This presentation premiered at WaterSmart Innovations

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Recovery of Winery Wastewater using Vibratory Shear Enhanced Processing

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ENERGY COMMISSION

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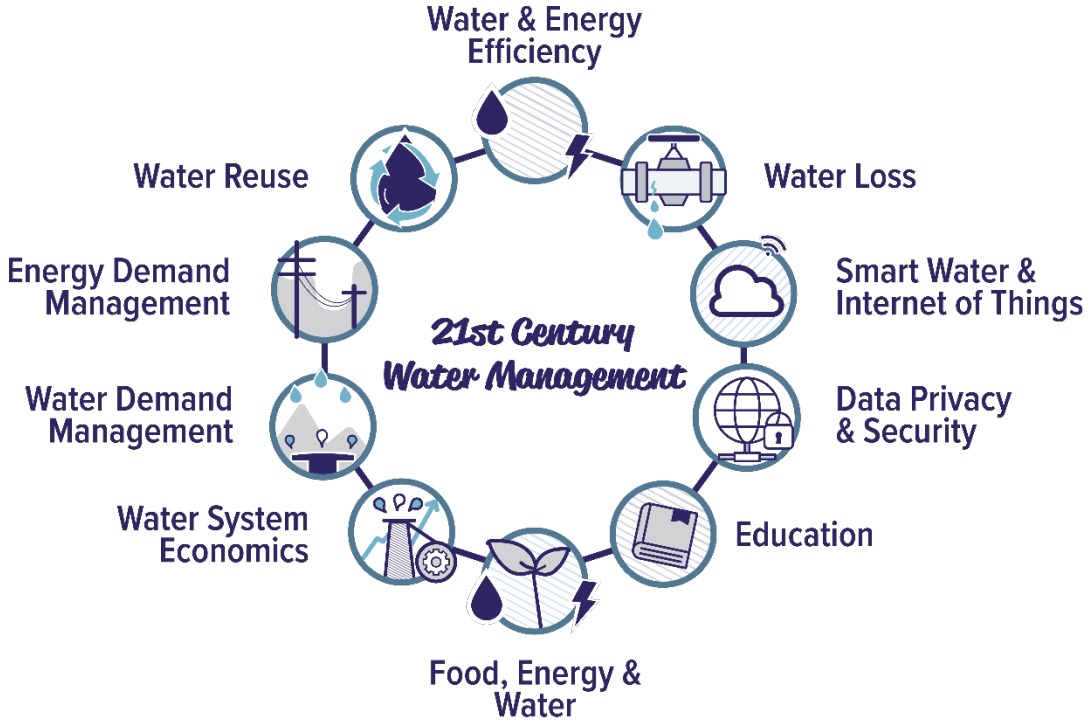
cwee.ucdavis.edu

NEW LOGIC
RESEARCH, INC.

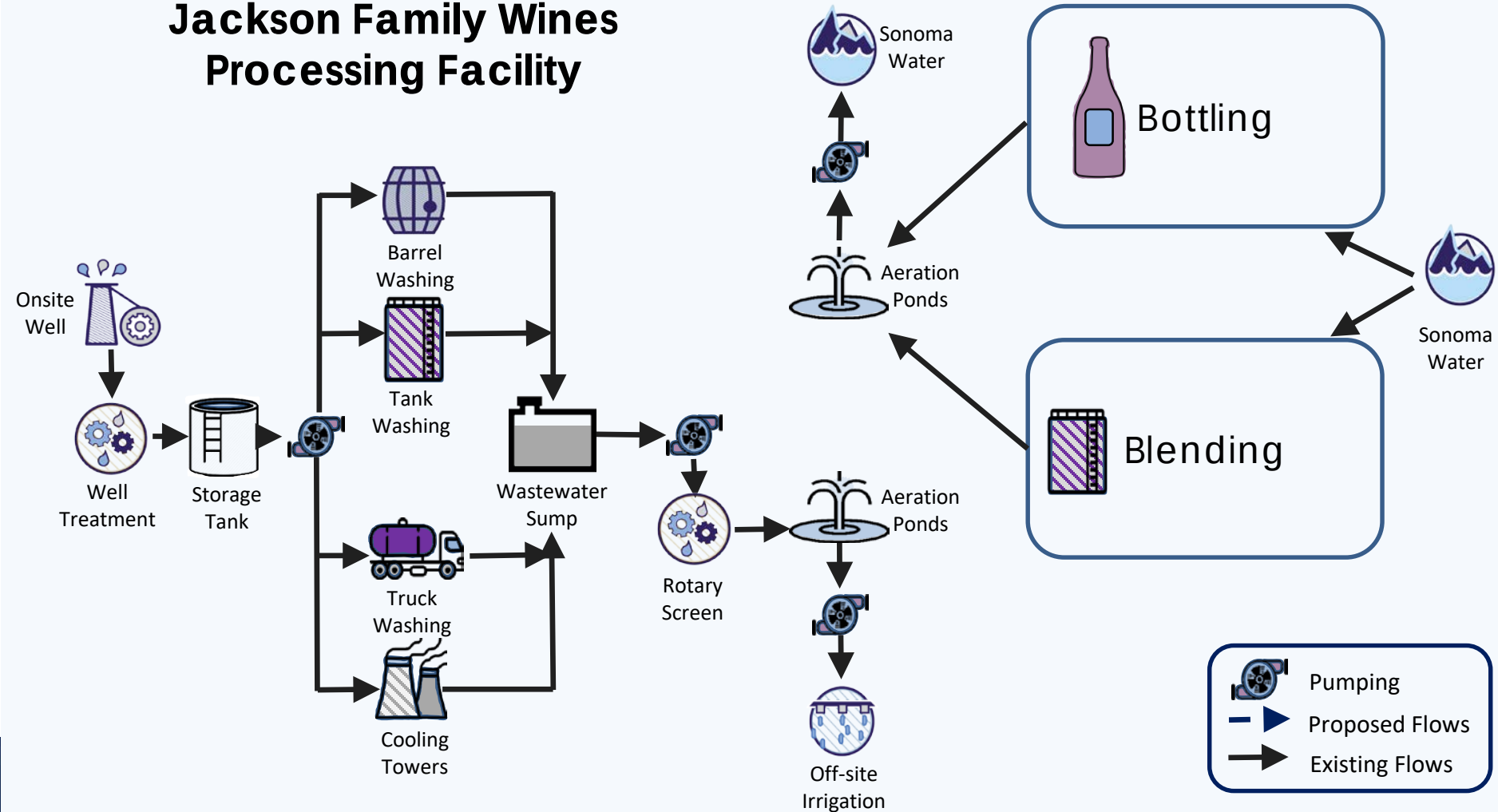
Jackson
FAMILY WINES

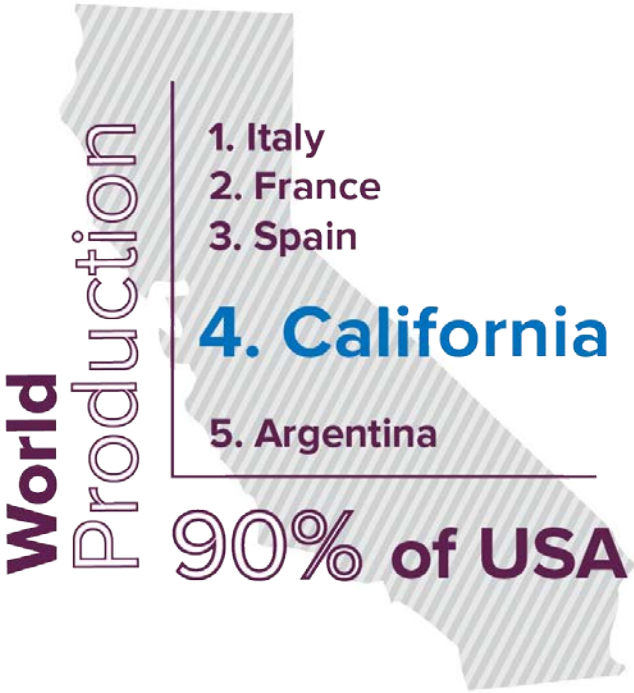
Advance water management solutions for the integrated savings of water & energy resources



Water Life Cycle – Water-Energy Nexus

Jackson Family Wines Processing Facility





*2014 data. Running average is 85%.

