

Locations of clear floor markers for Photo undistortion

x, y				
500, 500	1000, 1000	1500, 2000	1700, 3000	3500, 3500
1000, 500	1500, 1000	2500, 2000	1500, 3000	4000, 3500
1500, 500	2000, 1000	3500, 2000	4000, 3000	4500, 3500
2000, 500	2500, 1000	5000, 2000	5000, 3000	5000, 5000
2500, 500	5000, 1000	1000, 2500	500, 3500	
3000, 500	1500, 1500	1500, 2500	1000, 3500	
3500, 500	2500, 1500	2500, 2500	1500, 3500	
4000, 500	3500, 1500	3500, 2500	2000, 3500	
4500, 500	4500, 1500	4500, 2500	2500, 3500	
5000, 500	5000, 1500	5000, 2500	3000, 3500	

Cameras

1) Dist	2) Prox	3) Med
Exp Mode: TV	TV	TV
TV: 1/1000 0.8"	1/10	1/10
ISO: Auto	Auto	Auto
Exp Mode: None	None	None
Large/ superfine	Large/ superfine	Large/ superfine
Tungsten	Tungsten	Tungsten
Evaluate	Evaluate	Evaluate
Auto	Auto	Auto
Auto	Auto	Auto
off	off	off

Images: Once every 4 sec for 540 frames
 First photo is calibration.

Topography: Keyence Map

Initial condition - Scan 0060.CSV

$dx = 5$; $dy = 5$; $min\ x = 1160$; $min\ y = 310$; $max\ x = 5100$; $max\ y = 3750$
 Keyence Z when mapping = -900

012

PCADP Locations & Timings		(Elevation of Probe head = -1220)
	1	2660, 1980 - 15 min
P1	2	1160, 1980 - 1:30 min
	3	1160, 2980 - 25 sec
	4	1660, 2980 - 25 sec
	5	1660, 2480 " "
P2	6	1660, 1980 " "
P3	7	2160, 1980 " "
	8	2160, 2980
	9	2160, 2980
	10	2160, 3480
	11	2660, 3480
	12	2660, 2980
	13	2660, 2480
P4	14	2660, 1980
P5	15	3160, 1980
	16	3160, 2480
	17	3160, 2980
	18	3160, 3480
	19	3660, 3480
	20	3660, 2980
	21	3660, 2480
P6	22	3660, 1980
P7	23	4160, 1980
	24	4160, 2480
	25	4160, 2980
	26	4160, 3480
	27	4660, 3480
	28	4660, 2980
	29	4660, 2480
P8	30	4660, 1980
P9	31	2660, 1980 last spot until Exp Ends

Calc

Na

Alum

3:14

Task for run 3:13

✓ Time pictures start: 3:12

✓ Time exp. start: 3:18

✓ PCADP: start data collection

start data recording

✓ Start stop watch

✓ open valve

✓ Start Matlab script

✓ open siphon lines

release dye pulse

✓ pump slurry from aux

to main reservoir

✓ sample slurry

✓ Take photo of Kevin

15:00

Dye released ~~7:00~~ into run

	Large Reservoir	Small Reservoir
Gallons	645 + 20	275
Fluid		

Calcium Carbonate	4.7 lbs	1.95 lbs
Na Hex	17.47 lbs	7.23 lbs
Aluminum Oxide	194.96 lbs	80.62 lbs

Measurement of siphon block

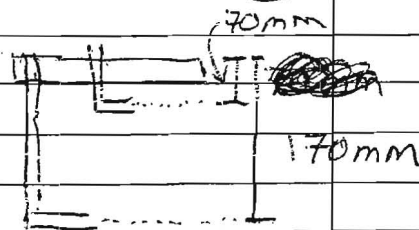
Keyence laser height = -800

white dot on top of siphon block = -1270

After Angle Inc correct white dot

on top of siphon block @ -1425.5

siphon block

OLADP

Meas/Burst Interval (s) = 1 sec

Cell size (mm) = 8

Averaging Interval(s) = 1

Blanking Dist (0.1) (m)

Pulse Dist (0.45)

coordinate system (XYZ)

cells = 42

Profile range (m) 0.336

Duration of experiment 31:45

After 30 minutes slight problem w/ CHT, lost track due to mixer, cut pump for ~30 sec, then turned pump on, but mixer off, got track back duration of problem ~ 1 min.

