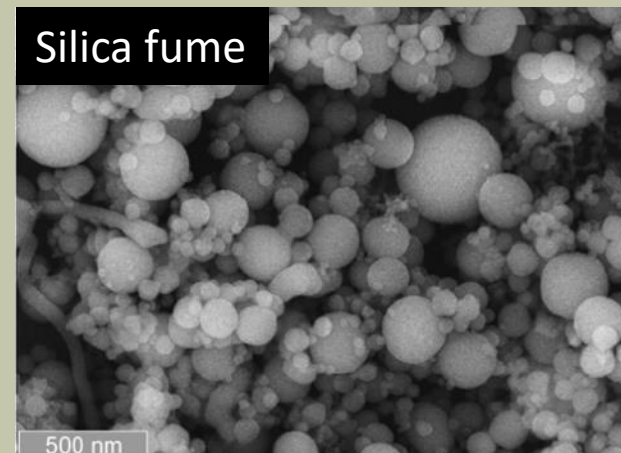
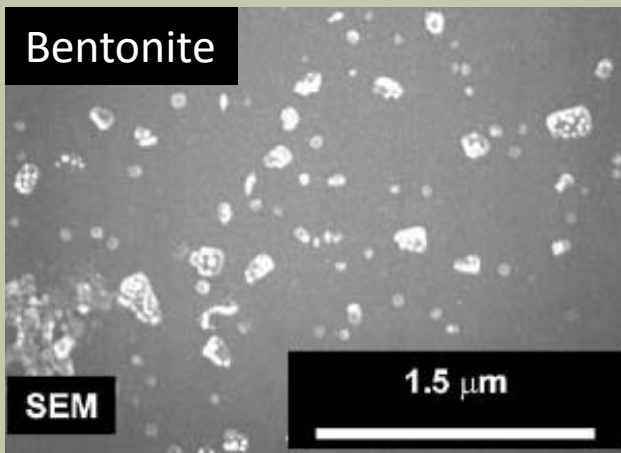
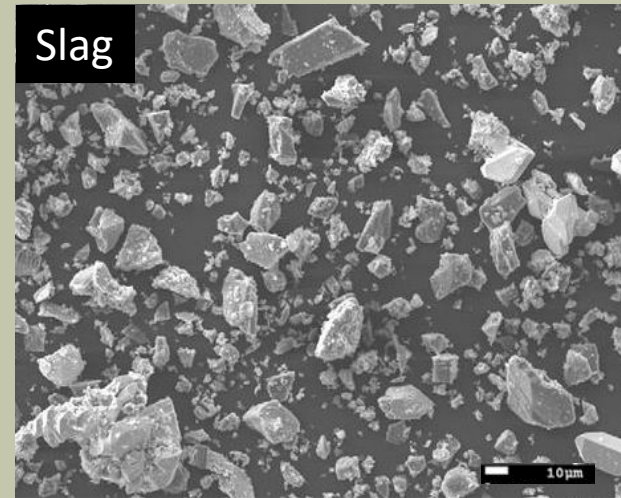
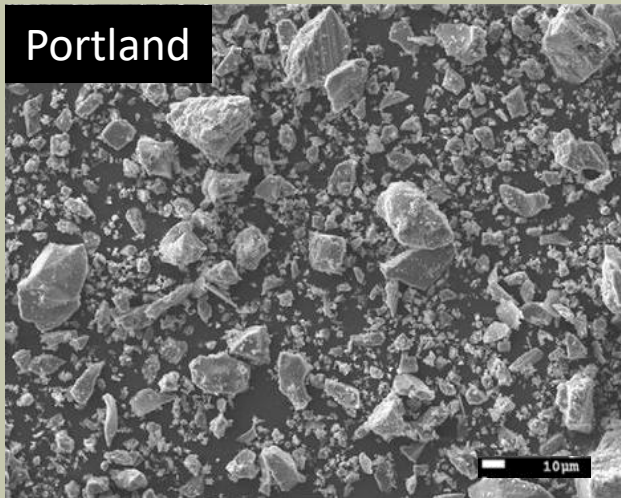
KEEP IT SIMPLE: REAGENTS