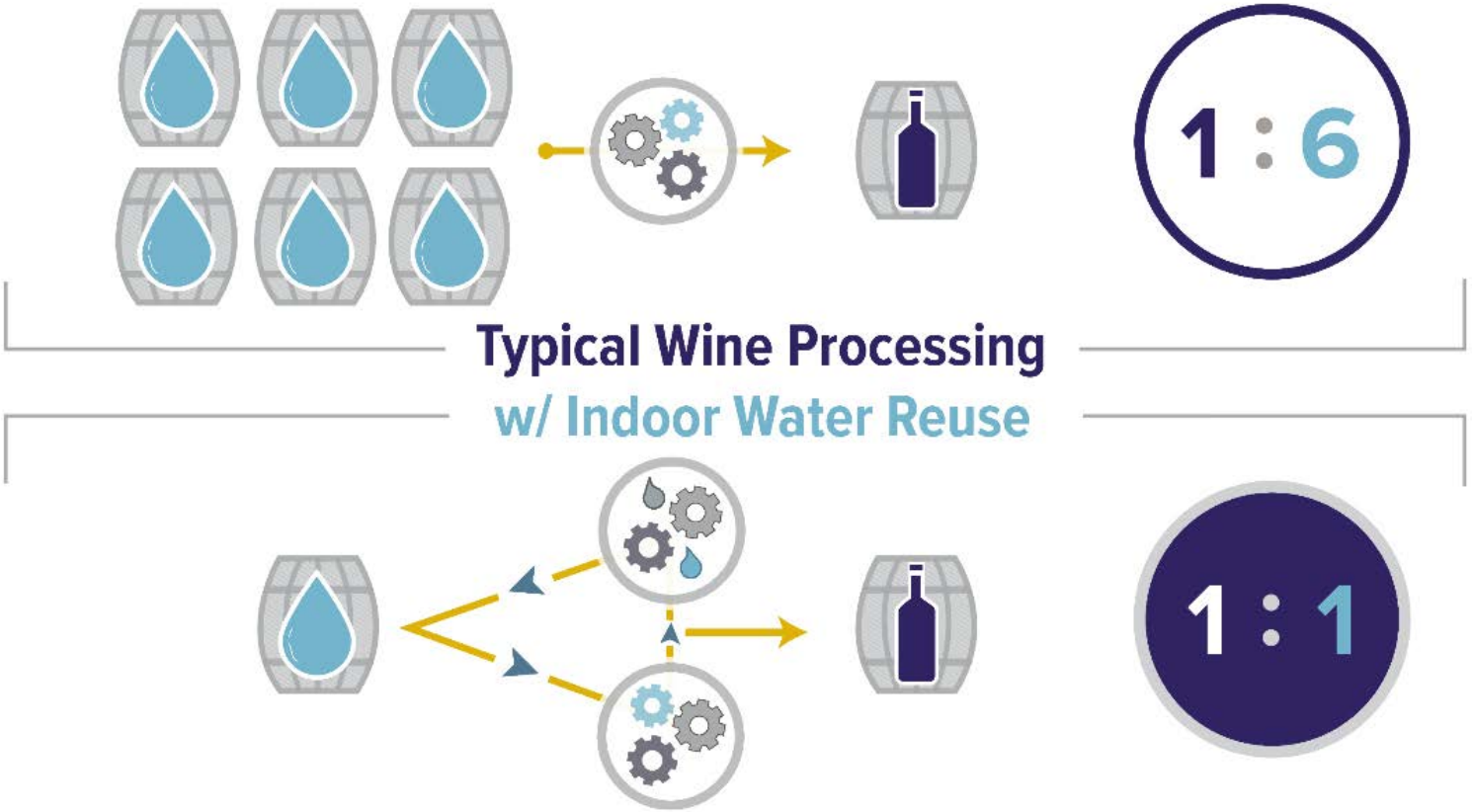
California Consumption

400 GWh/yr

2nd in food

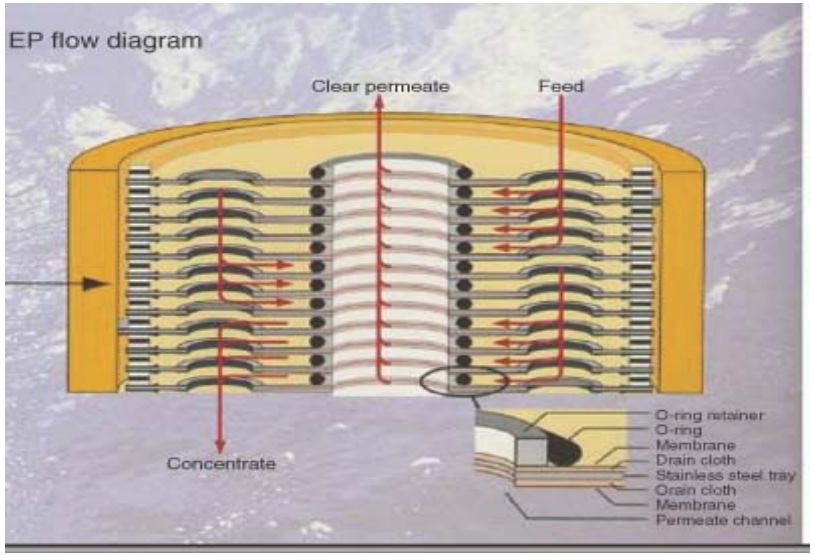
4B gal/yr

6:1 (h_2o:wine)



