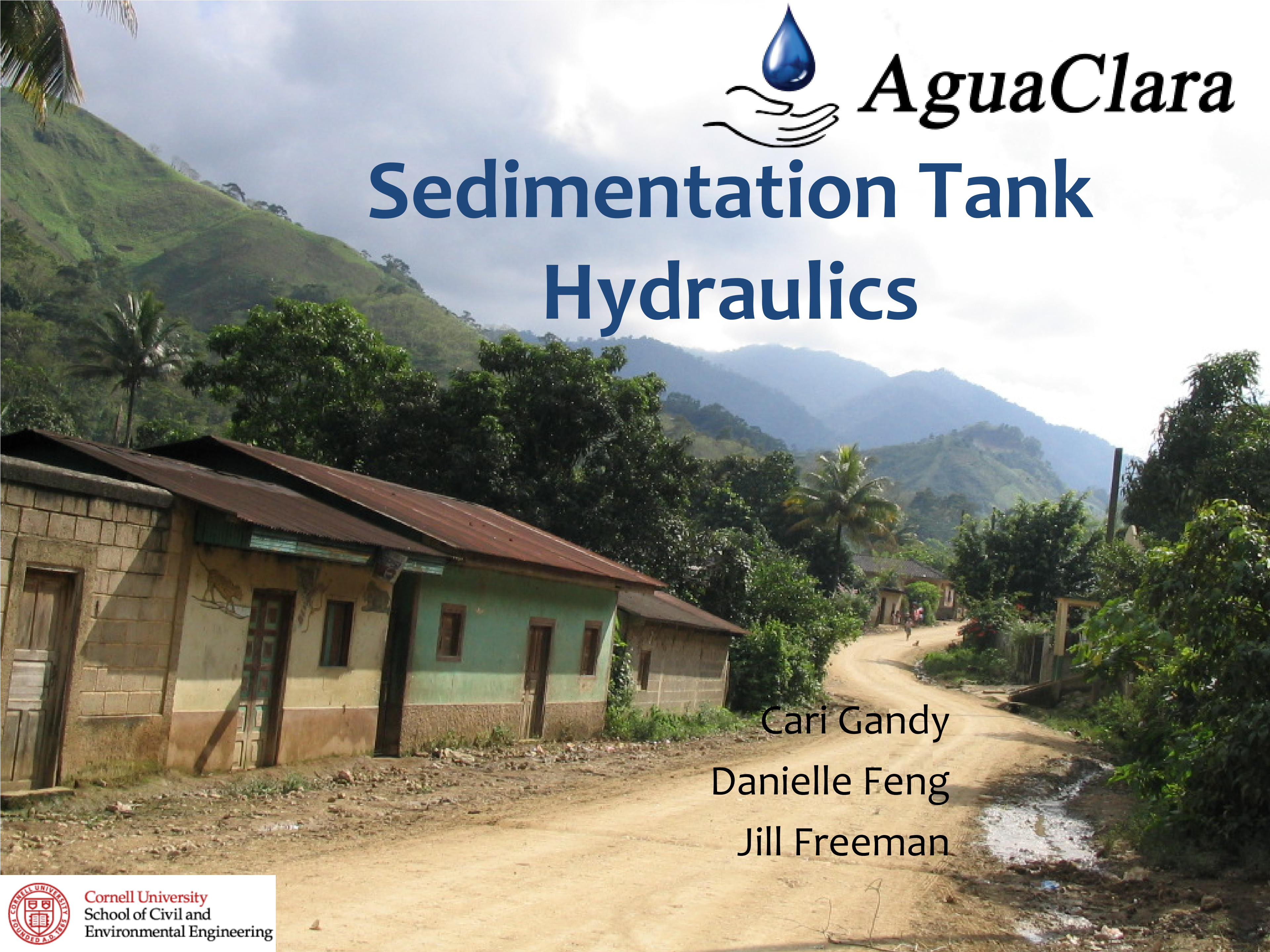


AguaClara

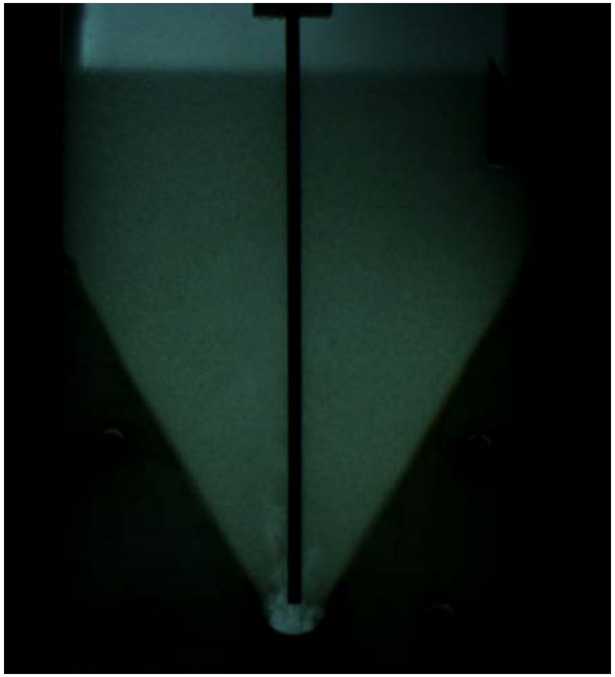
Sedimentation Tank Hydraulics

Cari Gandy
Danielle Feng
Jill Freeman

Cornell University
School of Civil and Environmental Engineering

Recap: What is a Floc Blanket?

- A floc blanket is a dense, fluidized bed of particles.
- Particle-particle interactions dominate

