

Tall Column Project

Presented to

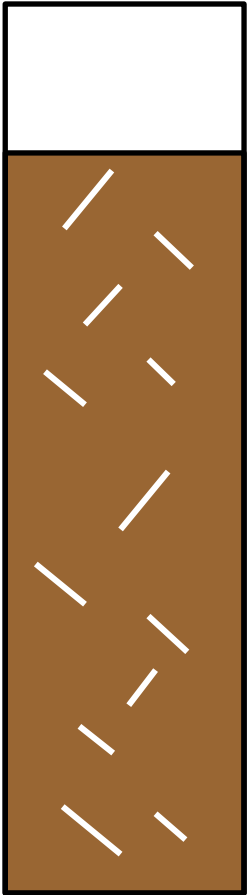
**2015 Project Management Institute
Project of the Year Gala**

Terry L. Sams

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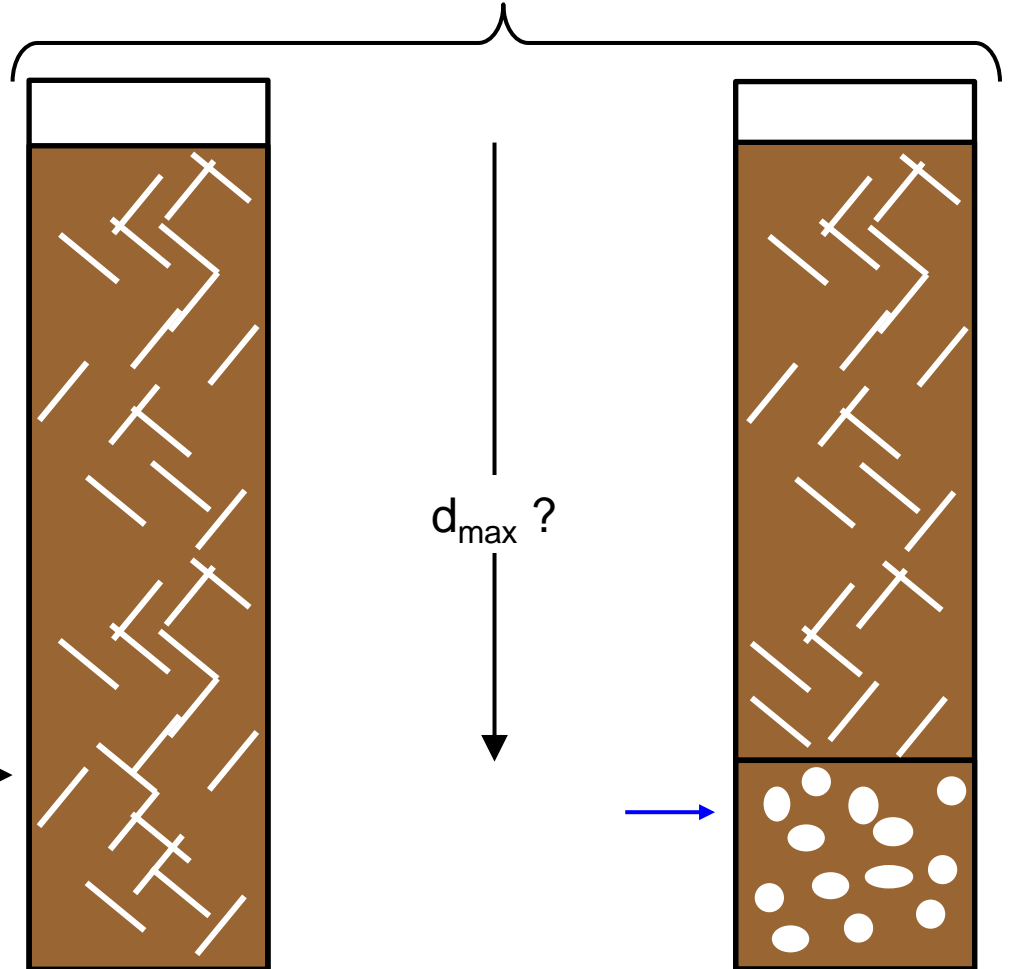