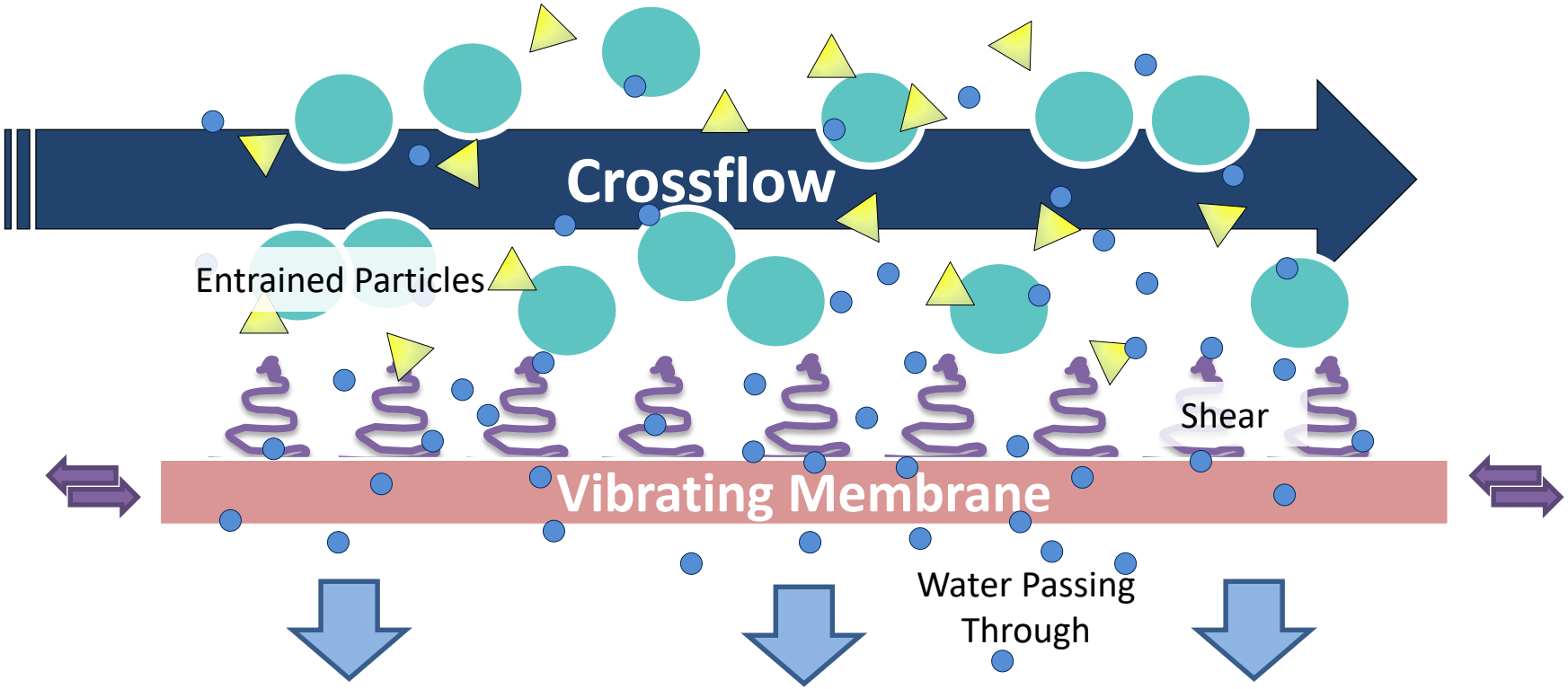
Wine Industry Water Reuse: Potential

- Vibrating membrane system
- Up to **90%** water recovery

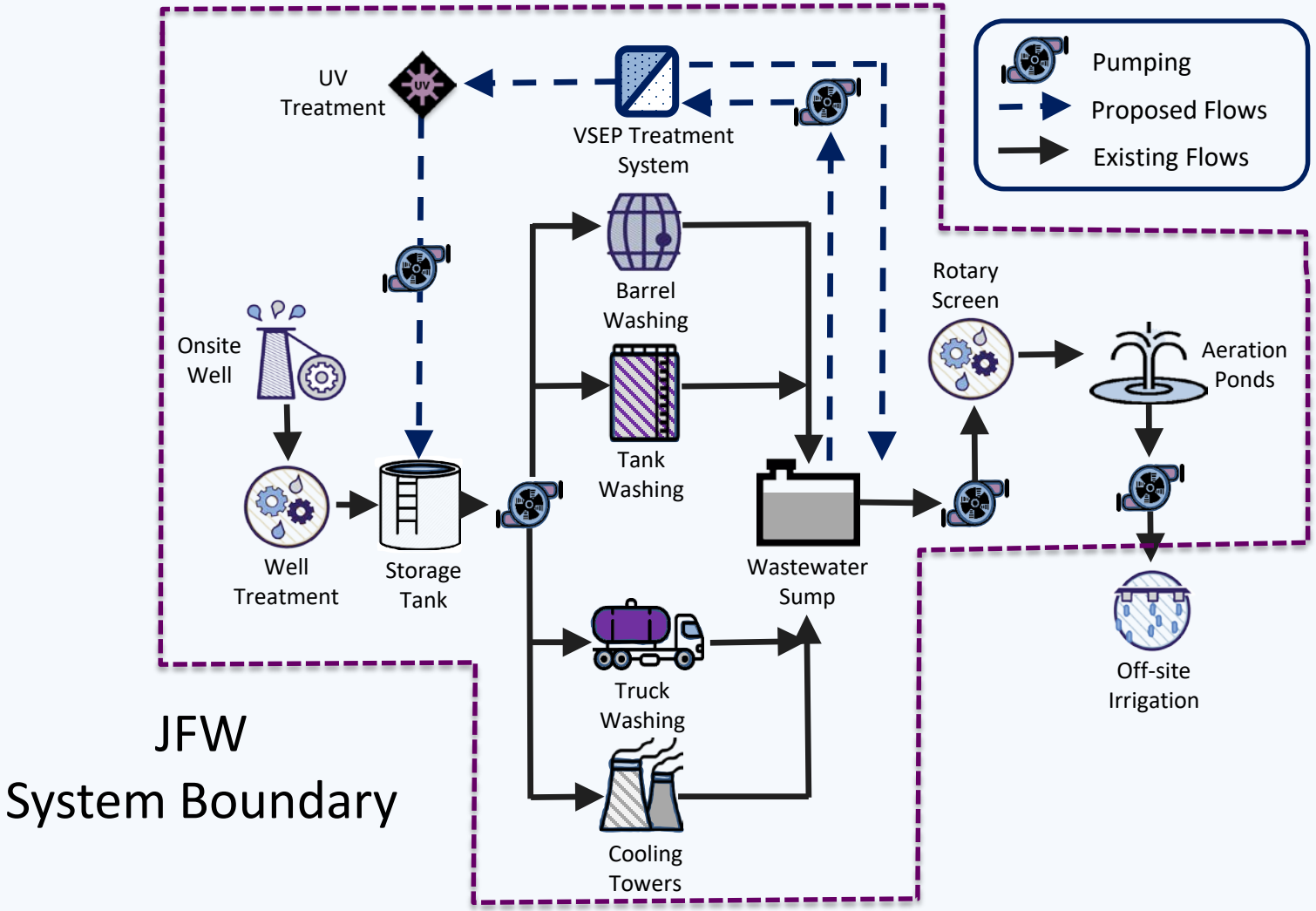


http://www.vsep.com/technology/index.html

*New Logic Research



Vibratory Shear Enhanced Processing

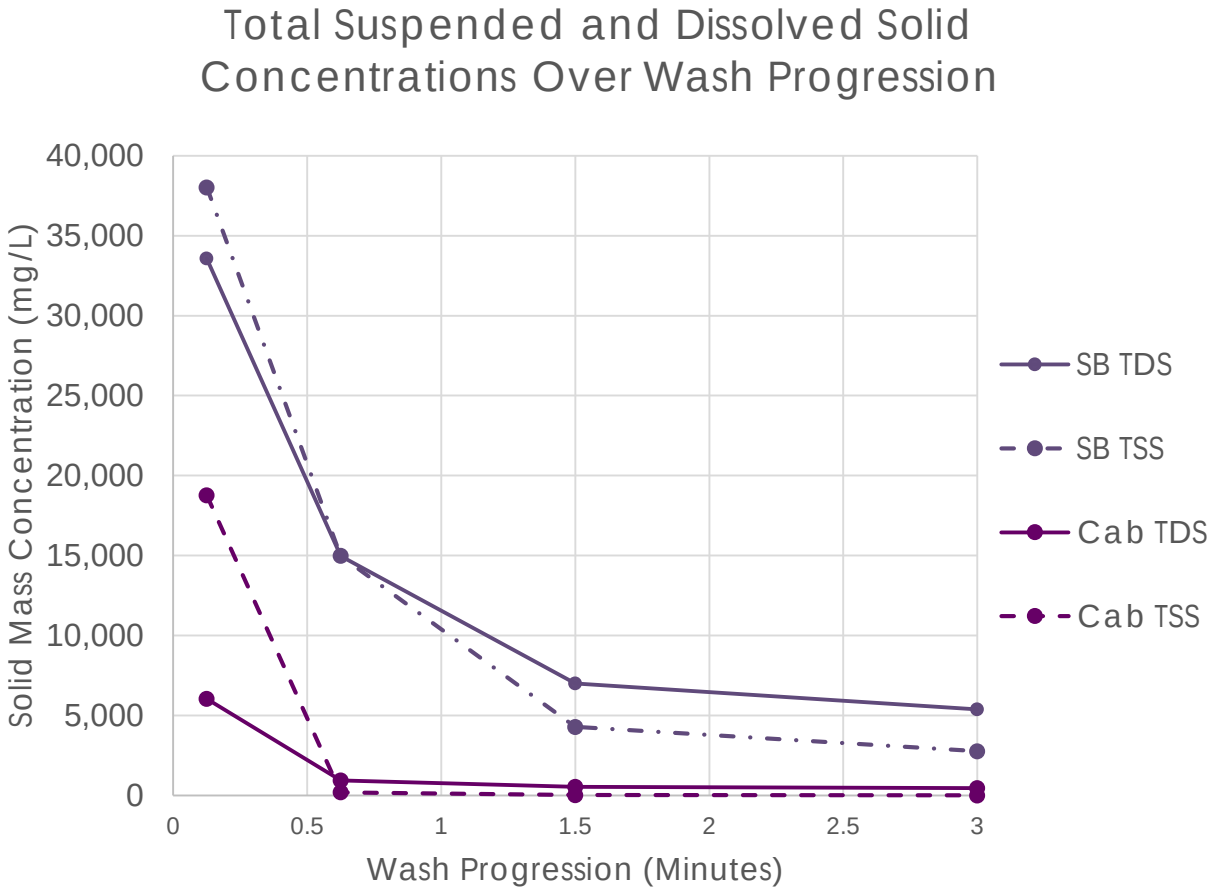

Pumping
Proposed Flows
Existing Flows
UV Treatment
VSEP Treatment System
Barrel Washing
Tank Washing
Truck Washing
Cooling Towers
Onsite Well
Well Treatment
Storage Tank
Wastewater Sump
Rotary Screen
Aeration Ponds
Off-site Irrigation
JFW
System Boundary

Feed Sources

- Barrel Washing
- Tank Washing
- Truck Washing