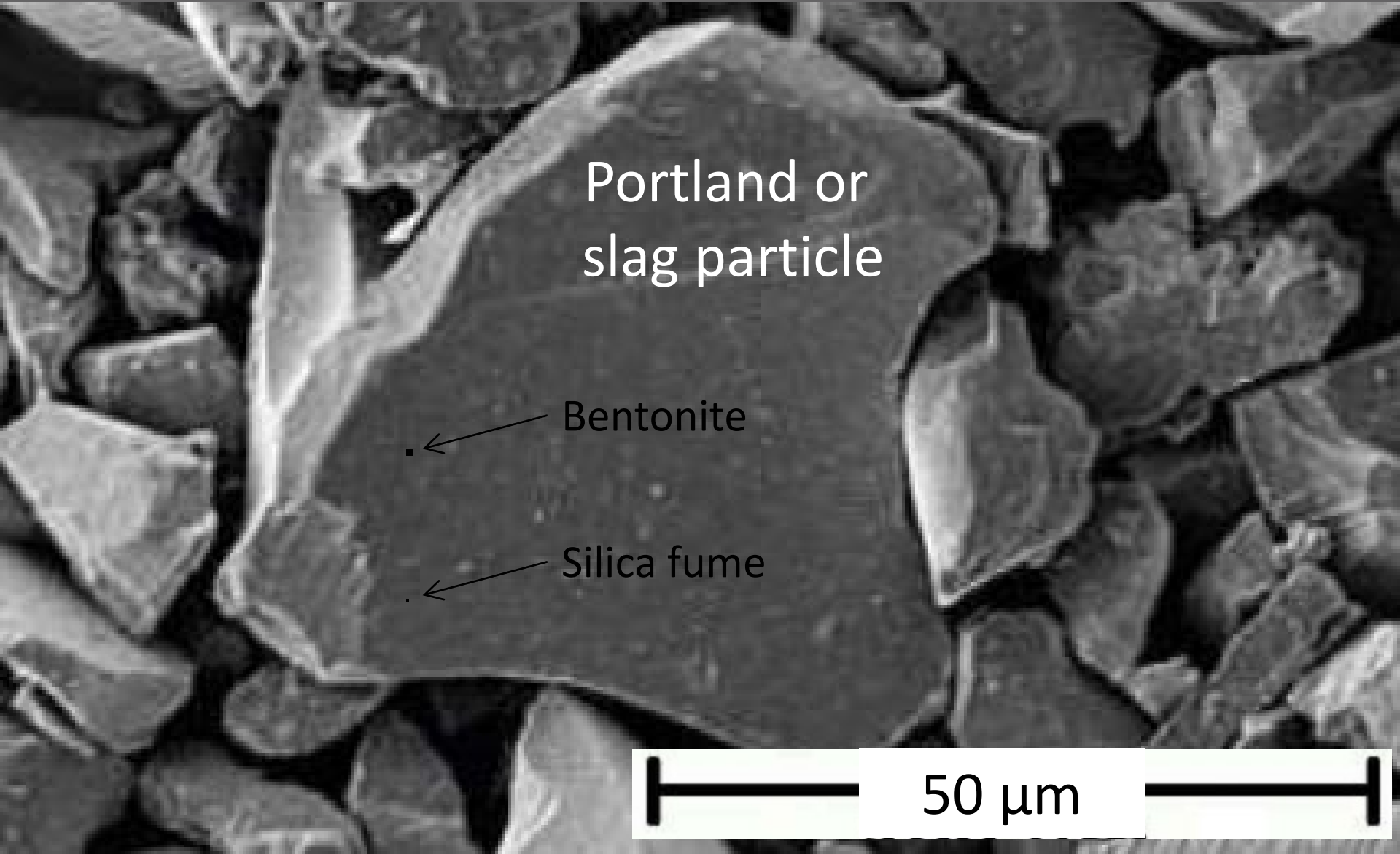
mass ratios in
1:1 W:C grout



CLOSER LOOK AT REAGENTS

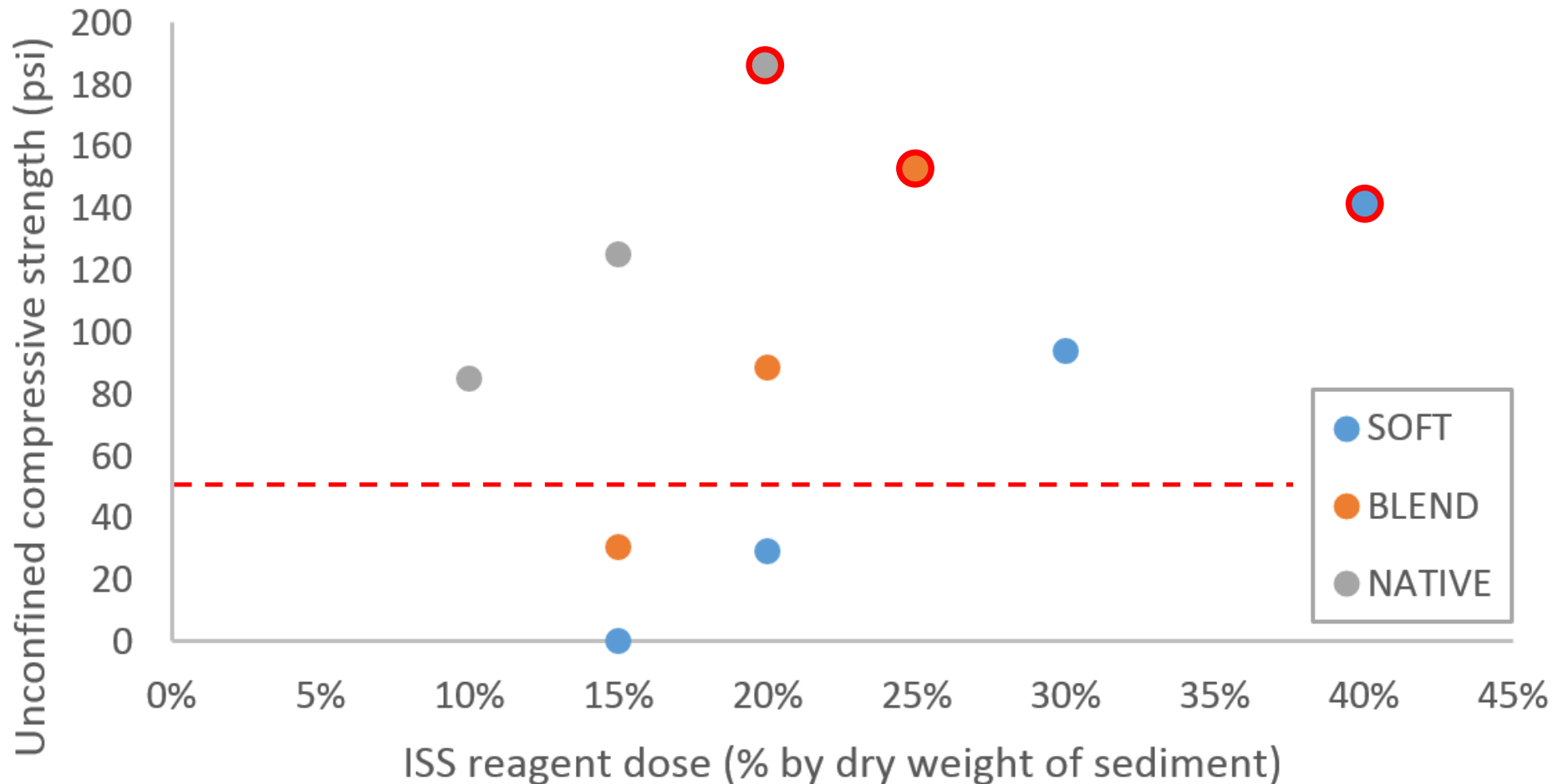


CLOSER LOOK AT REAGENTS (2)