Grow Bubbles
to Steady State Void

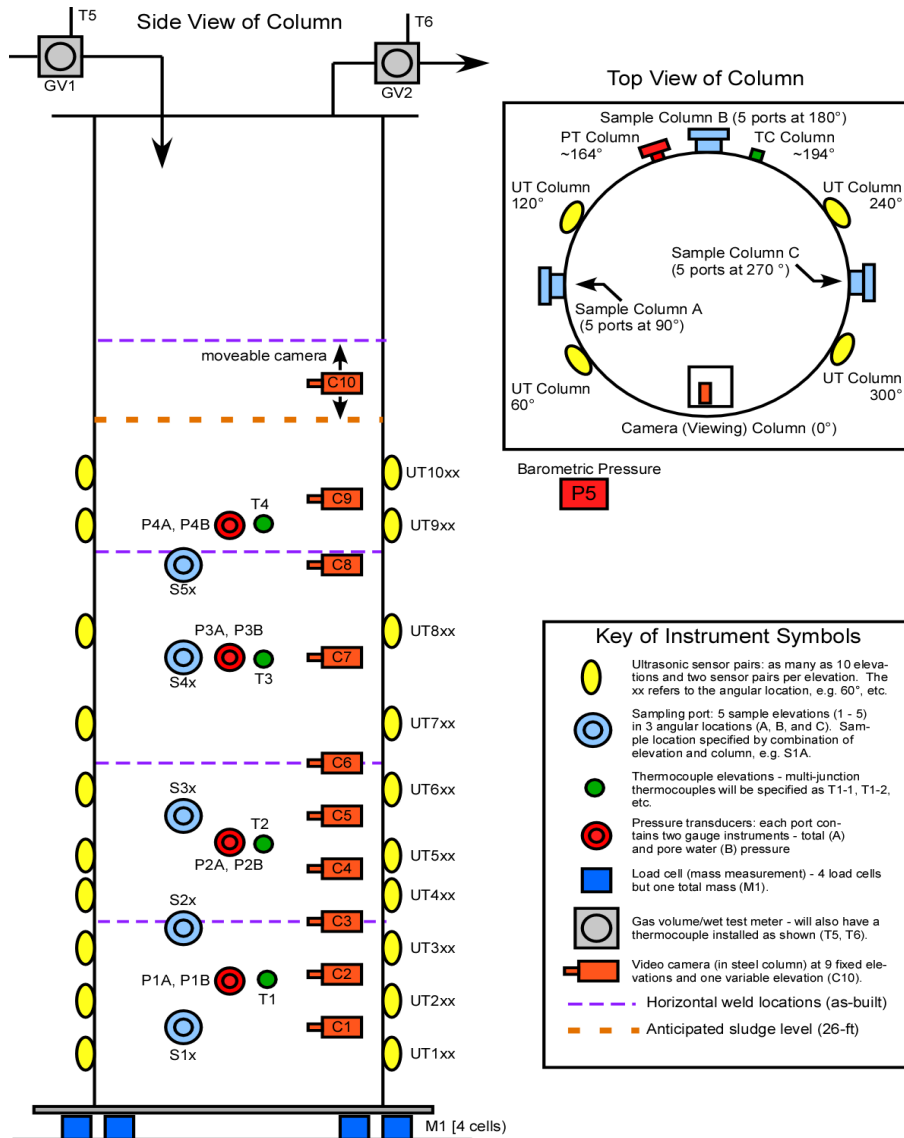


Void does not
Increase
with Depth

Measure Void as a Function of Height



- Measure gas void fraction as a function of height
 - Full-scale column height and simulant depth
 - Strength matching a typical full-scale DST
- Quantify if gas retention is higher towards the column bottom and confirm or refute if theoretical d_{max} affects
 - gas transport
 - retained gas void fraction