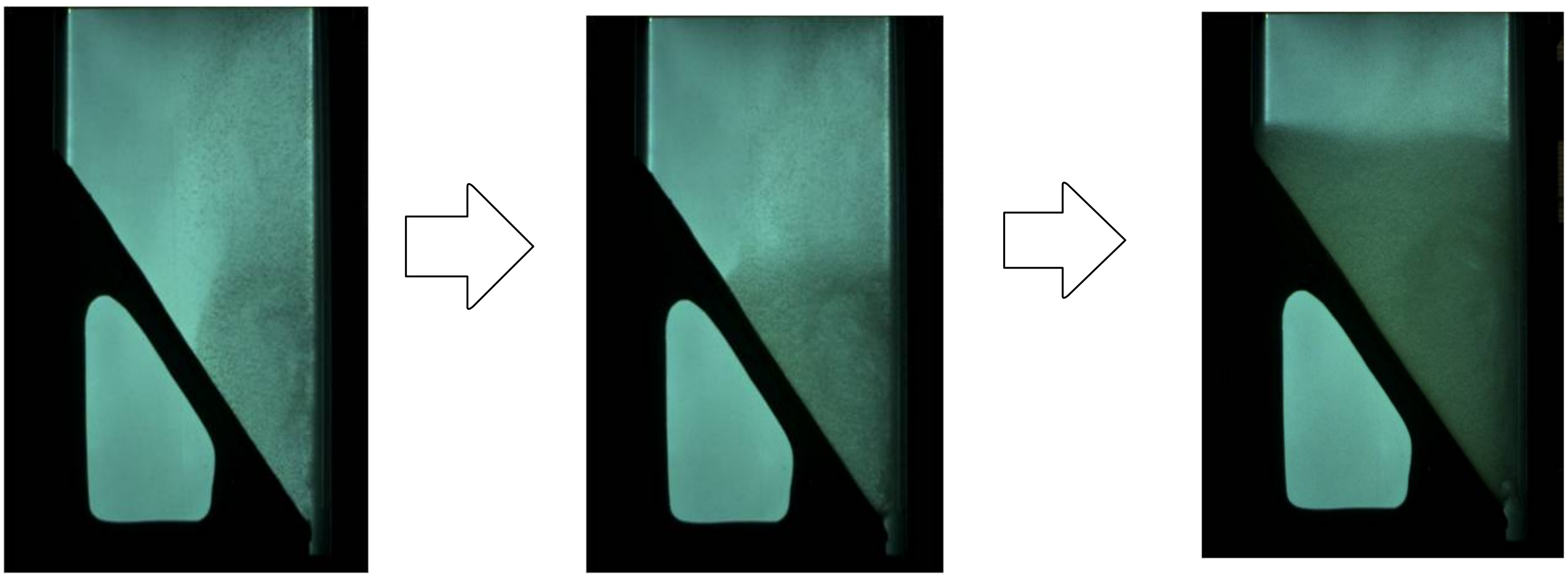


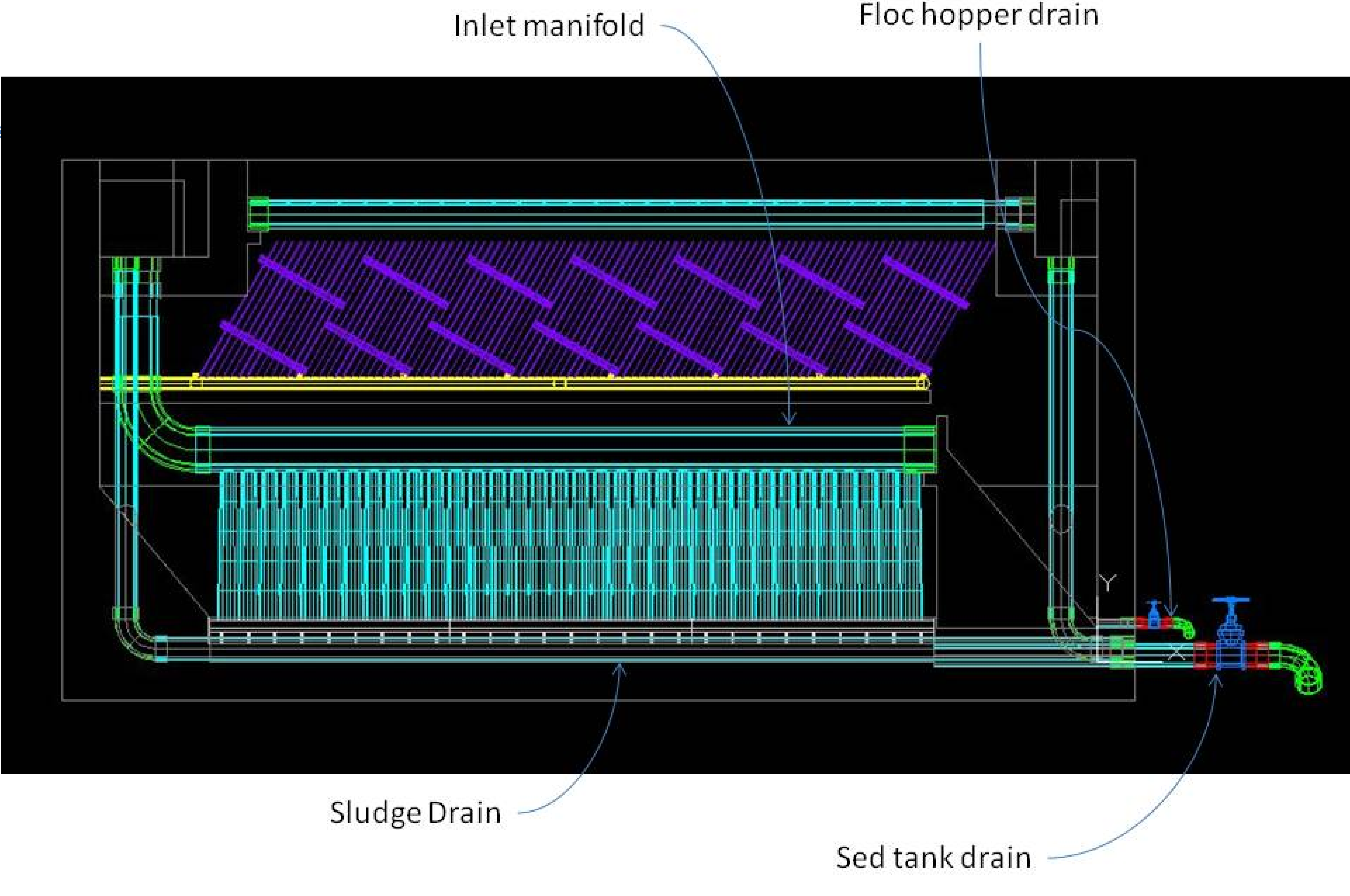
Benefits of a Floc Blanket:

- Reduces effluent turbidity by trapping small flocs.
- Reduces clean water wasting by less frequent draining of the sedimentation tank.