- Cooling Tower Blowdown

	pH	Hardness (mgCaCO3eq/L)	Total Dissolved Solids (mg/L)	Total Suspended Solids (mg/L)
Average	3.65	402	6075	2568
Standard Deviation	1.17	207	3742	2133

Winery Wastewater Water Quality Characterization


Total Suspended and Dissolved Solid Concentrations Over Wash Progression
Solid Mass Concentration (mg/L)
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
0
0.5
1
1.5
2
2.5
3
Wash Progression (Minutes)
SB TDS
SB TSS
Cab TDS
Cab TSS

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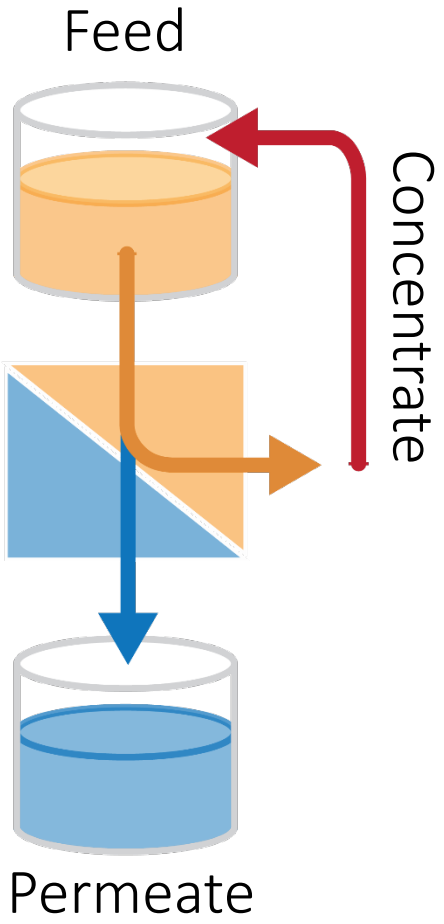
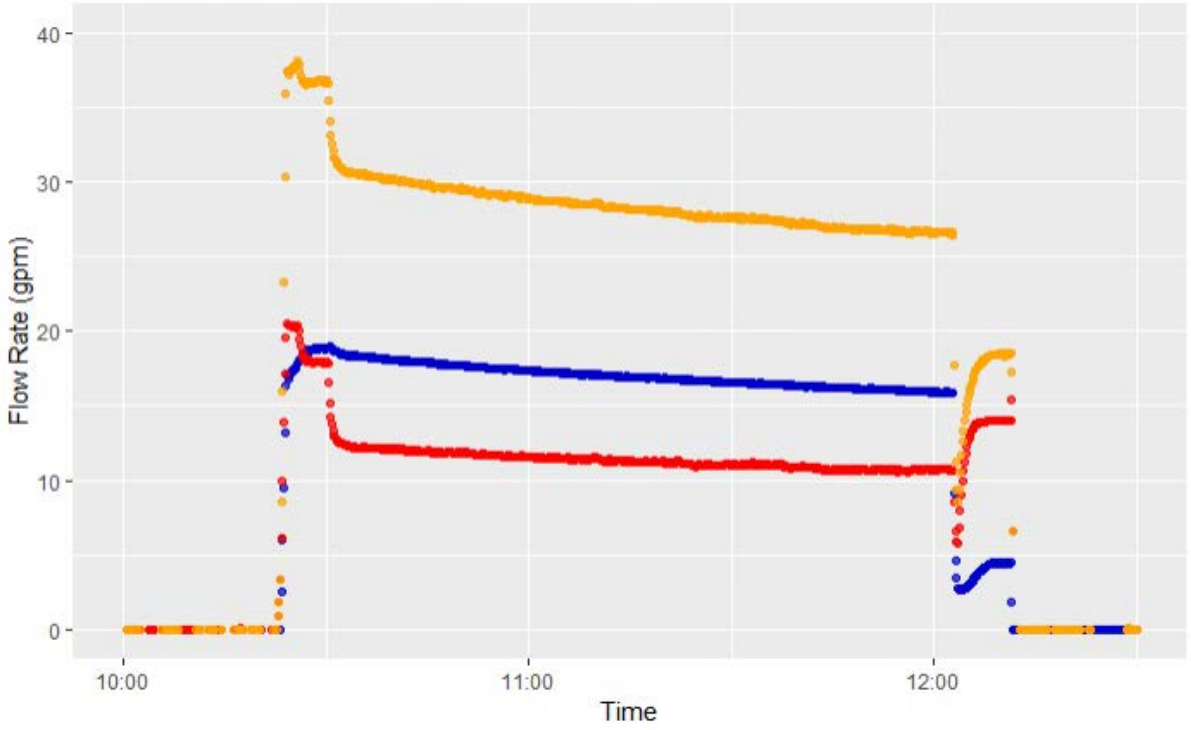
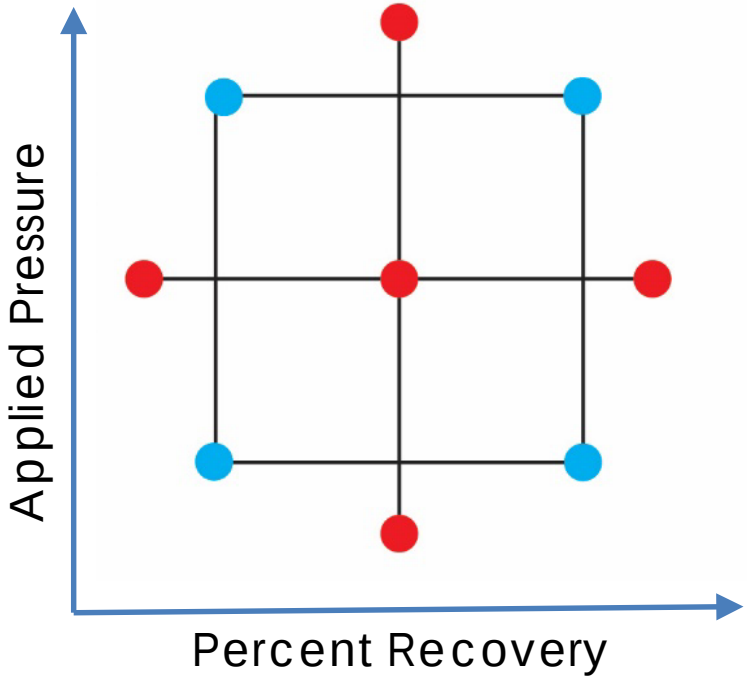
Installed VSEP System