Test Conditions

- ▶ 45-ft tall, 60-in ID, 3/8-in wall thickness
- ▶ 26-ft (310-in) of kaolin (full height)
 - Single simulant layer
 - Water layer of 24-in
- ▶ 500 and 1000-Pa kaolin clay slurry

Void Instruments

- ▶ Ultrasonic transducer pairs
- ▶ Horizontal core sampler with sample pressurization (gas compression) to measure void volume
- ▶ Video images to track downward motion (compression of identified objects or bubbles)
- ▶ Video images to track upward motion

Tall Column Installation



Simulant Mixing



Zero Valent Iron Addition

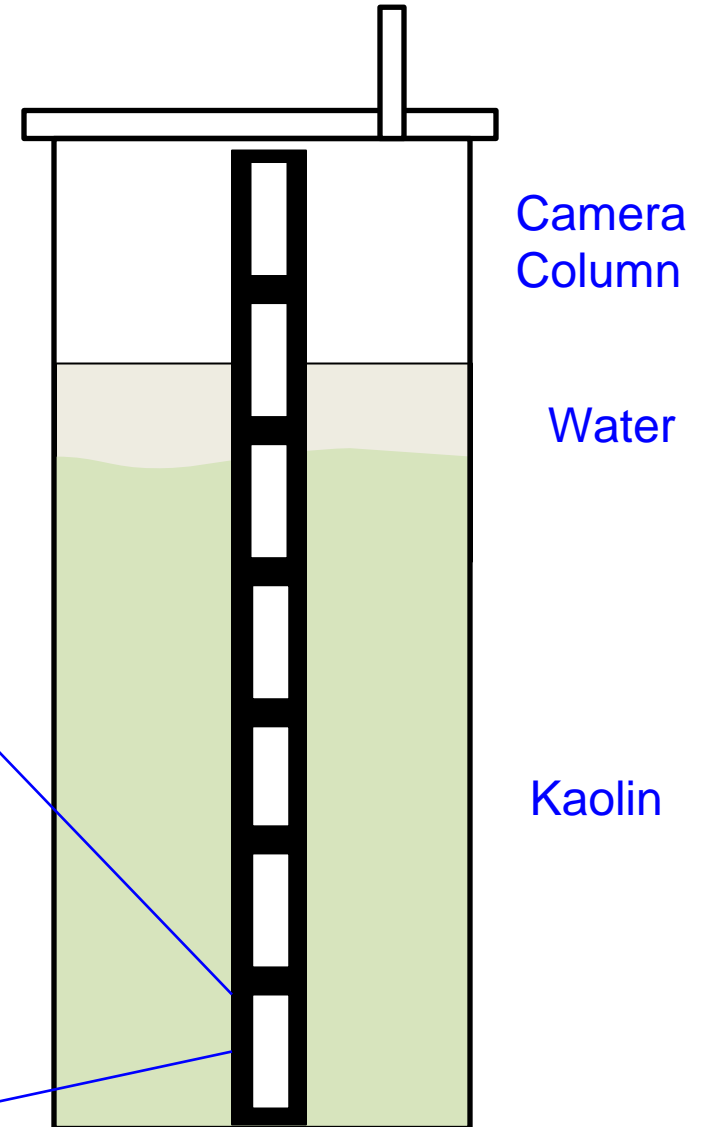


Filling the Column

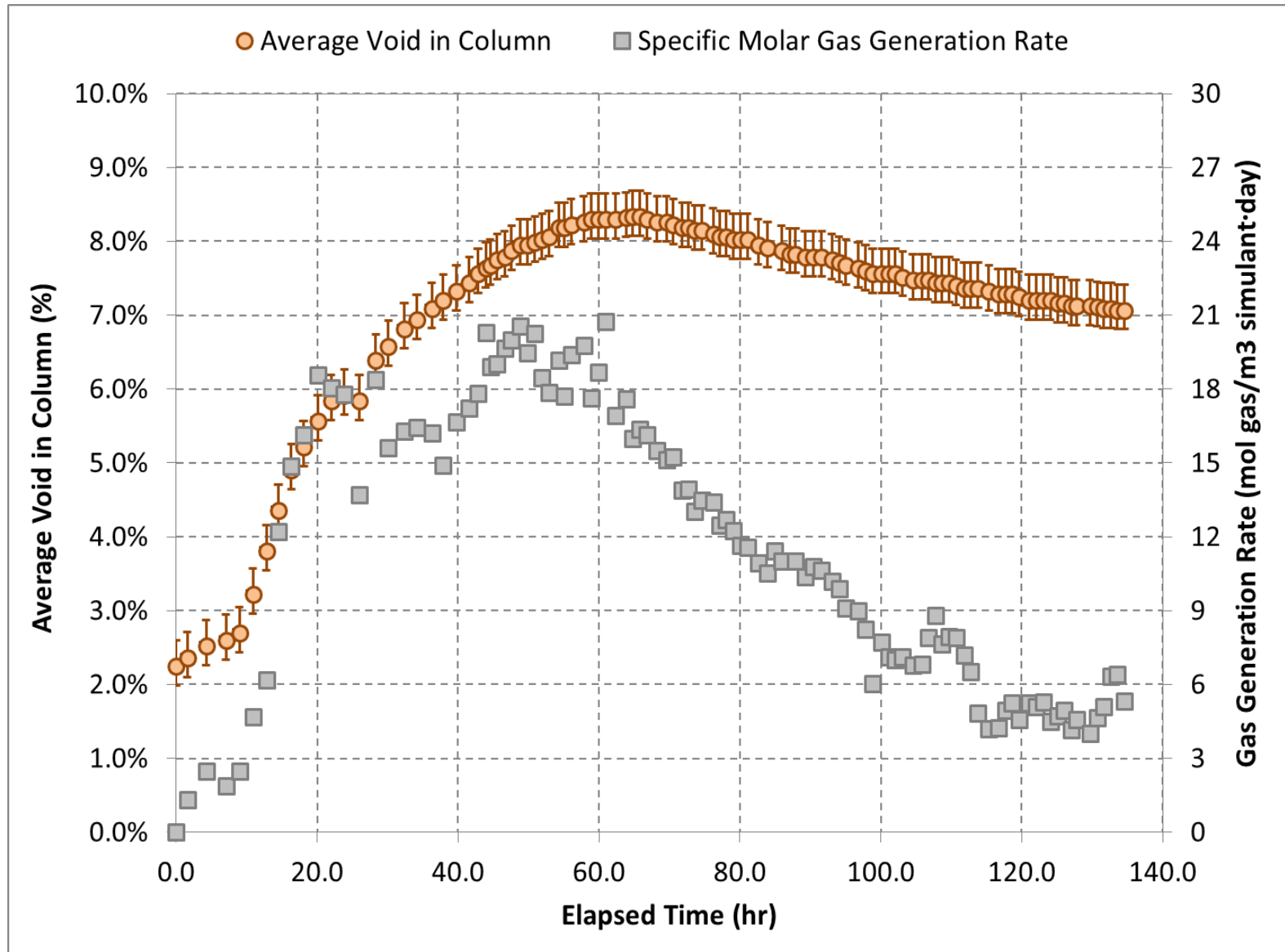


Bubble Growth

Simulant: Kaolin slurry
Gas Generation: Corrosion of Fe particles



Tall Column Test Results



- Sludge depth does not change gas retention and release
- Gas content in the bottom $\frac{1}{3}$ of sediment no higher than in the top $\frac{2}{3}$
- Safe to continue sludge retrievals into DST