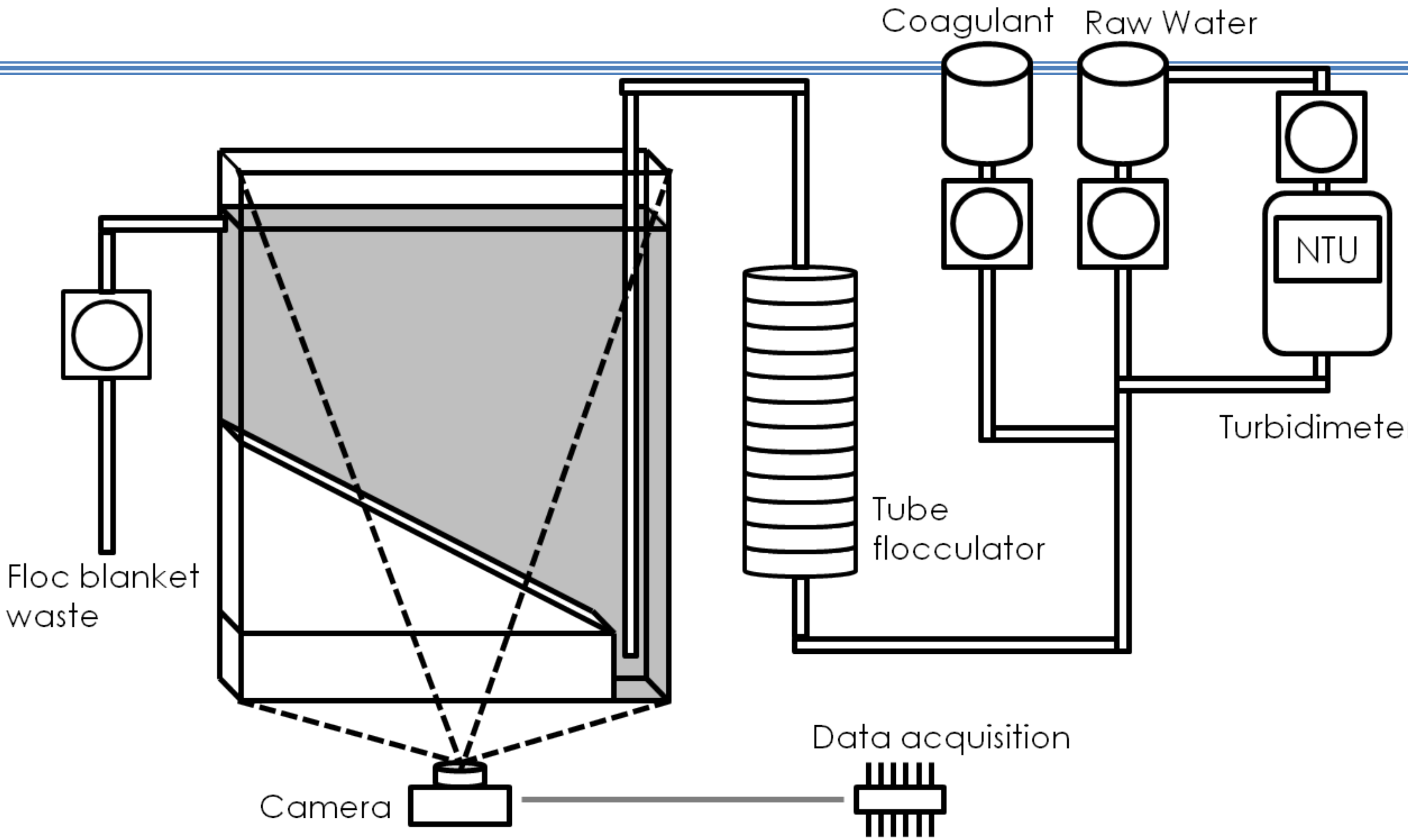
Recap: Floc Blanket Formation

- Adequate floc re-suspension by inlet jet
- Inclines to direct settling flocs towards inlet jet




Inlet manifold
Floc hopper drain
Sludge Drain
Sed tank drain

Recap: Methods



Experimental Setup

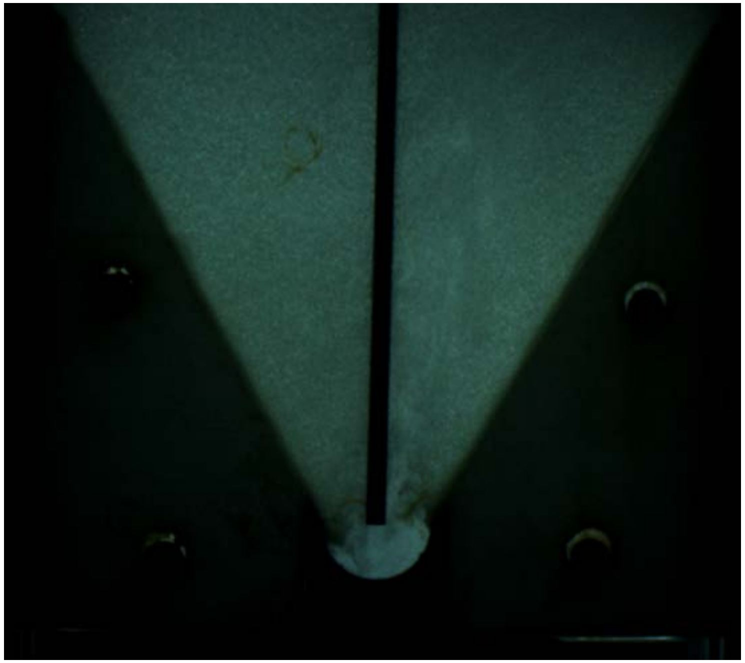
Recap: Objectives

- Determine a relationship between jet reverser size and floc blanket stability.
- Determine the effects of jet placement on floc blanket stability.
- Determine the lowest alum dose at which a floc blanket at a given influent turbidity can be formed and maintained.

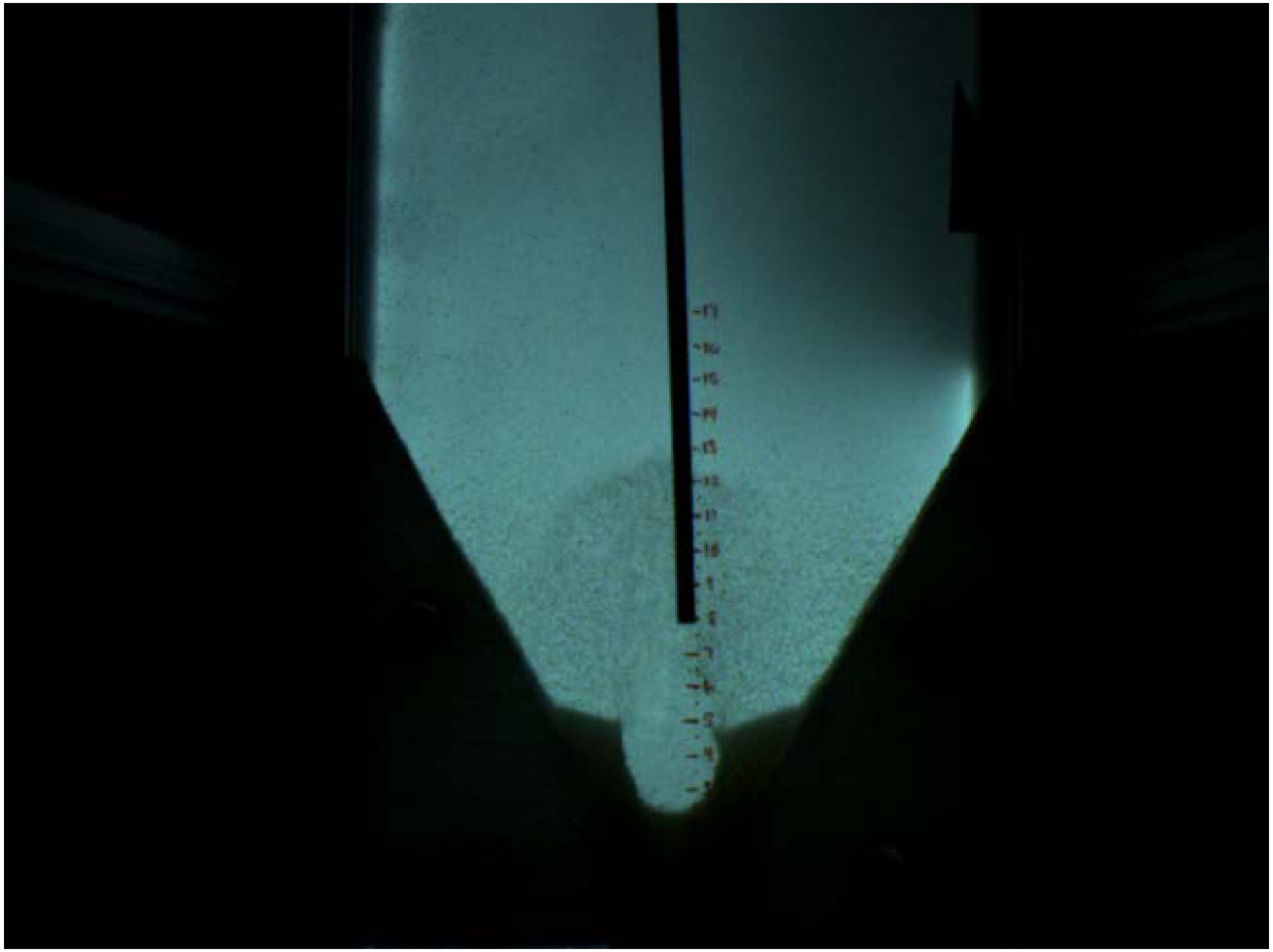
Since the Teach-in

- Continue to study jet displacement and explore the possibility of asymmetric jet placement
- Determine a relationship between influent turbidity and optimal alum dose to form and maintain a floc blanket.