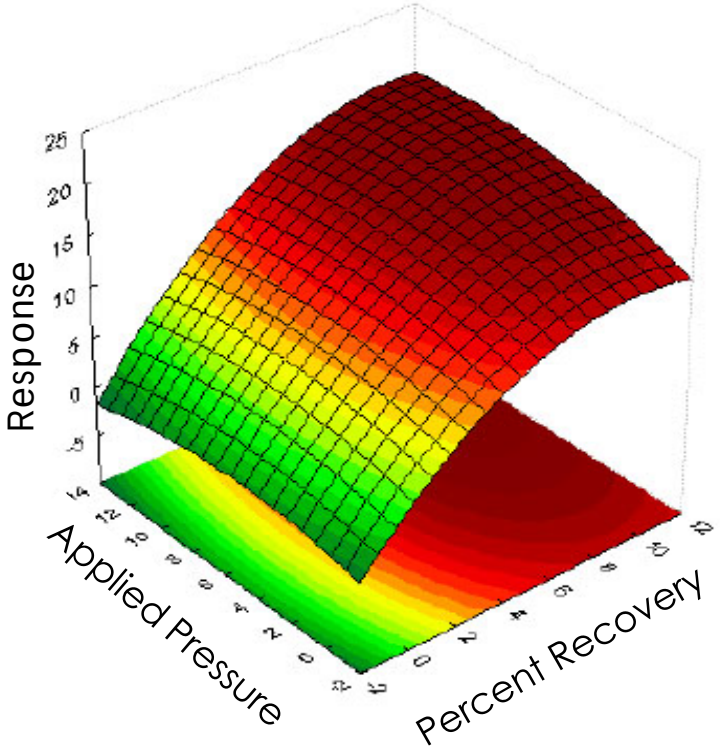




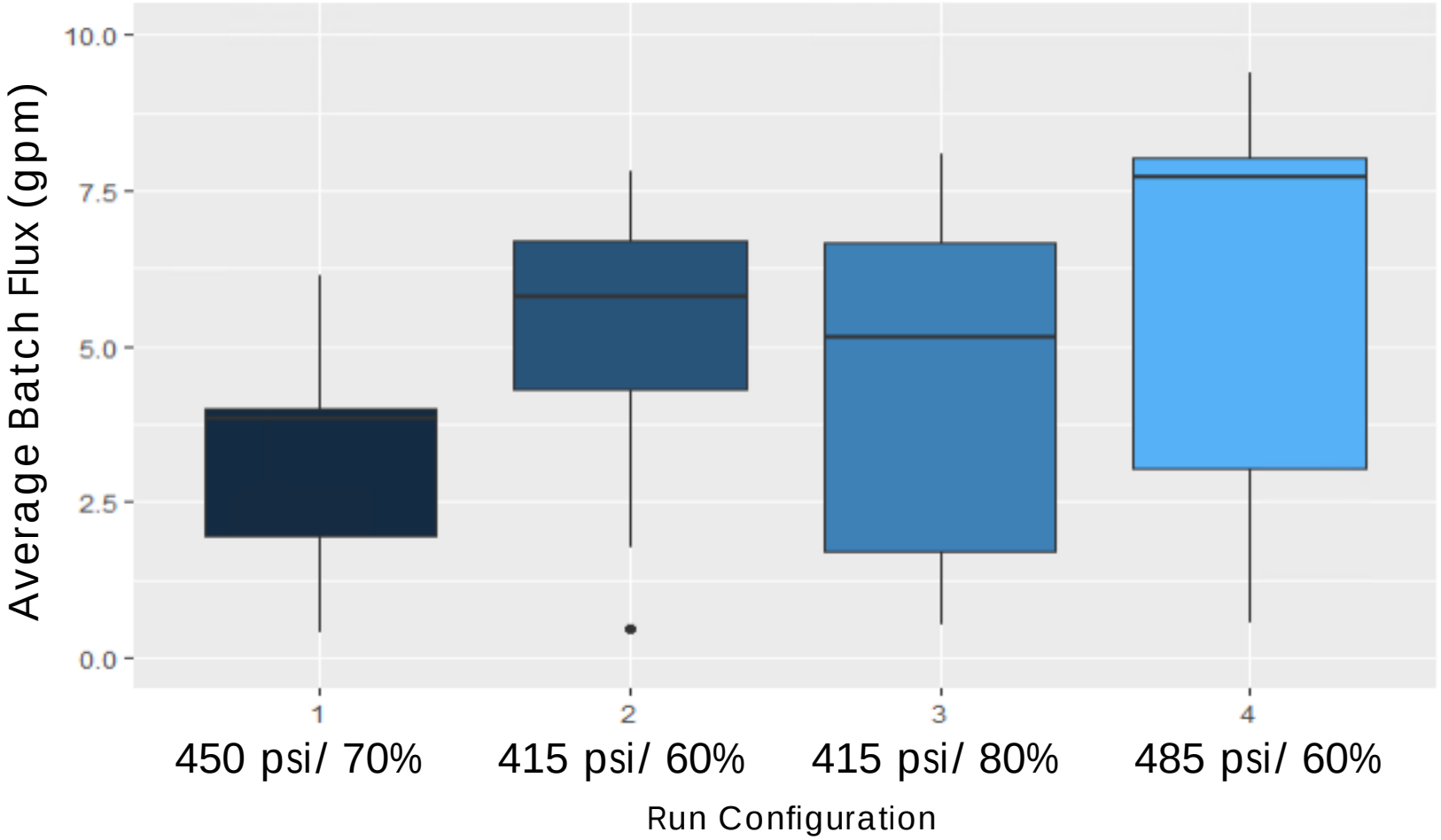
Batch Operation

Pressure	Percent Recovery	Response Variables
400-500psi	56-84%	Flux, % Rejection of TDS, Energy/gallon