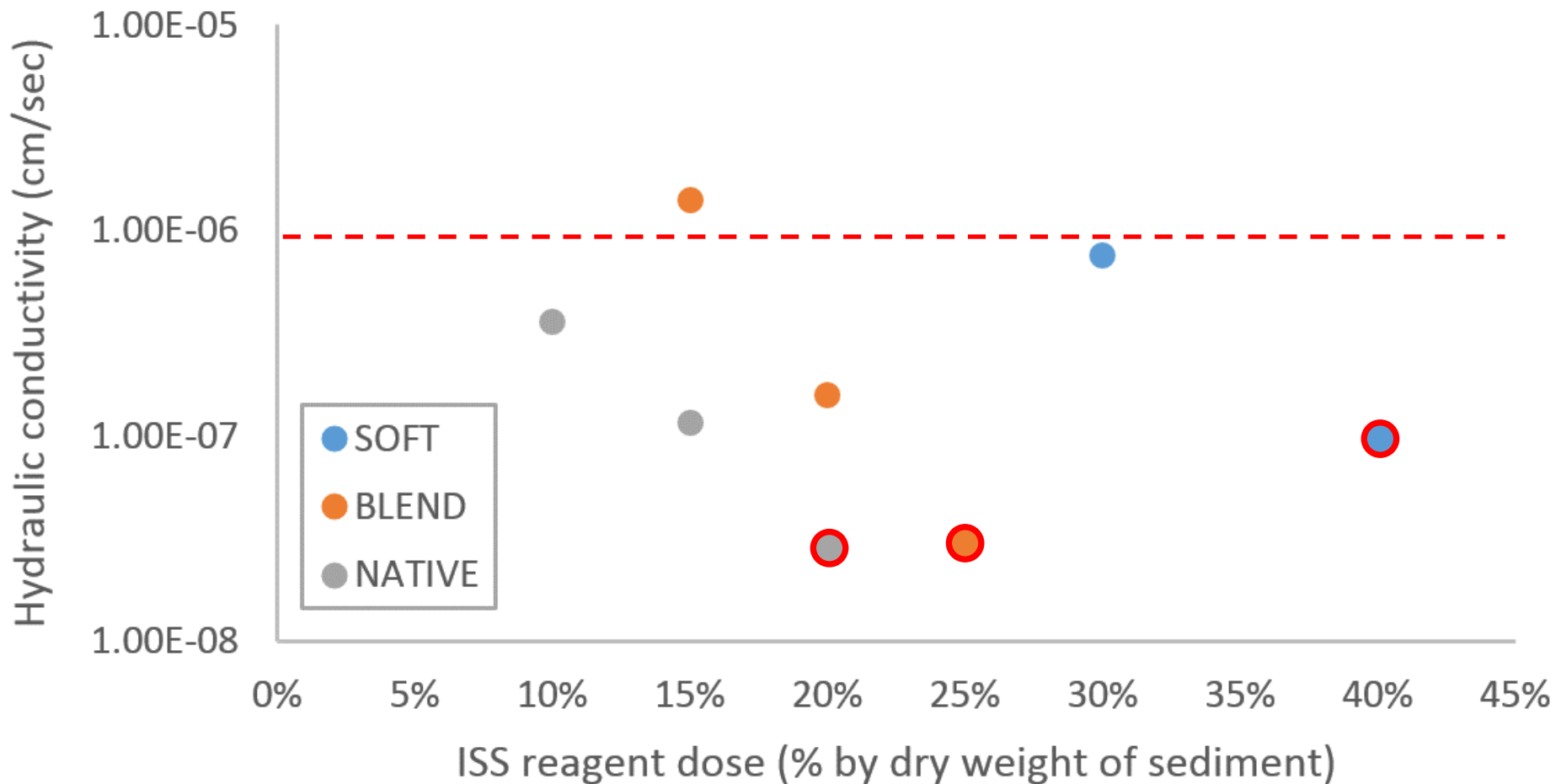
AIM FOR EARLY WINS: STRENGTH

28-day strength vs reagent dose



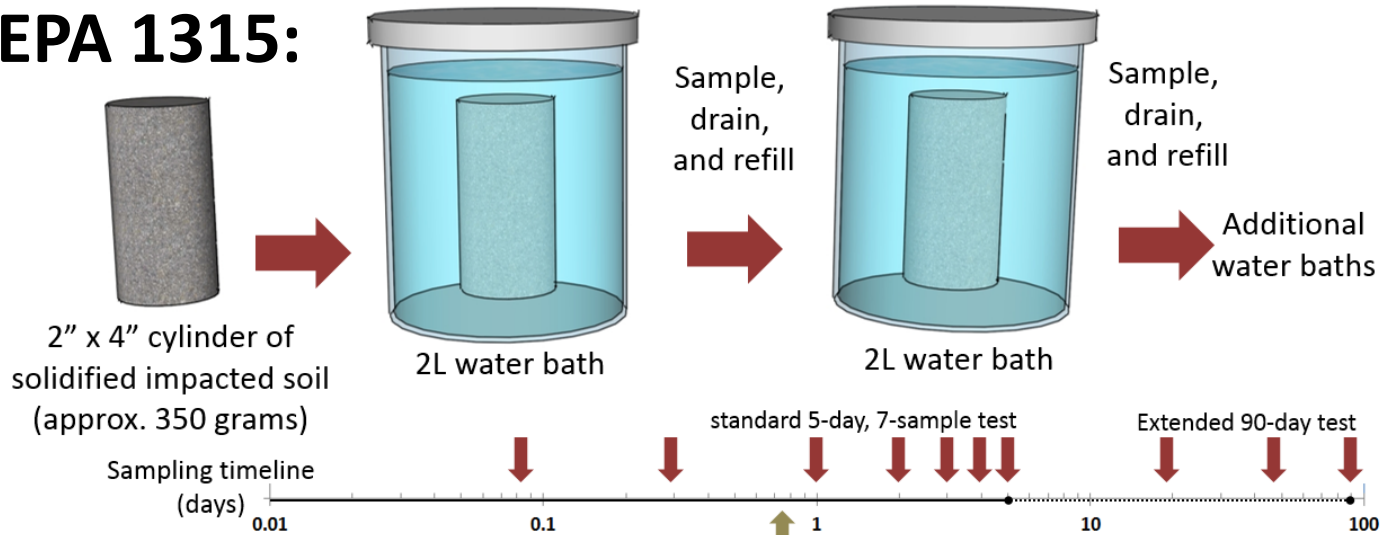