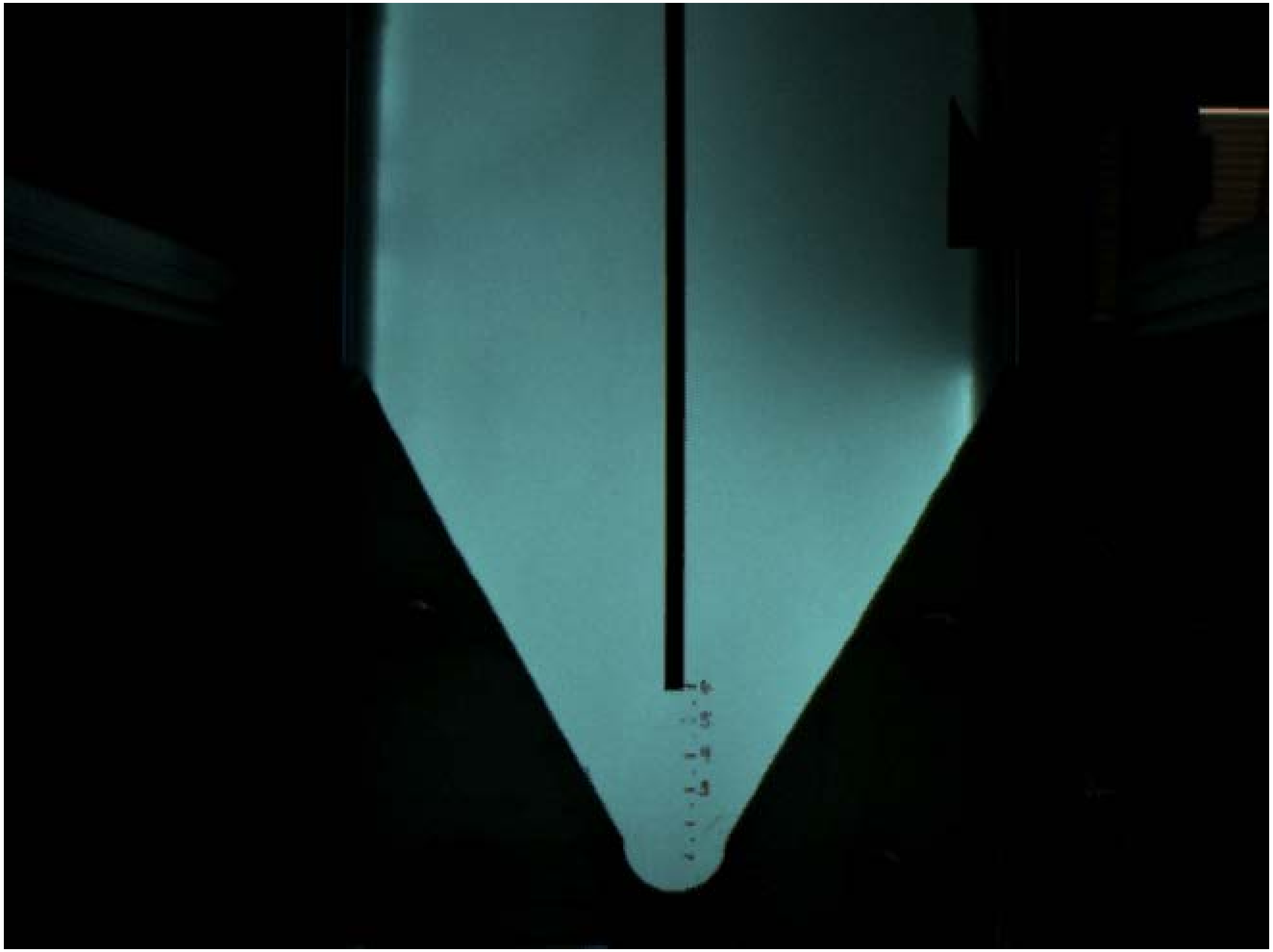
Downwards Jet Displacement



Upwards Jet Displacement

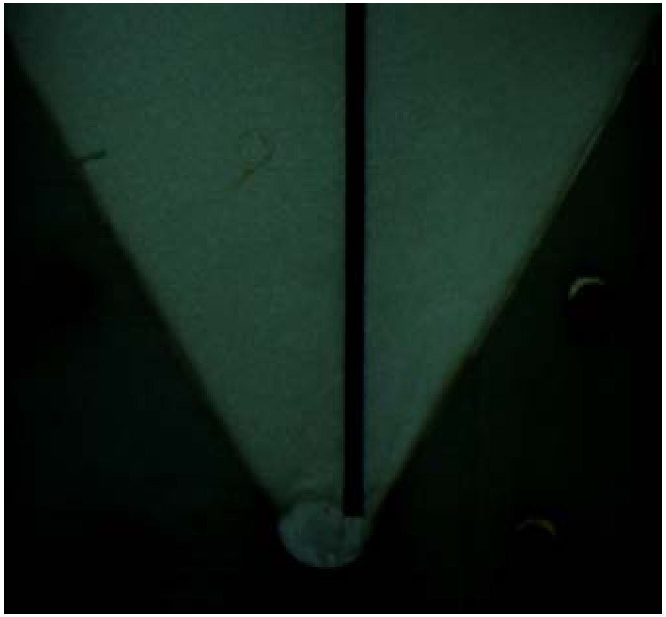


Upwards Jet Displacement



Horizontal Jet Displacement

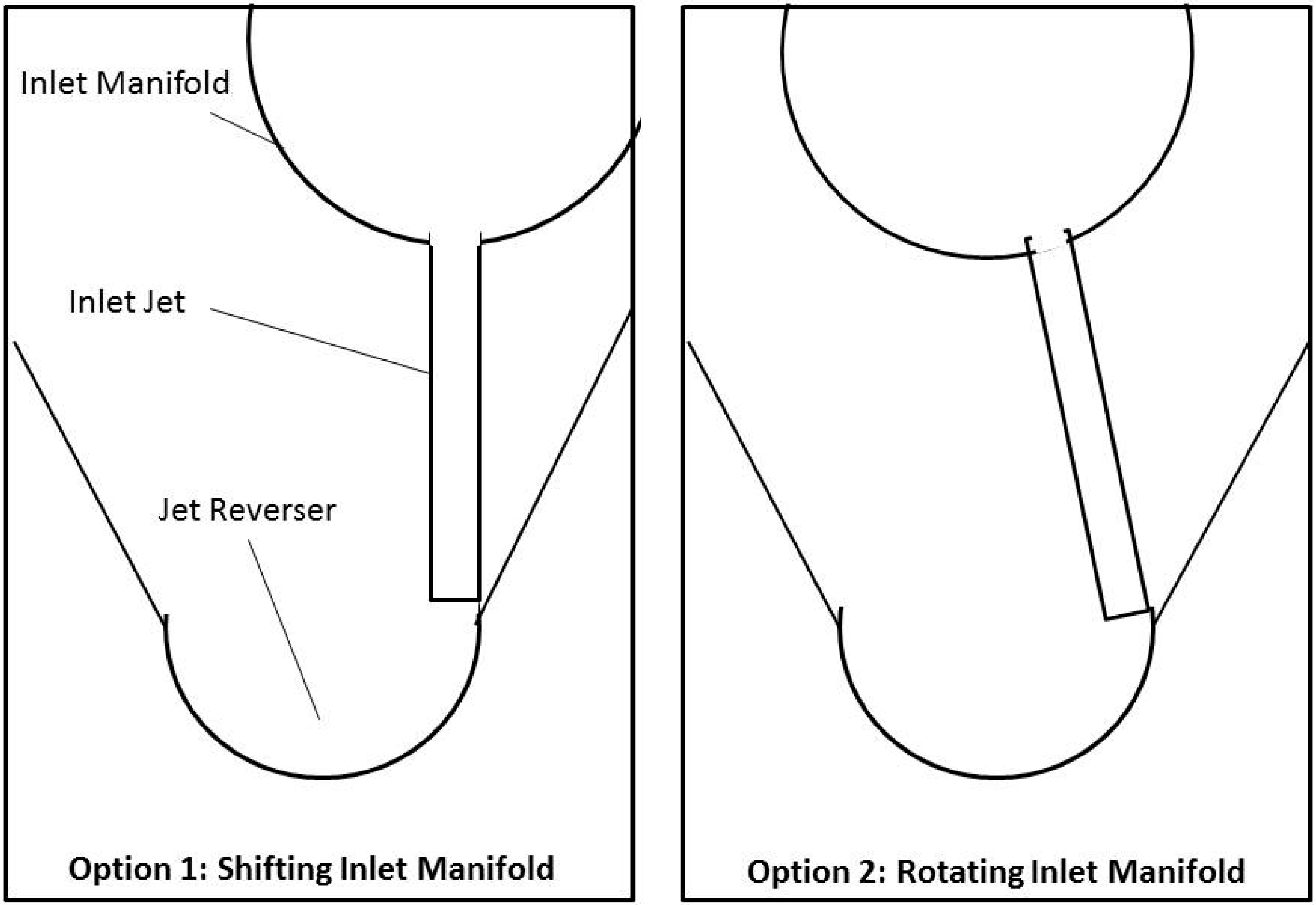
- Jet takes a preferential flow path.
- Dead zone formed in right side of reverser.