Flow Remaining 25G in Aux Tank
105G in Main Reservoir

Started exp off by opening distal hole cut pipe valve. At 12 minutes into experiment noted climbing water levels in basin and clouding of basin so opened trickle drains at that time

Notes on Flow 2 12/23

Position of white dot on siphon rake (~~4160, 2060, 1177~~)
apparent (4160, 2060, 1177)
Stage elevation of Keyence
-800
actual elevation (-1301)

Start photo collection: 12:08 pm

Start experiment: ~~12:10 pm~~
12:11 pm

22:00 min in \Rightarrow open line to feed lots of fresh water in.

27:00 min in \Rightarrow turn mixer off to prevent pump from sucking air

Cameras

1) Distal	2) Prox	3) Med
Exp Mode: TV	TV	TV
TV: 0.8"	1/10	1/8
ISO: Auto	Auto	Auto
Exp Mode: None	None	None
Large/superfine	Large/superfine	Large/superfine
Tungsten	Tungsten	Tungsten
Evaluate	Evaluate	Evaluate
Auto	Auto	Auto
Auto	Auto	Auto
off	off	off

Images: One every 4 sec for 600 frames

Topography: Keyence Map post flow 1: Scan 0062 (SV)
 $dx=5$ $dy=5$, $min x=1160$, $min y=310$, $max x=5100$, $max y=3750$
 Keyence Z when mapping = -900

opened both trickle drains & distal hole cut pipe drains
 at start of experiment

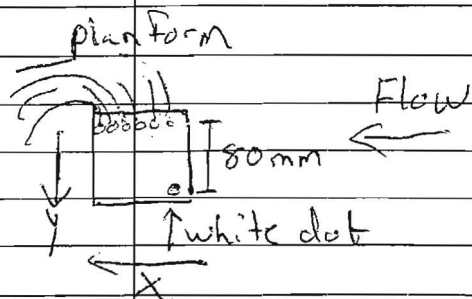
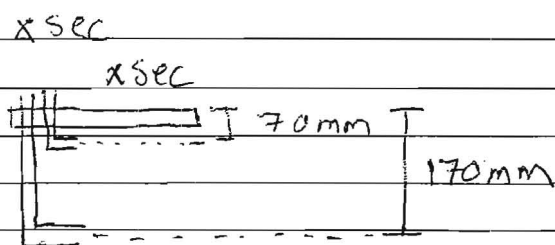
PCAPP Location same as flow 1 except starting
 and ending probe location, which for flow 2
 was (3540, 1980) about half way up distal wall
 Elevation of Probe head = -1220

dye released @ 15 min into exp \Rightarrow red dye

Siphons started sampling @ \sim 16:30 (similar to flow 1)

	Large Reservoir	Small Reservoir
Fluid	645 + 20 G	275
Calcium carbonate	4.7 lbs	1.95 lbs
Na Hex	17.47 lbs	7.23 lbs
Alumina oxide	194.96 lbs	80 80.62 lbs