Central Composite Design & Response Surface



VSEP Performance

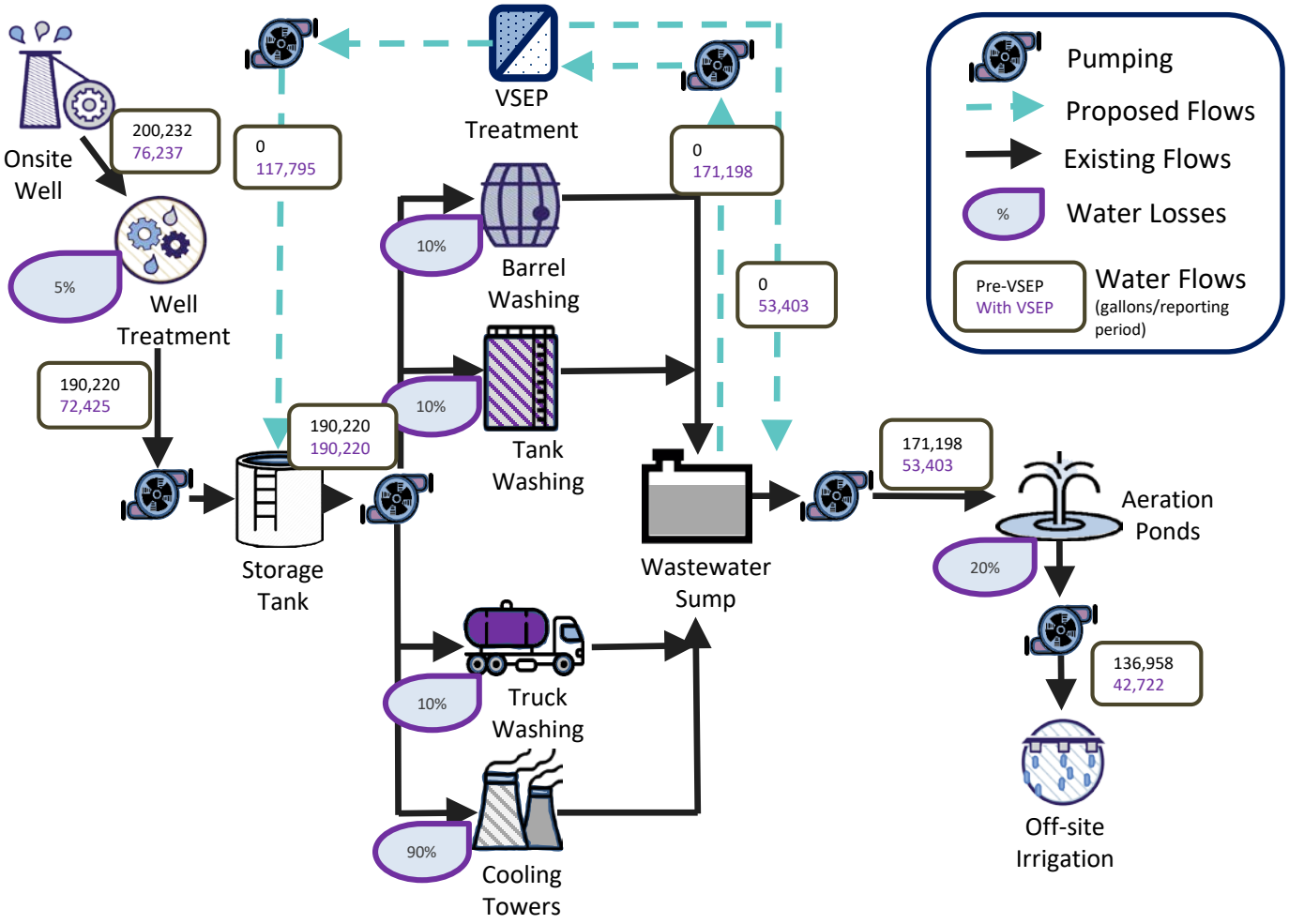
VSEP Treatment
% Recovery

68.8%

Onsite Well
Freshwater
Reduction

61.9%

Quarterly Values
Apr 1 – Jun 24, 2019

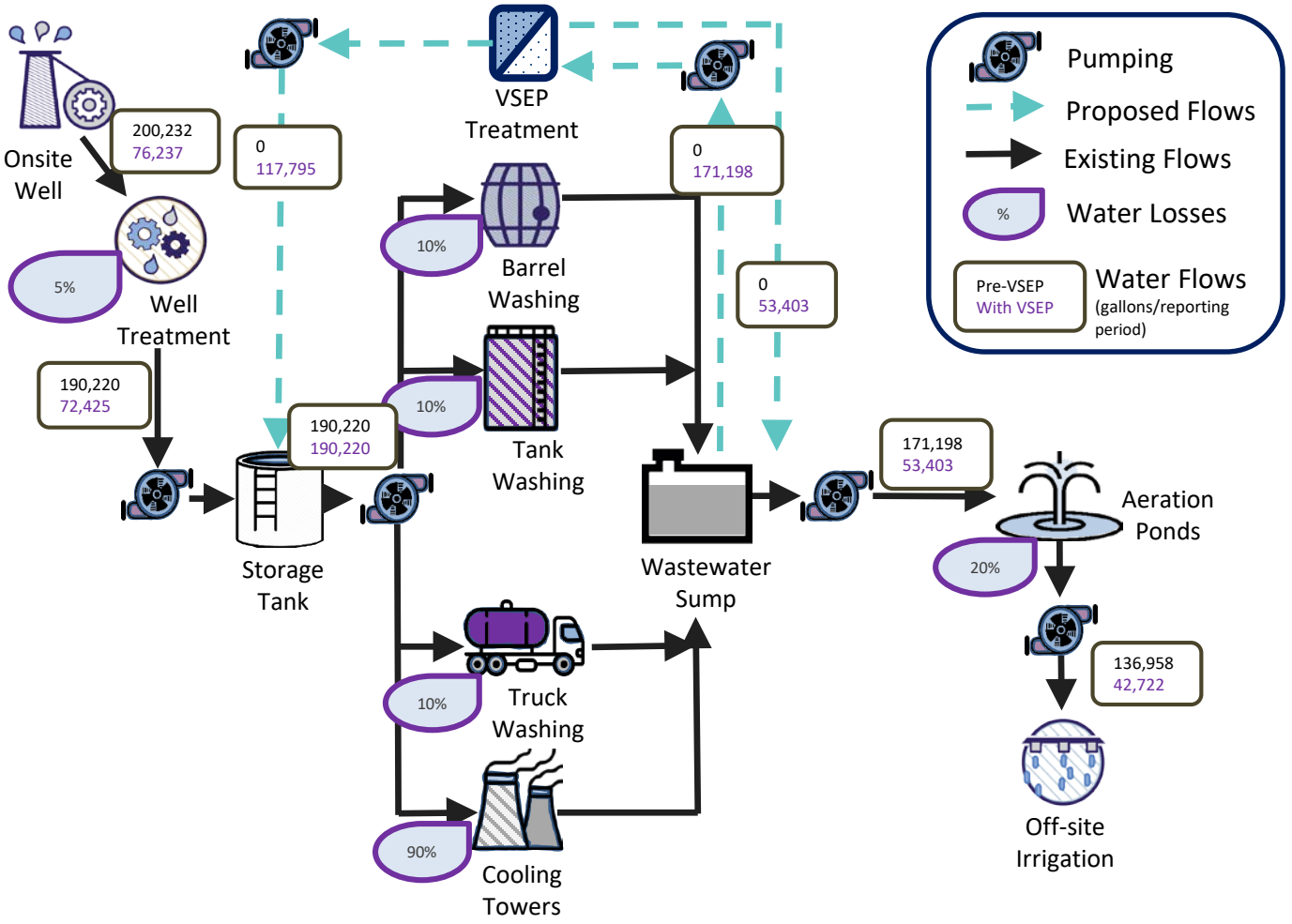


Onsite Well System Energy Reduction

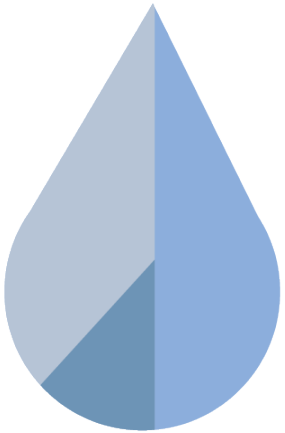
23.0%

Quarterly Values

Apr 1 – Jun 24, 2019



Water

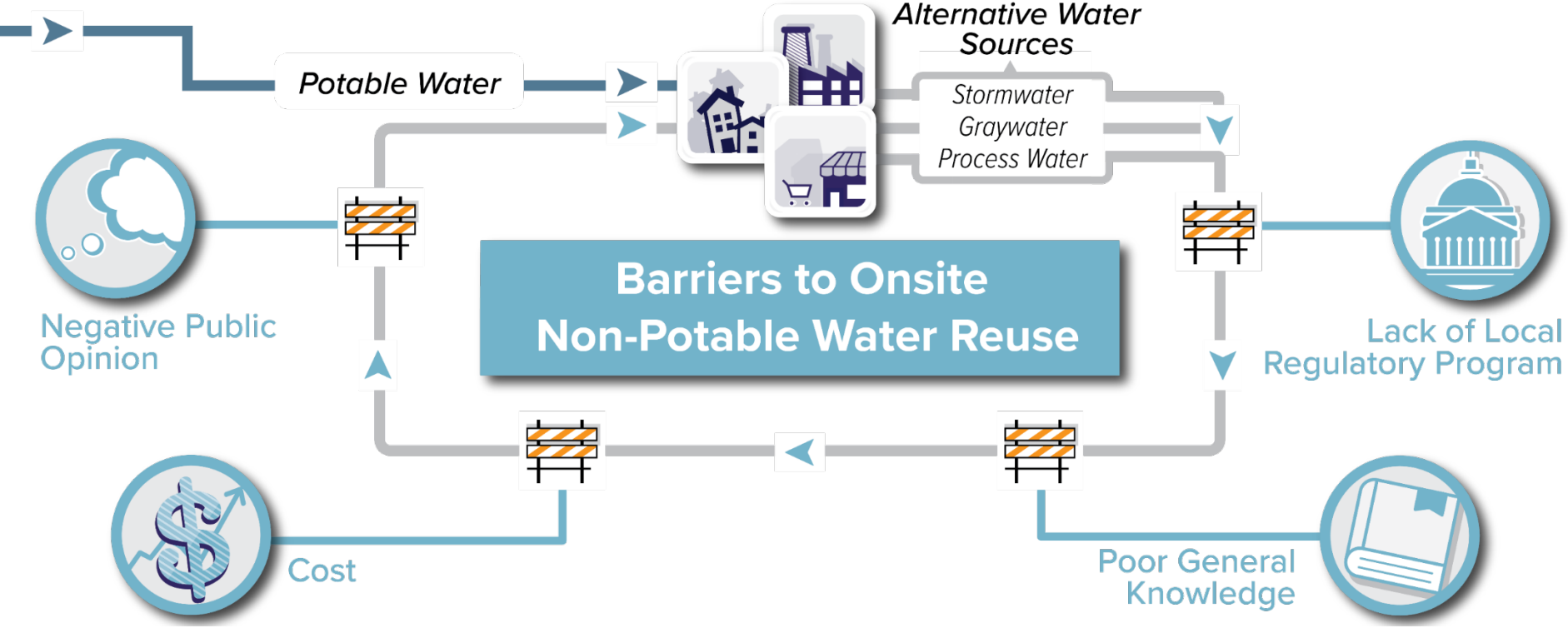