AIM FOR EARLY WINS: K

28-day hydraulic conductivity vs. reagent dose



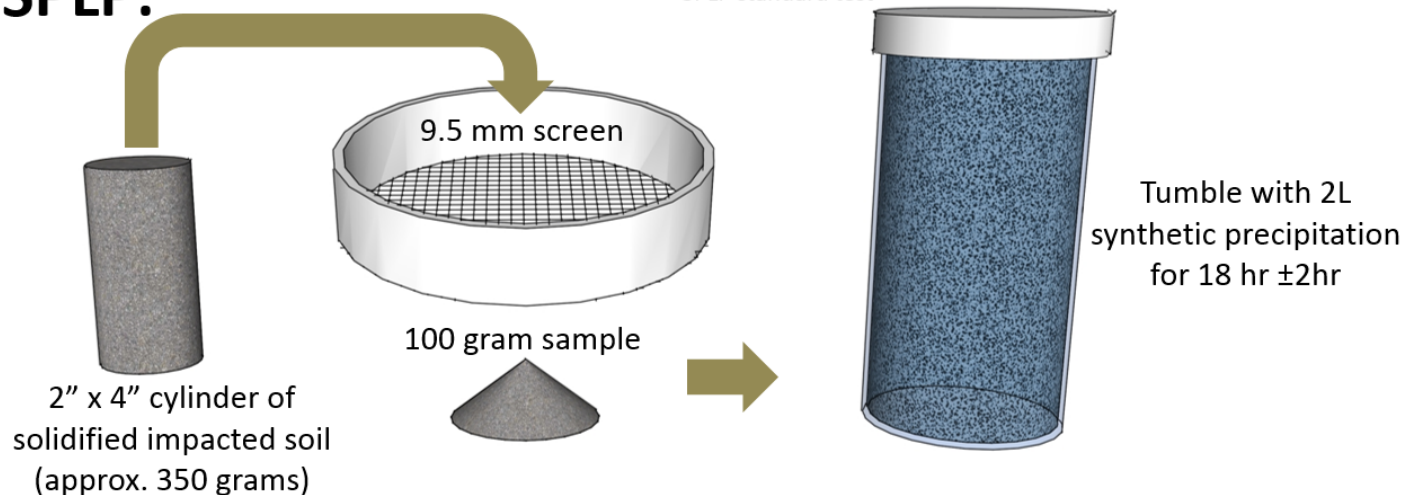
LEACH METHODS

EPA 1315:



1315 method

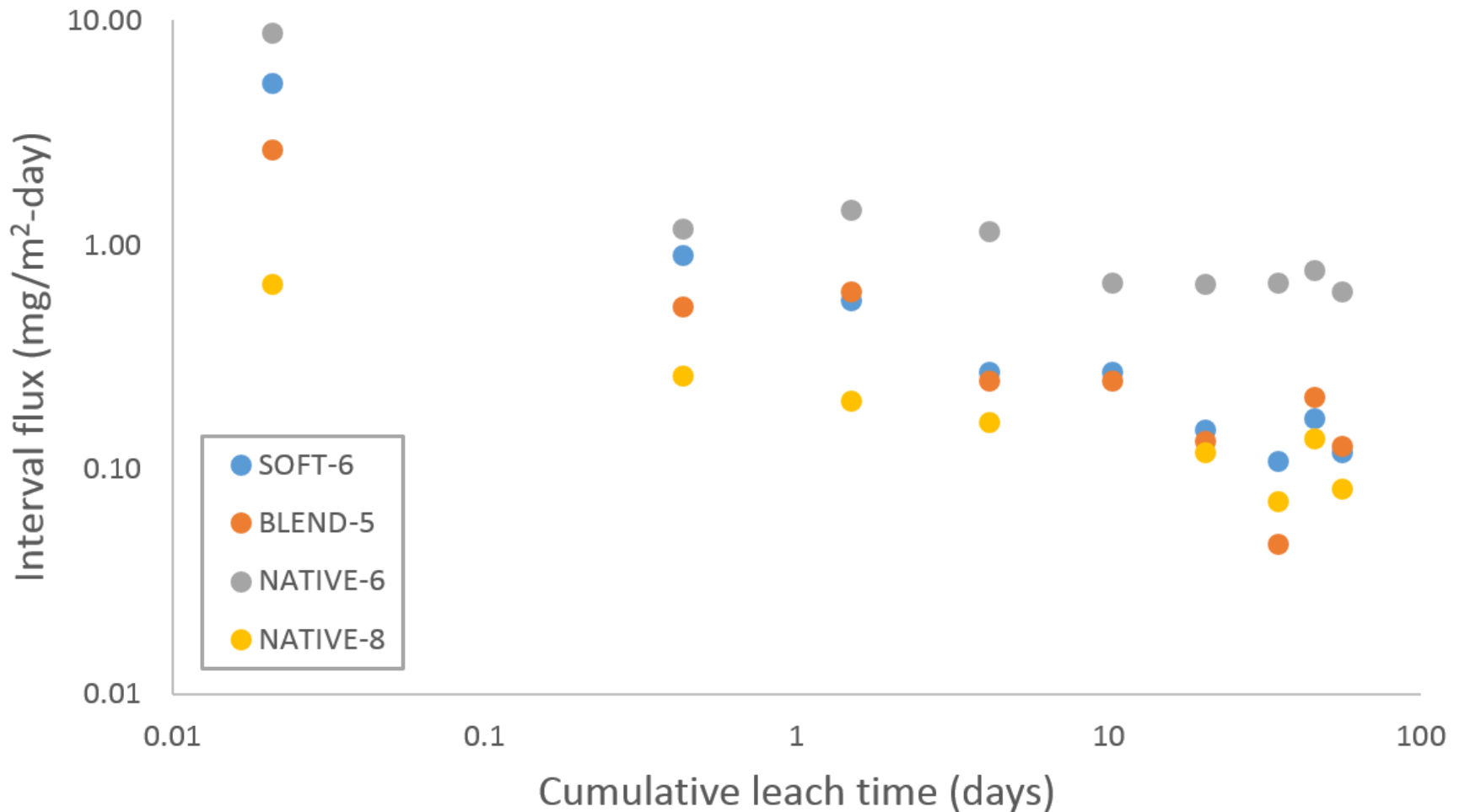
SPLP:



SPLP method

LEACH DATA: FLUX

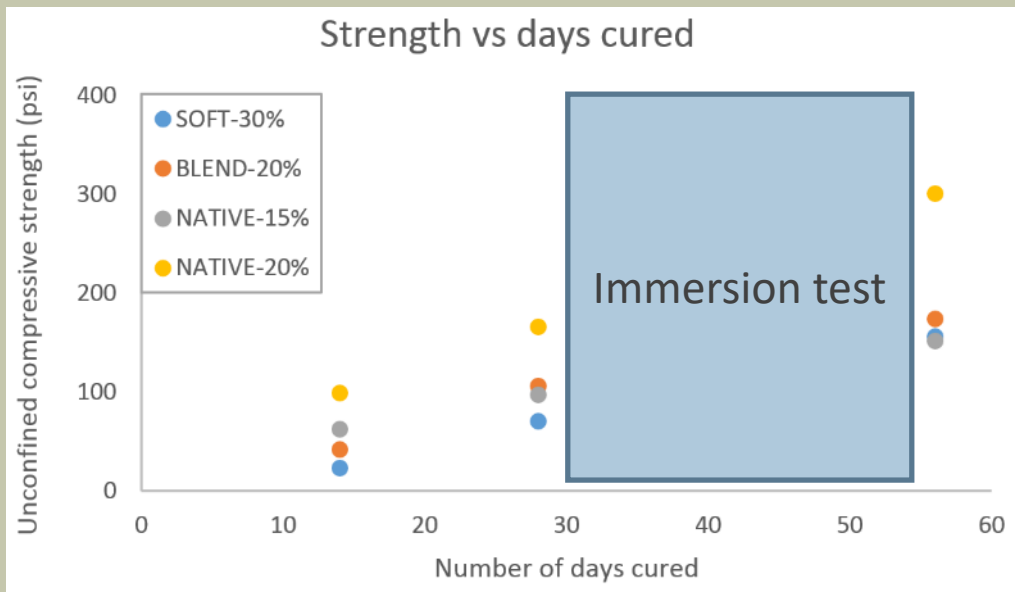
Interval Flux - Total SVOCs



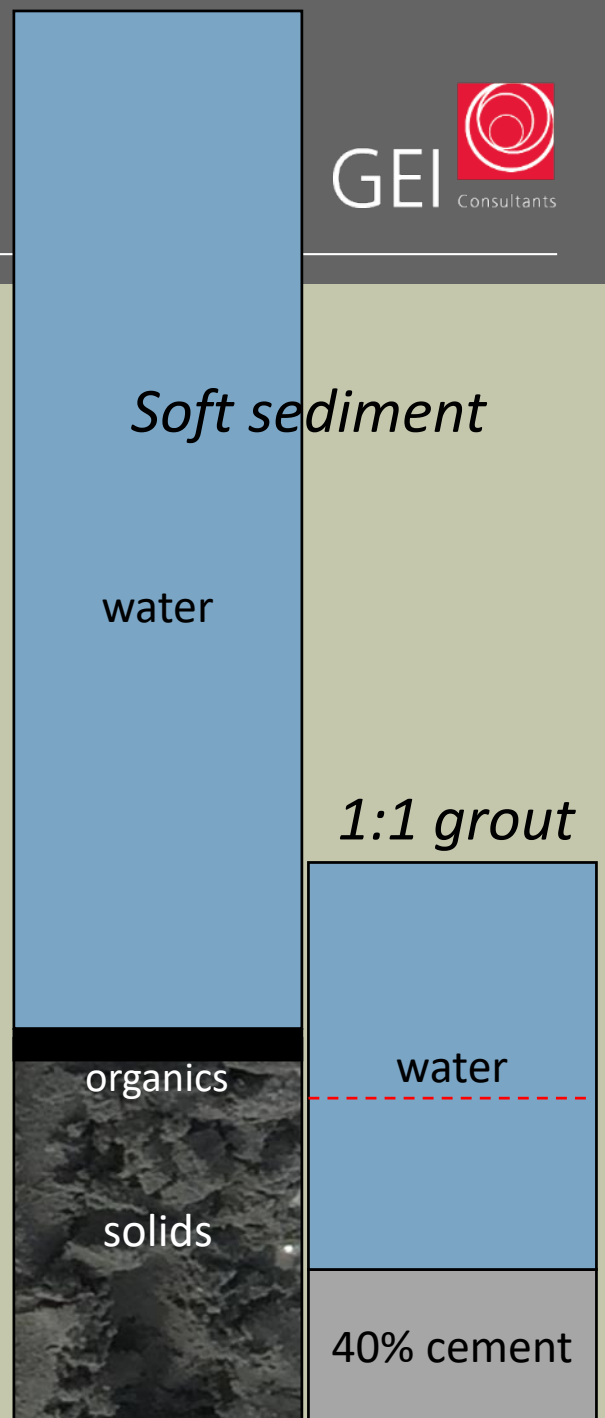
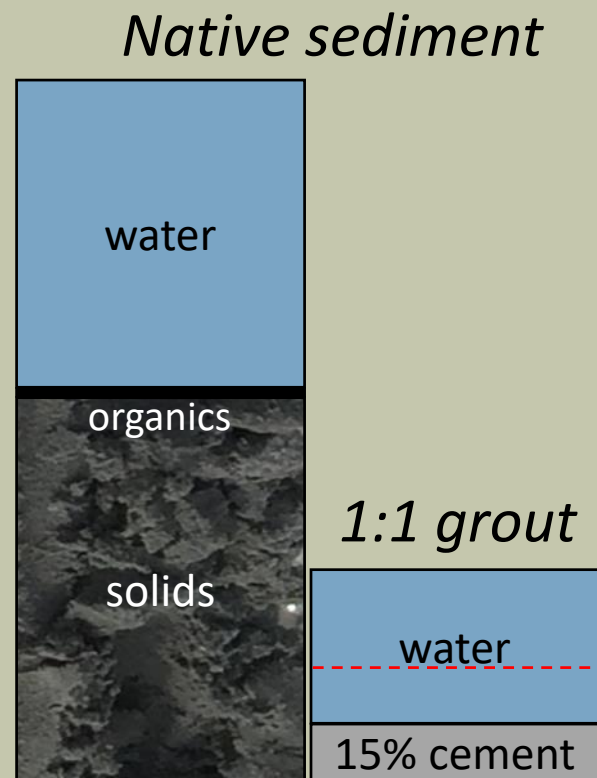
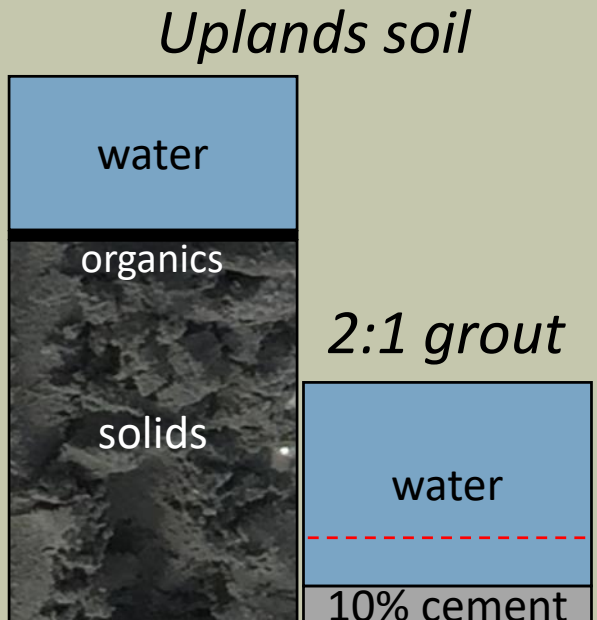
PERFORMANCE: DURABILITY