Measurement Siphon Block



PCADP

Meas / Burst Interval (s): 1

Cell size (mm): 8

Averaging Interval (s): 1

Blanking Dist (m): 0.1

Pulse Dist (m): 0.45

Coordinate system: XYZ

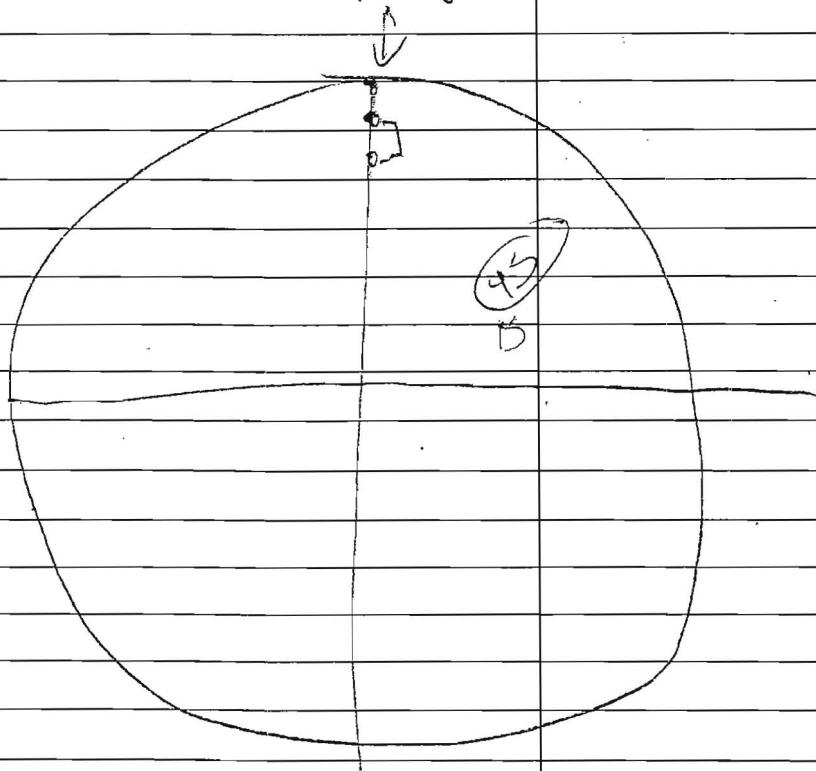
cells: 42

Profile range (m): 0.336

Duration of exp: 31:48

Flow Remaining 25 G in Aux Tank
58 G in Main Reservoir

Topography: Keyence Map post Flow 2: Scan 0064, CSV
 $dx = 5$, $dy = 5$, $min x = 1160$, $min y = 310$, $max x = 5100$, $max y = 3750$
 Keyence Z when mapping = -900



017

2/10 Sample Run of TC's into Deepwater Basin for Kevin's mini Basin Project

Relative to 12/23 Flow we reduced gate width to 0.13 m & gate height to 4.5 cm. Accordingly we reduced flux into Basin by 0.5 to ~12.7 GPM.

Gate width reduce by 1/2 from 12/23 flow, Gate height reduced to try to get flow to be close to our target after flow expansion due to entrainment.

Mixed slurry w/ 150 G of water, 1.06 lbs calcium carbonate, 3.94 lbs SHMP, 49.45 lbs Alumina Oxide

have PCADP positioned at Basin center with probe head at (~~-2660~~ 2660, 1980, -1220)

Will stay at Basin center for 120s, then move to (1160, 1980, -1220) for 60 sec.

PCADP

Meas / Burst Interval (s) : 1

cell size (mm) : 8

Averaging Interval (s) : 1

Blanking Distance (m) 0.1

Pulse Distance (m) 0.5

Coordinate system : XYZ

cells 48

Profile range (m) 0.384

3/3 Sample Run of TD'S into Deepwater Basin
for Kevin's mini basin experiment.

Starting Volume of slurry in main reservoir = 1176
meter

Have installed float valve btw CHT & Basin,
starting this run w/ meter gate valve
closed, goal will be to quickly adjust
it to 12.7 GPM,

Buff
add
Ents

PCADP settings same as in 2/10 run
and locations and timing are same

Ran into Problem w/ connecting to PCADP,
so changed serial 2 USB connector.

3/8 Ready (Hopefully) to run another Flow

@ basin center $\bar{u} = 0.0233 \text{ m/s}$
 $\bar{q} = 0.0030 \text{ m}^2/\text{s}$
 $h = 12.8 \text{ cm}$

u_{max} @ 3.2 cm above bed

@ entrance box $\bar{u} = 0.0591 \text{ m/s}$
 $\bar{q} = 0.0066 \text{ m}^2/\text{s}$
 $h = 11.2 \text{ cm}$

u_{max} @ 1.6 cm

3/10 Setup Aux Reservoir w/ sump pump to
Discharge fresh water of known amount into basin
to test if measured discharge of water into
basin in known amount of time matches
flux rate on newly installed float meter.
Fluxed ~~176~~ 175G of water into basin in
14:14, so 12.36 GPM, when float meter read
12.76 GPM.