6.6%

Energy

5.5%

Facility Wide Projected Savings



Rupiper, A.M. & Loge, F.J., Identifying and overcoming barriers to onsite non-potable water reuse in California from local stakeholder perspectives, Journal of Resources, Conservation, and Recycling (2019), doi.org/10.1016/j.rcrx.2019.100018

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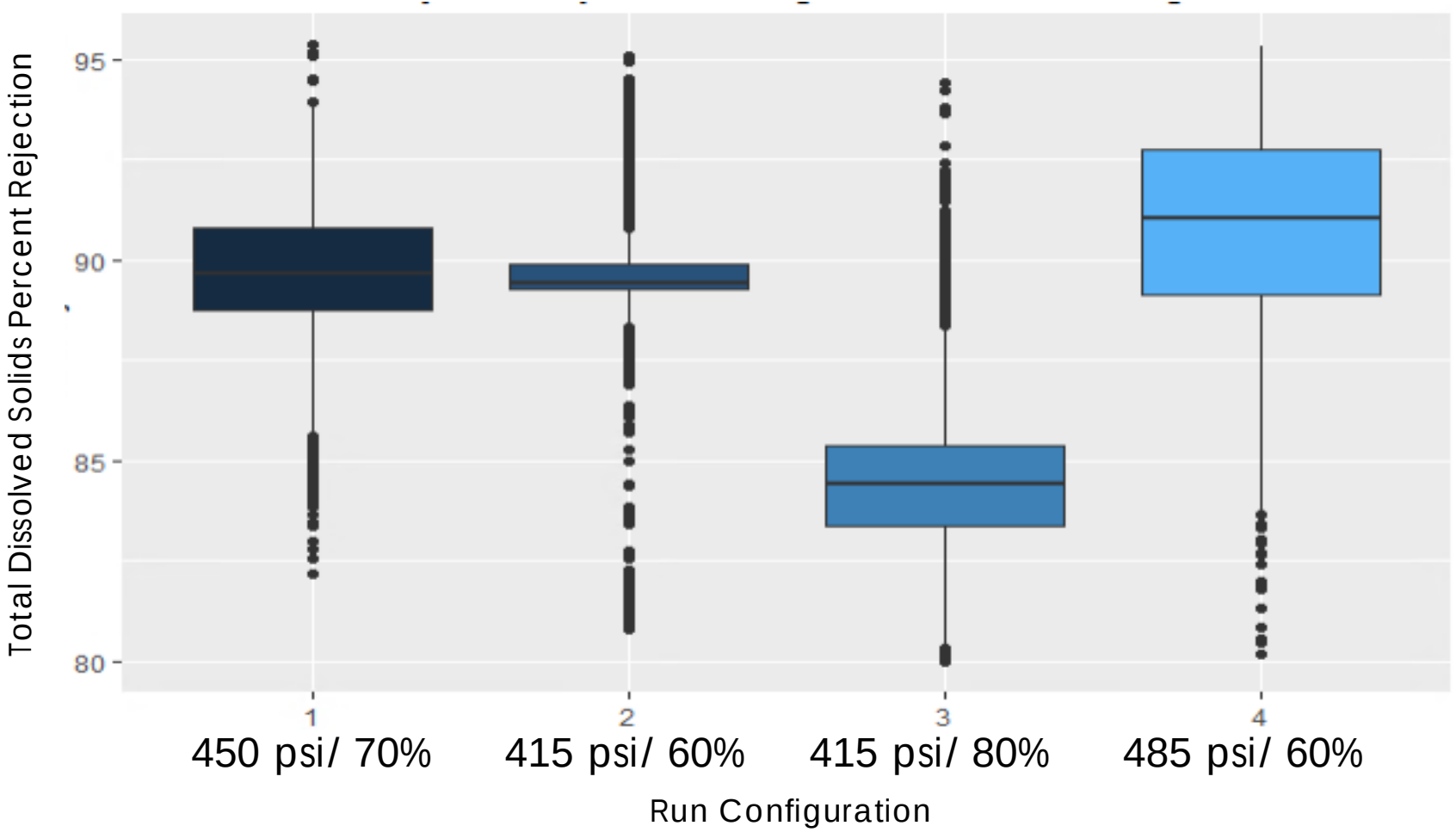
Thank You • Questions?