Horizontal Jet Displacement

- Deadzone eliminated
- Sludge no longer collects in reverser

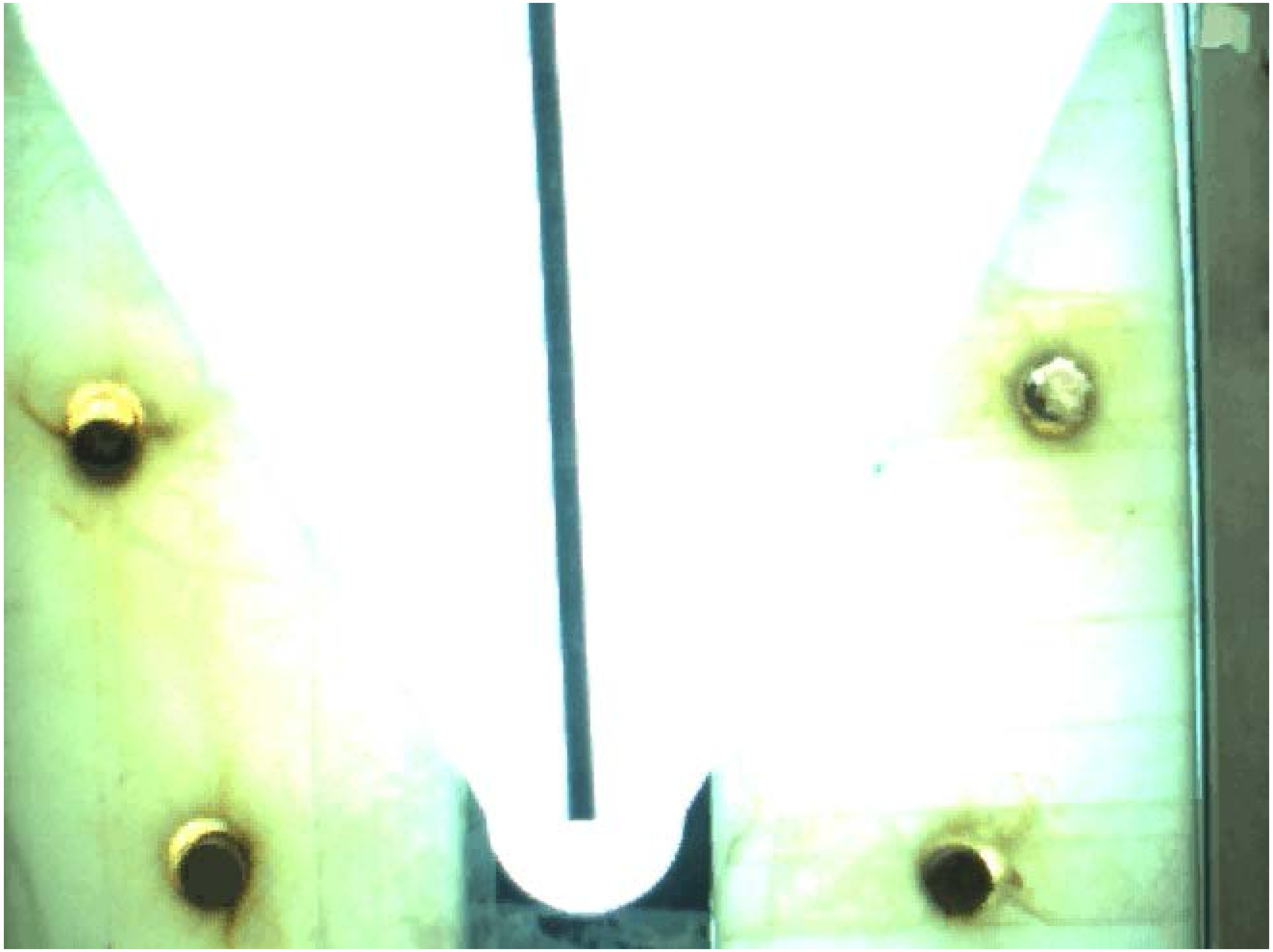
Asymmetric Jet Placement



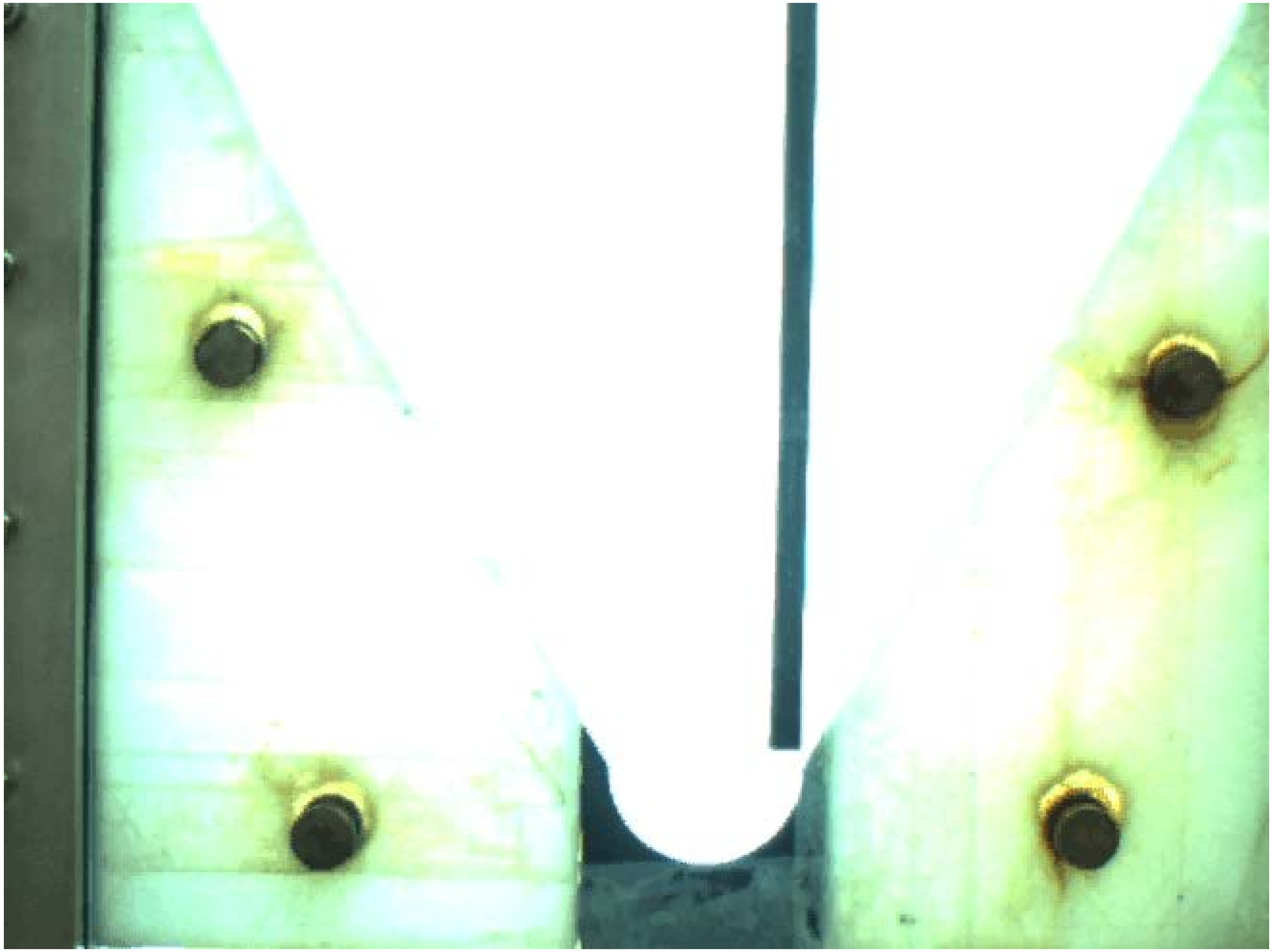
Asymmetric vs. Symmetric Jet Placement

Asymmetric	Symmetric
Will require more changes to design.	Splits jet reverser path
Sludge on one side is not directly resuspended.	More sensitive to slight jet displacement

Centered Jet

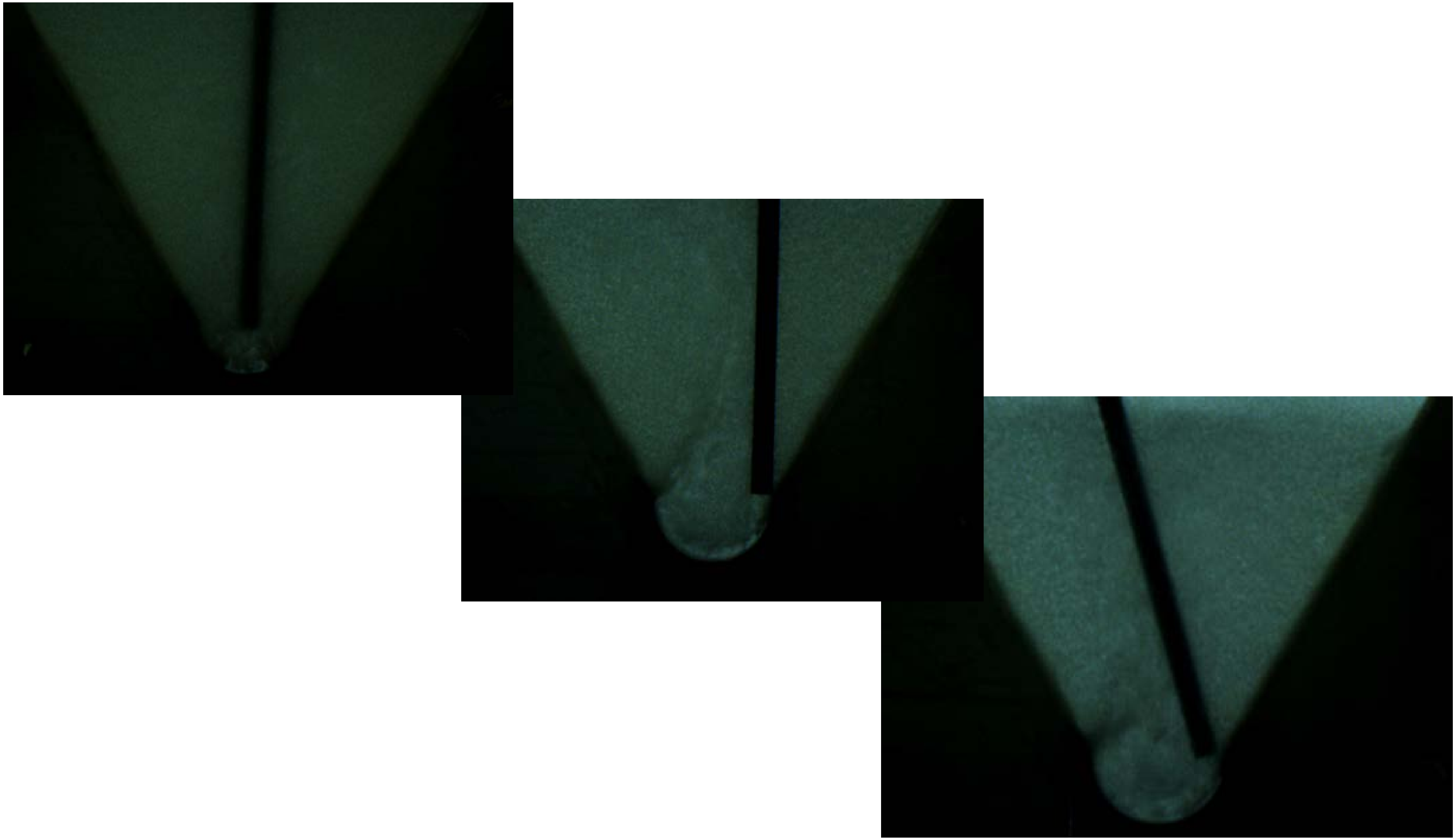