3/17 Update on Conditions of Recent⁰¹⁹
T.C. Runs in Deepwater basin

all y locations @ 1980

Entrance

Run Date	(x ₁ , y ₁)	(x ₂ , y ₂)	Gate width	Gate height	Box Slope	
Dec 2020	N/A	N/A	0.26 m	5.2 cm	30°	
2/10/21	2660	1160	0.13 m	4.8 cm	10°	
3/8/21	2660	1160	0.13 m	3.8 cm	10°	
3/10/21	2660	1160	0.13 m	3.3 cm	0°	
Baffles added to Entrance Box	3/16/21 A	2660	1390	0.13	3.3 cm	0°
	3/16/21 B	1160	1390	0.13	3.3 cm	0°

For 3/16/21 Flows, also added a tunnel from Entrance Box perforated wall to mini basin lip. tunnel is 0.13 m wide, ~3.3 cm tall & 0.23 m long

John Firm → KY coal Paper

Steve Greb et al. 2002 → Paper on Regional Geology

Kentucky Geo Survey hosted on University of Kentucky

4/8/21 Notes on mini basin run

TDWD-21-1 Flow 1

Aim → pump ~~12.5~~ 12.7 GPM to basin through constant head tank.

Flow will exit tunnel w/ 13 cm width tunnel is 3.3 cm tall.

Will deploy PCADP w/ same timing script as 12/16/20 Flow and same deployment parameters

Topography & Keyence Map: Initial Topography script File Scan0086.CSV
Keyence^a file is same as 12/16/20 Flow

List of items for checklist

- make sure line is primed
- make sure overhead fluorescent lights are off
- open trickle drains
- start ADP collection
- start ADP recording
- sample slurry from CHT
- make sure CHT is overflowing
- make sure mixer is on
- turn flood lights on
- make sure siphon lines are primed
- make sure collecting photos
- salt in dye jug

LDM D-51-1 flow 1

Cameras

1) Dist	2) Prox	3) Med
Exposure Mode: TV	TV	TV
TV: 0.8"	1/10	1/10
ISO: Auto	Auto	Auto
Exp Mode: None	None	None
Large/Superfine	Large/Superfine	Large/Superfine
Tungsten	Tungsten	Tungsten
Evaluate	Evaluate	Evaluate
Auto	Auto	Auto
Auto	Auto	Auto
off	off	off

Dye released 15 min into run.

Large Reservoir while circulating to full CHT has ⁶⁰⁵ ~~623~~ G of slurry that is a 1% by concentration slurry w/ deflocculant in at percentage that we used in TMB-20-1 Flow

Camera deployment same as 12/16/20 Run
 Start photo collection: 5:10 pm exactly exactly
 Start experiment: 5:39 37

opened only trickle drains at start of experiment

dye released at 15 min into flow

Forgot to have large mixer on @ start of flow turned it on @ about 11 min into flow.

Large reservoir had 242G @ end of run
 Run duration = 29 min 20 sec.

Measurement of siphon block

top of siphon block elevation = ~~-1251.3~~
-1305.6

Elevation of bottom siphon = -1521.9

Elevation of sediment surface = -1607.4

Problem w/ ~~depth~~ deployment of siphons. Plan was to deploy siphons in basin center $(x, y) = (2660, 1980)$ w/ 10 siphons @ dz btw siphons of 15mm w/ lowest siphon at 10mm above sediment interface.

However, when Kevin was positioning siphons he used Keyence laser deployed under water and he failed to factor in angle of refraction in z calculation, so we had siphons @ $x, y = (2660, 1980)$, but basal siphon was 85.5mm above bed.

Note about dye release: dye did not plunge into ~~ax~~ entrance box when released as dye was about the same density of the ambient fluid. So dye slowly released out of entrance box ~~of~~ over basically the ~~entirety~~ rest of the flow after release. In future flow I should add salt to dye to make it more dense.