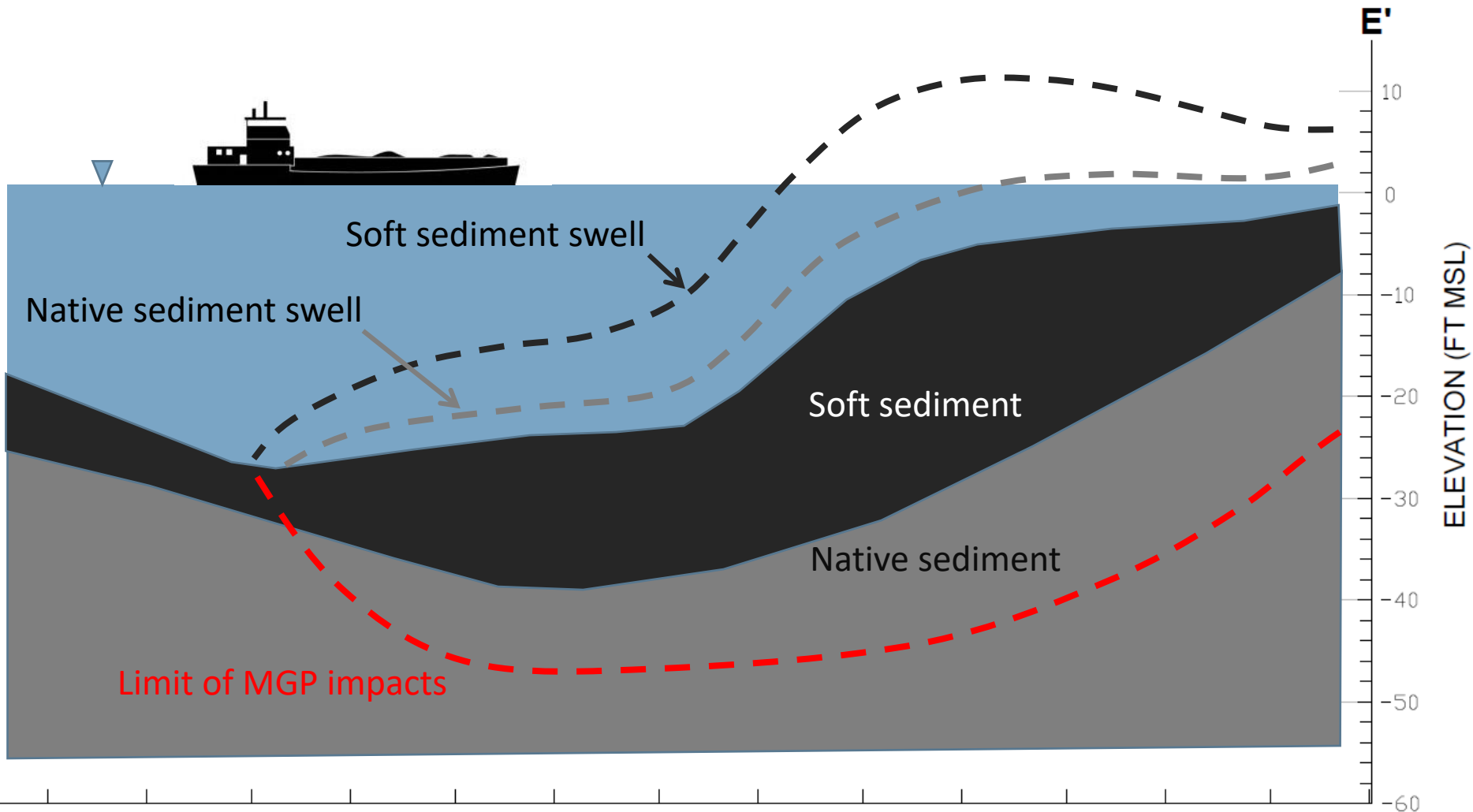
Avoid this...



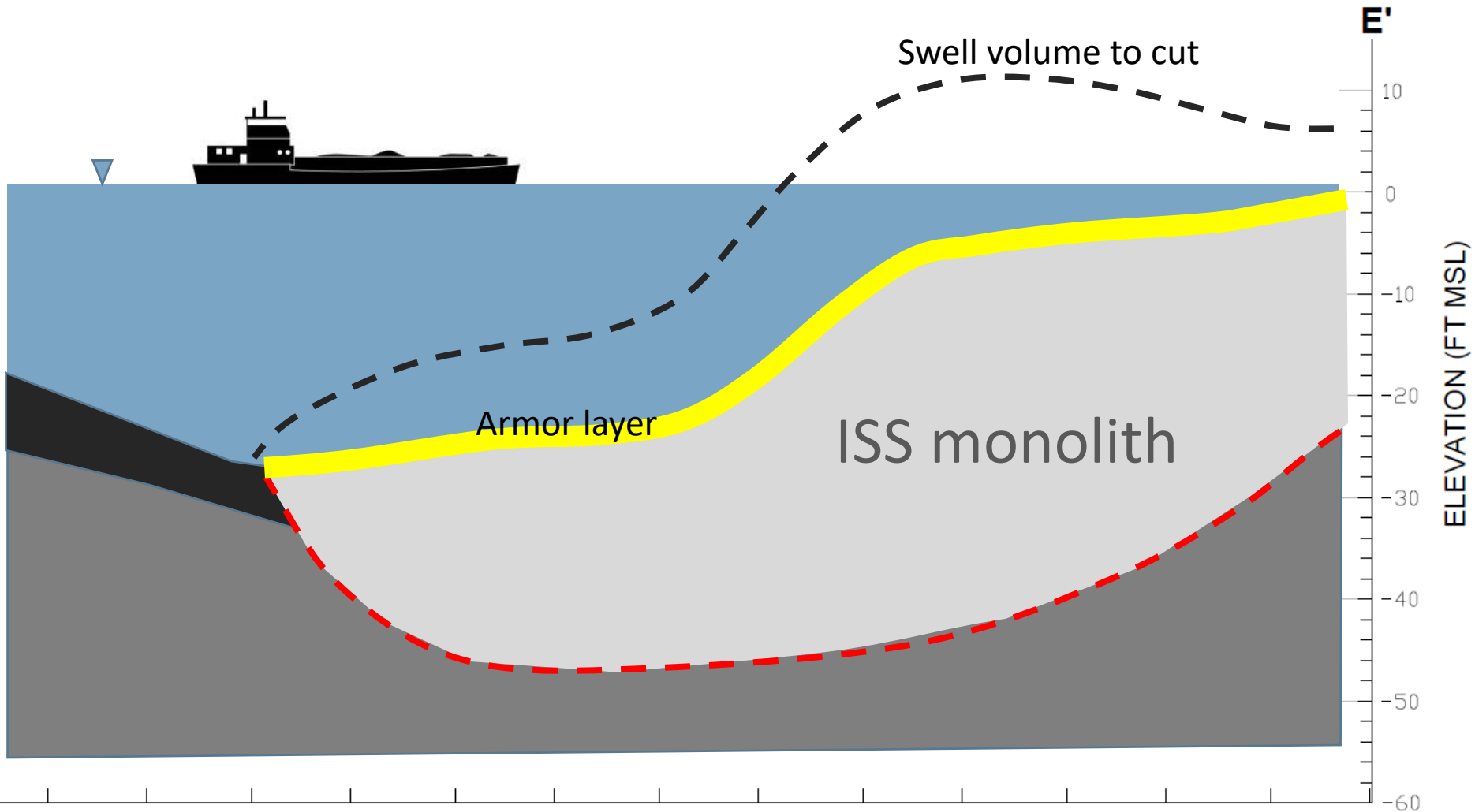
WATER IS THE ENEMY (2)