VSEP Performance

Intermittent Operations: January – August 2019 – To Date

Total Hours of Operation:

2,011

Total Gallons of Permeate:

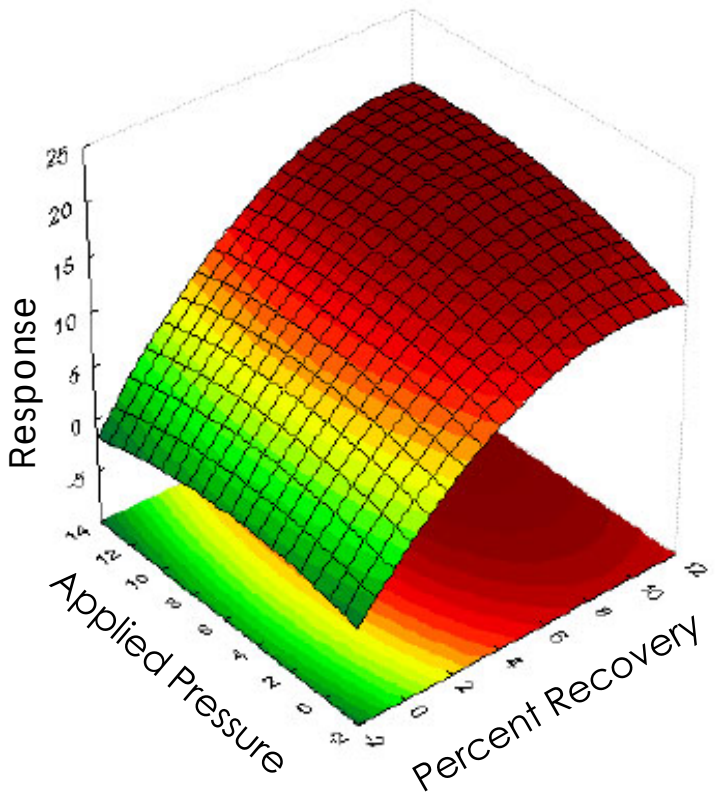
300,050

Planned Recovery up to

80%

Barrel Washing Line Alone Uses 1.6 MG/yr.

1.28 MG/yr. saved.



$$y = b_0 + b_1x_1 + b_2x_2 + b_{12}x_1x_2 + b_{11}x_1^2 + b_{22}x_2^2$$

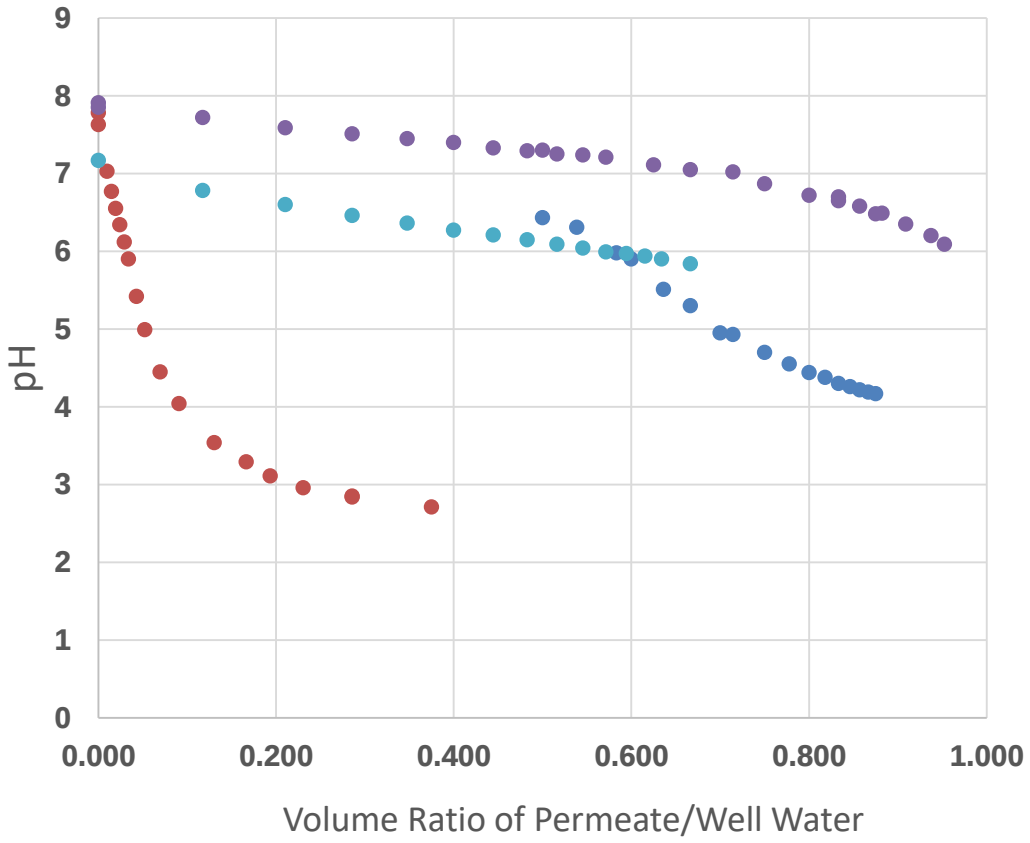
$y = Response\ surface\ value$

$b_x = estimated\ coefficients$

$x_1 \& x_2 = experimental\ factor\ values$
$(pressure\ \&\ \%\ recovery)$

Optimization – Response Surface Methodology

- Design
- Blending and pH adjustment
- Concentrate disposal
- Permitting



How apply to other potential sites?

- Look at different feed scenarios, how does that change the response?
- Permeate Water Quality – treated water opportunities

Onsite Non-Potable Water Reuse Systems

- Demonstrating the safety and water and energy saving opportunities that can be achieved.