Images collected above basin every 4 sec for 600 frames. ~~Forgot~~ Forgot to turn overhead fluorescent lights off, so they their reflections will appear in images.

Map post flow 1: Scan0086.csv. Same Map parameters as Scan 0086.csv

4/13/21 Notes on Flow 2 of TDWB-21-1⁰²³

Flow is being run on top of Flow 1
Aim: discharge 12.7 GPM of slurry into basin
for 30 minutes. Flow w/ exit entrance box through
tunnel that is 13cm wide by 3.3 cm tall

Will deploy PCA DP at ~~two~~ locations during
experiment.

Location 1: ADP head will be at (2660, 1980, -1341)
(1st 28 min, 30s) This is over basin center, 260mm above
sediment interface

Location 2: ADP head will be at (1330, 1980, -1235)
This will capture basin inlet conditions.
(Last 1 min, 30s) It is far enough downstream of tunnel
such that all 3 beams should hit the
flow.

Siphons will be at (2660, 2250) currently sediment
interface here is @ -1598. 10 siphons
on rake w/ 15mm spacing between.
aim is for bottom siphon to sit 10mm
above sediment surface, so -1588mm

Cameras: one image from each of 3 cameras
above basin every 4sec for 600 frames

<u>Dist</u>	<u>Prox</u>	<u>Med</u>
Exposure Mode: TV	TV	TV
TV: 0.8"	1/10	1/10
ISO: Auto	Auto	Auto
Exp Mode: None	None	None
Large/superfine	Large/superfine	Large/superfine
Tungsten	Tungsten	Tungsten
Evaluate	Evaluate	Evaluate
Auto	Auto	Auto
Auto	Auto	Auto
off	off	off

024

dye released — min into run

at start
 Large reservoir while circulating to overflowing DHT has 625 g of slurry that is 17% by volume Alumina Oxide sediment w/ defloculant in slurry at mass % used in TDWB-20-1 Flows

at end
 Large reservoir while circulating to overflowing DHT has 576 g of slurry left

Time at start of image collection
~~4:18:00~~ 4:19:00
 Time at start of experiment 4:21:00
 Time at end of experiment 4:30:07

opened trickle drains at start of experiment
 Large mixer on at start of experiment

PLADP

Hzas/Burst Interval (s): 1 sec
 cell size (mm): 8
 Averaging interval: 1 sec
 Blanking dist (m): 0.1
 Pulse Dist (m): 0.32
 Coordinate system: (XYZ)
 # cells: 26
 Profile range: 0.208m

Siphons sampled @ (starting times
 time 1 = 3:35 into flow
 time 2 =
 time 3 =

time 1 = 5:10

Experiment ended early as dual because float motor had not risen. so flux rate was off

026

4/17/21 Notes on Flow Z of TDWB-21-1
 Keyence map taken after yesterday's failed run
 Scan 0089.CSV Scan parameters same as
 scan 0086.CSV

Flow is being run on top of Flow 1 & yesterday's failed Flow Z.

Aim: discharge 12.7 GPM of slurry into basin for 30 min. Flow will exit entrance box through tunnel that is 13 cm wide & 3.3 cm tall

Will deploy PCADP at 2 locations during experiment

Location 1: PCADP head will be @ (2660, 1980, -1340)
 For 1st 28:30 min. This is over basin center, 260 mm above sediment interface (1350)

Location 2: PCADP head will be at (~~1330~~, 1980, -1234)
 for last 7:30. This will capture basin inlet conditions. It is far enough downstream of tunnel such that all 3 beams should hit the flow.

Configuration Parameters

Meas/Burst Interval (s): 1

cell size (mm): 8

Averaging Interval (s): 1

Blanking distance (m): 0.1

Pulse Distance (m): 0.32

Coordinate system: (x, y, z)

cells: 26

Profile range (m): 0.208 m

Siphons will be at (2660, 2250) currently sediment interface here is @ -1596, 10 siphons on rake w/ 15 mm spacing btw. Aim is for bottom siphon to sit ~~10~~⁸ mm above sediment surface, so -1588 mm.