Vertical Asymmetric Jet




AguaClara

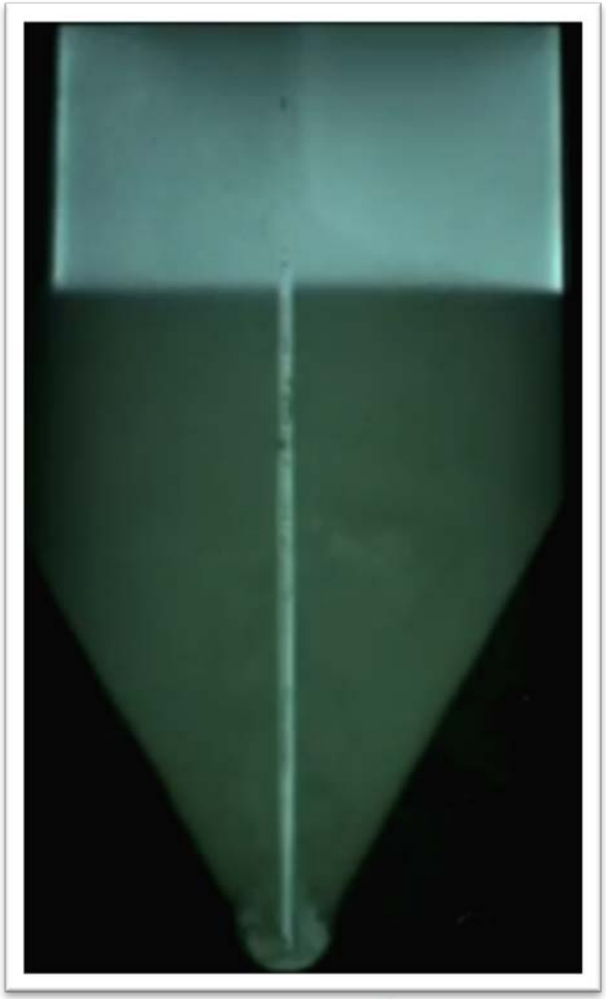
Comparison of Jet Placements



Comparison of Jet Placements

Floc Blanket Stability

- Determine the alum dose at which a previously formed floc blanket will fail.
- Determine the minimum alum dose at which a floc blanket can be formed.
- Find these values for 50, 100, and 200 NTU and determine if there is a general relationship between dosage and turbidity.