TAKING IT TO THE FIELD



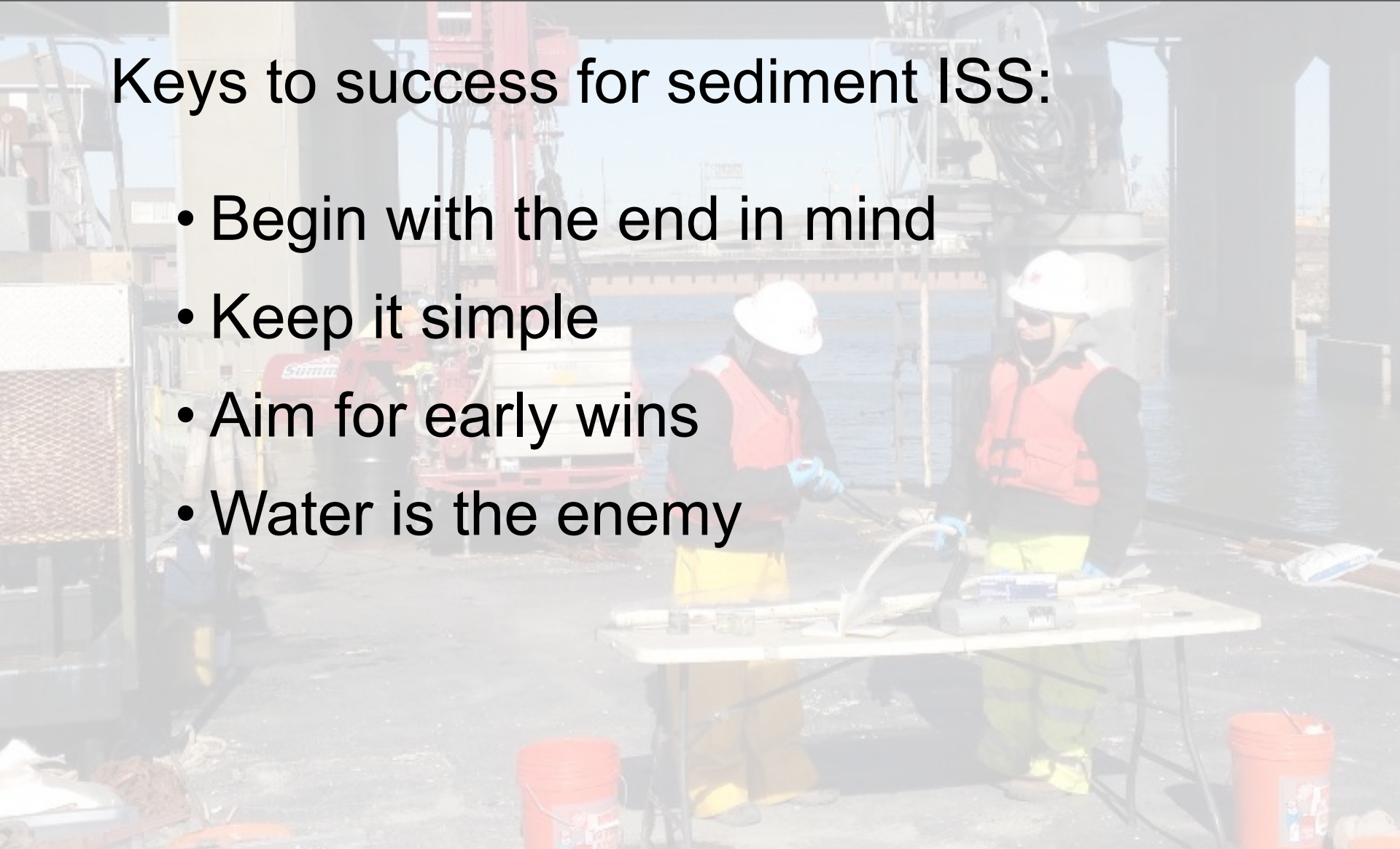
TAKING IT TO THE FIELD (2)



TAKEAWAYS

Keys to success for sediment ISS:

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- Keep it simple
- Aim for early wins
- Water is the enemy



ACKNOWLEDGEMENTS & THANK YOU

Coauthors: George Onorato & Barry Raus

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Analytical: TestAmerica Pittsburgh