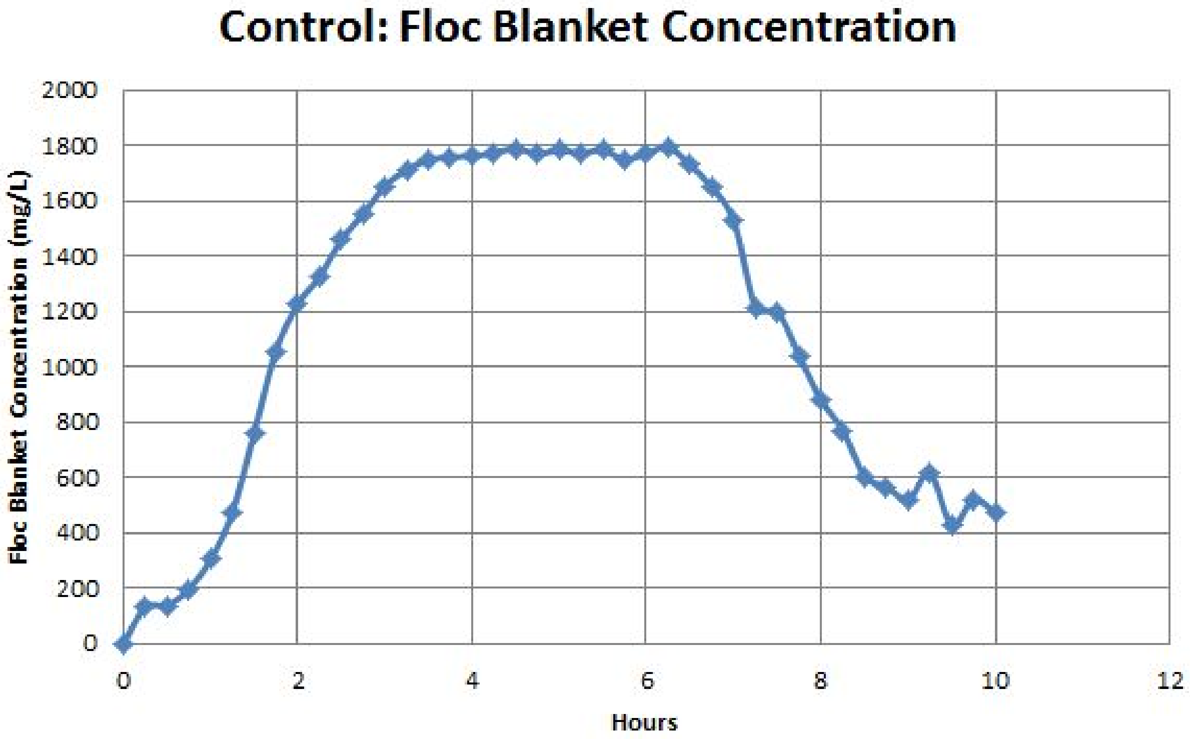


Cornell University
School of Civil and Environmental Engineering

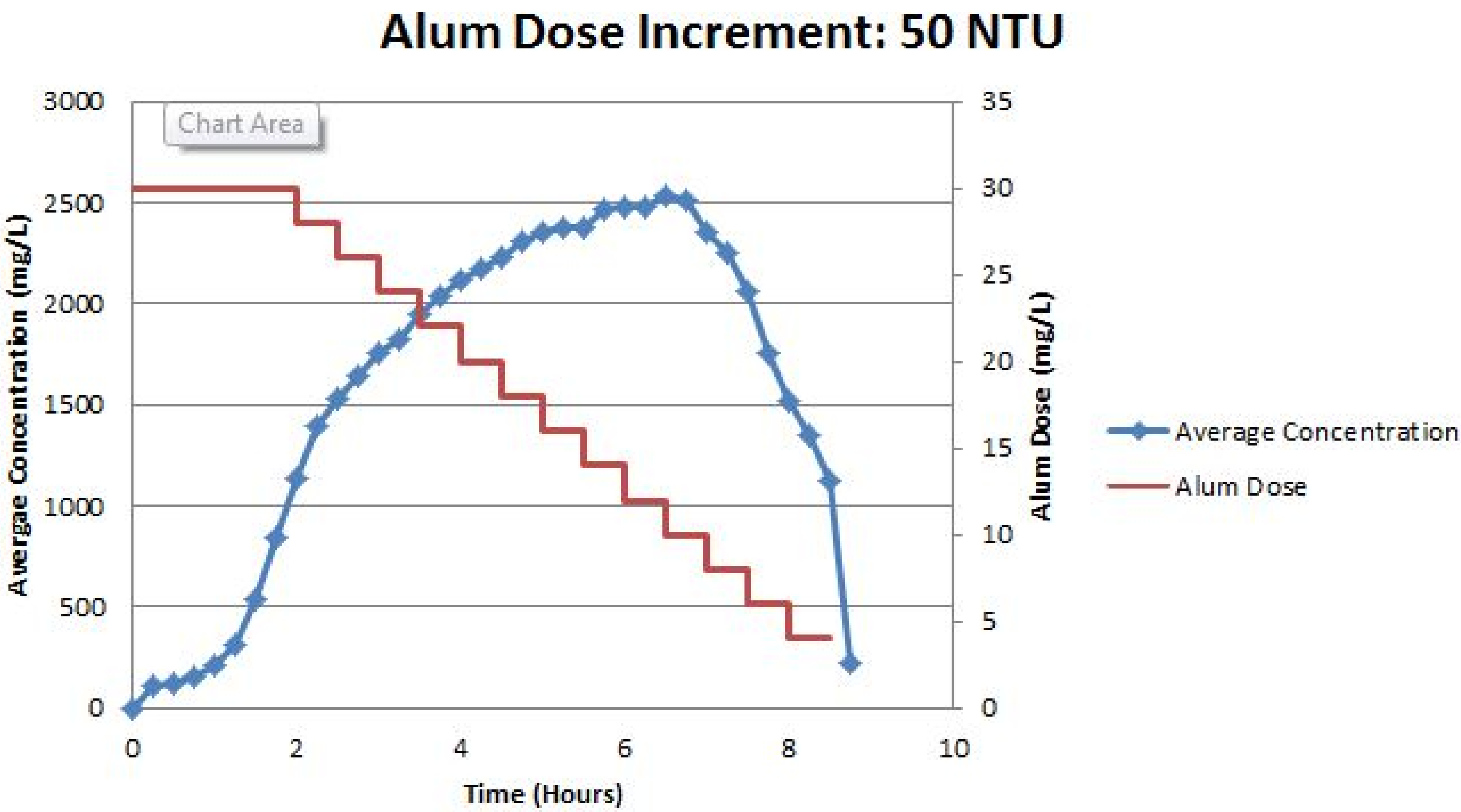
AguaClara

Concentration Analysis

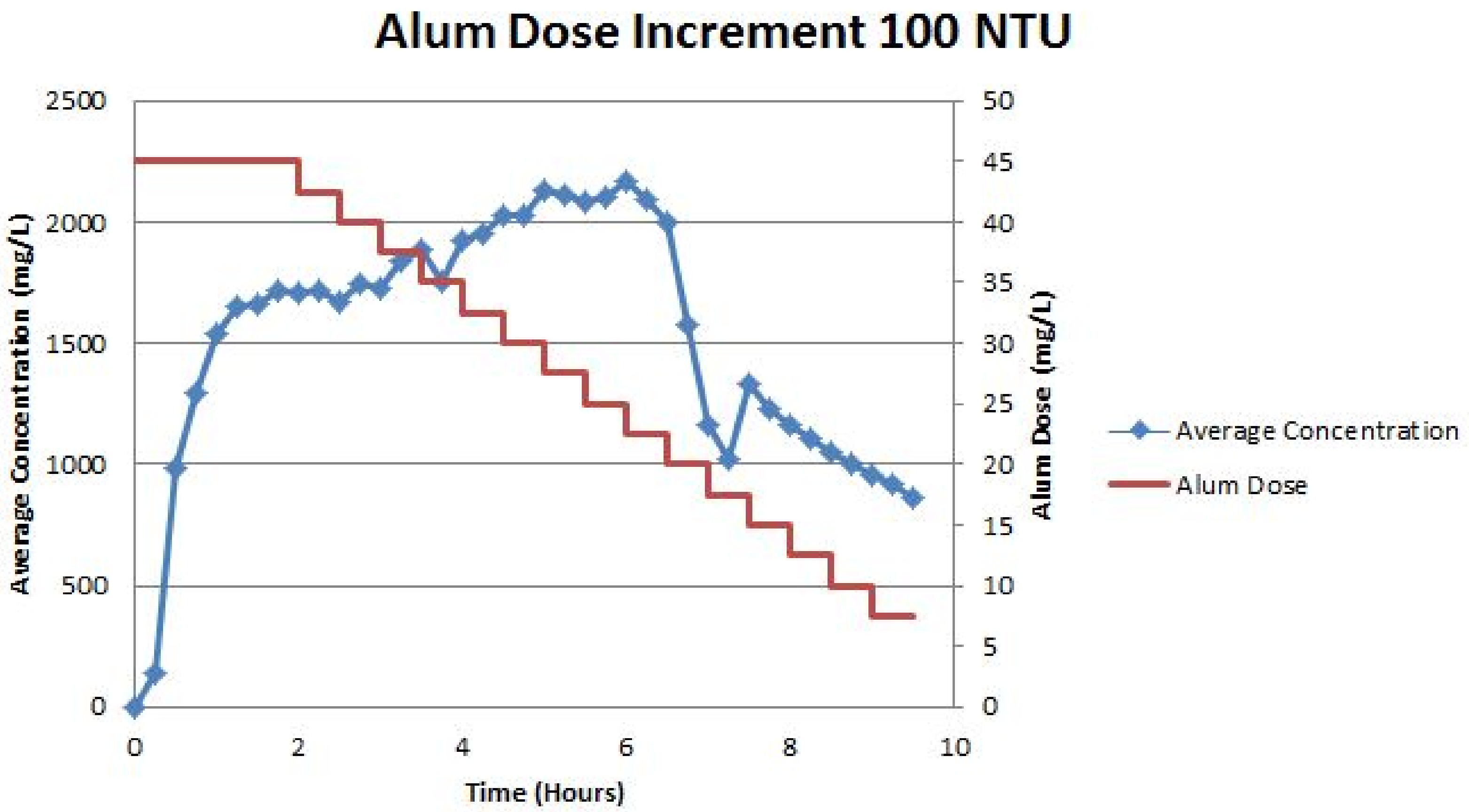
- Find relative concentration by comparing experimental images to one background image.



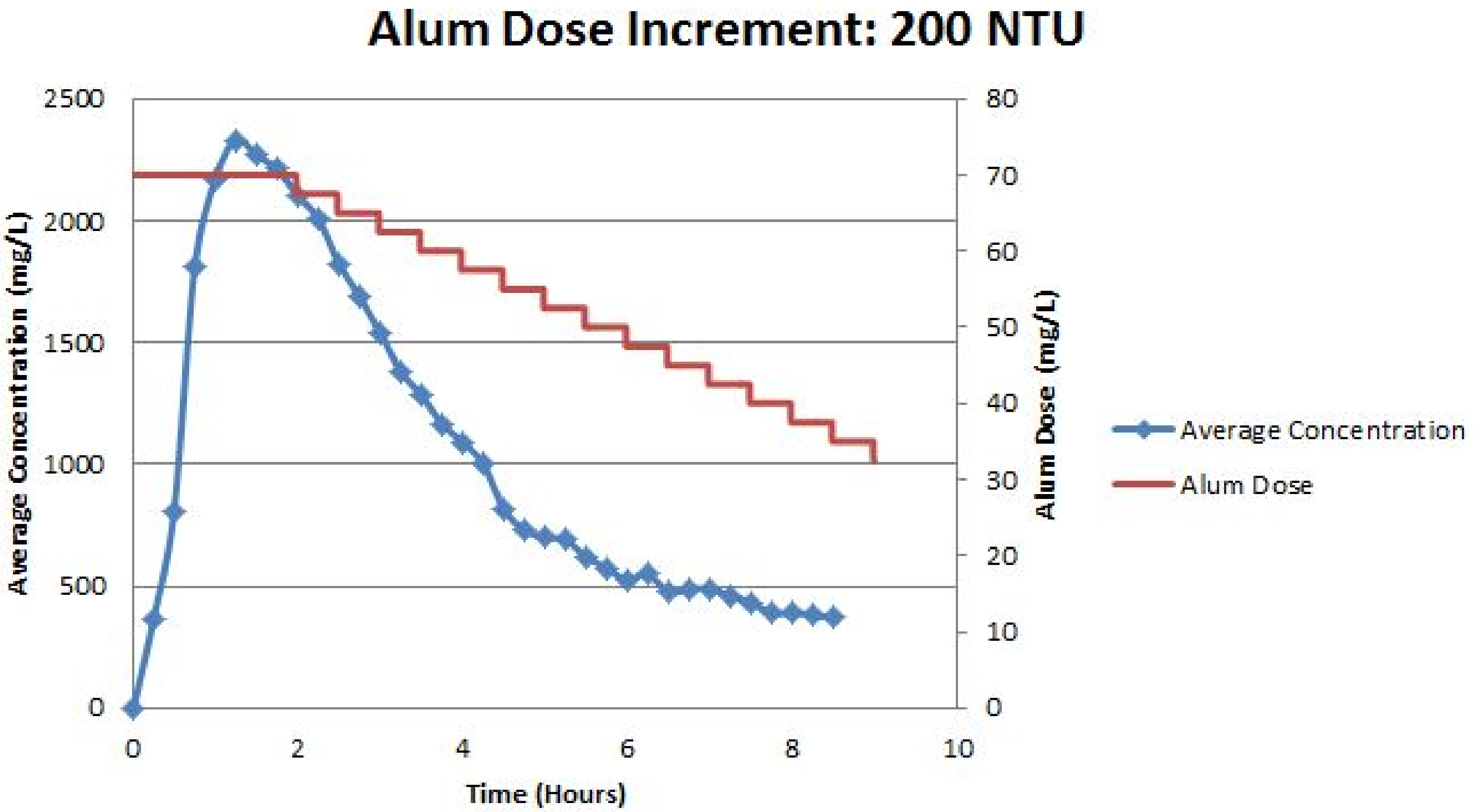
Turning Down the Dose



Turning Down the Dose



Turning Down the Dose



Cornell University
School of Civil and Environmental Engineering

AguaClara

Optimal Dose

Turbidity	Alum Dose at Failure	Lowest Successful Alum Dose
50 NTU	12 mg/L	30 mg/L
100 NTU	25 mg/L	30 mg/L
200 NTU	70 mg/L	40 mg/L

Future Work

- Floc Hopper Geometry
- Wasting Rate