Siphons started sampling @
 time 1 = 3 min in
 time 2 = 15 min in
 time 3 = 25 min in

027

Siphons ended sampling @

time 1 = 4:30 in

time 2 = 16:40 in

time 3 = 26:39 in

Cameras: one image from each of 3 cameras above basin every 4sec for 600 frames

Dist	Prox	Med
Exposure Mode: TV	TV	TV
TV: 0.8"	1/10	1/10
ISO: Auto	Auto	Auto
Exp Mode: None	None	None
Large/super fine	Large/super fine	Large/super fine
Tungsten	Tungsten	Tungsten
Evaluate	Evaluate	Evaluate
Auto	Auto	Auto
Auto	Auto	Auto
off	off	off

Dye, w/ salt dissolved in it, released 16:40 min into flow

opened trickle drains at start of experiment

Large mixer on at start of experiment

Large reservoir while circulating to overflowing CHT
 & mixer off has 530 G of slurry that is 1% by volume
 L-umina oxide sediment w/ defloculant in
 slurry @ mass % used in TDWB-20-1 Flows

Large reservoir while circulating to overflowing CHT
 & mixer off at end of flow has 148 G left

Time at start of image collection: 3:45:00

Time at start of experiment: 3:47

~~Large mixer~~ Time at end of experiment 4:17

028

4/22/21 Actual Gate X-tunnel height
during TDWB-21-1 = 37mm

4/27/21 Notes on Flow of TDWB-21-7

Reference map of initial conditions TDWB-21-1(KEY) Scan0005

Scan parameters same as scan 0086.CSV

Flow is being run on freshly carved surface

Aim: discharge 6.35 GPM of slurry into basin for
30 min. Flow will exit entrance box through
tunnel that is 6.5 cm wide & 3.7 cm tall

Will deploy PCADP @ basin center (x,y) = 2660, 1980
for full duration of flow. Z of PCADP
head is @ -1340. Z of sediment interface
at start is -1611

Configuration Parameters

Meas/Burst Interval (s): 1

cell size (mm): 8

Averaging Interval (s): 1

Blanking distance (m): 0.1

Pulse Distance (m): 0.32

coordinate system: (x, y, z)

cells: 26

Profile range (m): 0.208

Siphons will be @ (2660, 2250) currently sediment
interface here is @ -1606.5. 10 siphons on rake
15 mm spacing btw. Aim is for bottom siphon

to sit ~~15~~ 9mm above sediment surface, so -1597.6m

9mm

siphons started sampling @ time 1 = 1:30

time 2 = 3:13

time 3 = 6:45

siphons stopped sampling @ time 1 = 2:30

time 2 = 4:34

time 3 = 8:05

Cameras: one image from each of 3 cameras above
basin every 4sec for 600 frames

Med

TV
1/8

Auto
None

Large/superfine
Tungsten
Evaluate

Auto
Auto
off

Dye, w/ salt dissolved in it released 1500 min into flow

opened trickle drains at start of experiment

Large mixer on during full experiment

Large reservoir while circulating to ~~overfilling~~ ^{empty} CHT
Mixer on has 383 g of slurry that is 1% by
Volume Alumina oxide sediment w/ deflocant in
slurry @ mass 70 used in TDWB-20-1 Flows

Large reservoir while circulating to ~~overfilling~~ ^{empty} CHT
Mixer on @ end of flow has 207 g left

Time at start of image collection: 3:17

Time @ start of experiment: 3:19

Time @ end of experiment: 3:49

4:07^{PM} in real time = 4/21/2021 @ 11:47:04 PM
on PC ADS 4/22/21

ADP started data collection 91sec before valve

opened

8:15V

Dist

Exposure Mode: TV
TV: 0.8

ISO: Auto
Exp Mode: None

Large/superfine
Tungsten
Evaluate

Auto
Auto
off

Prox

TV
1/10

Auto
None

Large/superfine
Tungsten
Evaluate

Auto
Auto
off

Med

TV
1/8

Auto
None

Large/superfine
Tungsten
Evaluate

Auto
Auto
off

030

4/29/21 Notes on Flow 2 of TDWB-21-2

Keyence map of ^{Post-Flow} ~~initial~~ conditions Scan 0009

Scan parameters same as scan 0086. CSV

Flow is being run on top of TDWB-21-2 Flow 2

Aim: discharge 6.35 GPM of slurry into basin for 30 min. Flow will exit entrance box through

tunnel that is 6.5 cm wide & 3.7 cm tall

Will deploy PLADP @ suite of locations given in script file: TDWB-21-2-ADP.SCP

Timing of moves given in trigger file:

ADP-Triggers_TWB
-21-2-FConfiguration Parameters

Meas/Burst Interval(s): 1

cell size (~~cm~~)^{mm}: 8

Averaging Interval (s): 1

Blanking distance (m): 0.1

Pulse Distance (m): 0.45

coordinate system: (x, y, z)

#cell: 42

Profile Range (m): 0.336

No Siphons deployed

Cameras: one image from each of 3 cameras above basin every 4sec for 600 frames

Dist	Prox	Med
Exposure Mode: TV	TV	TV
TV: 0.8	1/80	1/8
ISO: Auto	Auto	Auto
Exp Mode: None	None	None
Large/superfine	Large/superfine	Large/superfine
Tungsten	Tungsten	Tungsten
Evaluate	Evaluate	Evaluate
Auto	Auto	Auto
Auto	Auto	Auto
off	off	off

Dye, w/salt dissolved into it released 9 min into Flow

opened trickle drains @ start of experiment &
Large mixer on during full experiment

Large reservoir while circulating to empty CHT
& mixer on has 393 G of slurry that is 19% by
volume Alumina oxide sediment w/ deflocculant in
slurry @ mass 70 used in TDWB-20-1 Flows

Large reservoir while circulating to empty CHT
& mixer on @ end of flow has 204 G left

Time at start of image collection: 1:00 pm
Time at start of experiment: 1:02 pm
Time at end of experiment: 1:32 pm

5/13/21 Notes on Flow 1 of TDWB 21-3

Keyence map of initial conditions TDWB-21-3-Scan 0008.CSV
scan parameters same as scan 0086.CSV

Flow is being run on freshly carved surface

Aim: discharge ~~12.6~~^{25.6} GPM of slurry into basin for
30 min. Flow will exit entrance channel through
tunnel that is 26 cm wide & 3.7 cm tall

Will deploy PCADP @ basin center (x,y) = 2660, 1980
for full duration of flow. Z of PCADP head
is @ -1340. Z of sediment interface is -1608

Configuration Parameters

Meas/Burst Interval (s): 1

cell size (mm): 8

Averaging Interval (s): 1

Blanking distance (m): 0.1

Pulse Distance (m): 0.32

coordinate system: (i, j, z)

cells: 26

profile range: 0.208

siphons will be @ (2660, 2250) currently sediment interface here is @ -1603. 10 siphons on lake w/ 15 mm spring btw. Aim is for bottom siphon to sit 10 mm above sediment surface so -1593 mm siphons started sampling @ time 1 = 1:30

time 2 = 3:22

time 3 = 6:45

time 4 = 26:00

Siphons stopped sampling @ time 1 = 2:30

time 2 = 4:43

time 3 = 8:10

time 4 = 27:47

Cameras: one image from each frame of 3 cameras above basin every 4 sec. for 600 frames

Dist	Mod	Pixel
Exposure Mode: TV	TV	TV
TV: 0.8	1/10	1/8
ISO: Auto	Auto	Auto
Exp Mode: None	None	None
Large/superfine	Large/superfine	Large/superfine
Tu: sten	Tu: sten	Tu: sten
Evaluate	Evaluate	Evaluate
Auto	Auto	Auto
Auto	Auto	Auto
off	off	off

Dye, w/ salt dissolved in it released 15 min up
Flow

opened trickle drains at start of experiment & Large mixer on during full experiment

Large ^{reservoir} mixer while circulating to full CHT & mixer on has 600g of slurry that is 1/2 by volume air, no oxide w/ defloculant in slurry @ mass % used in ID: P-204 F0105

aux tank ~~275~~ 275 G slurry in it

Time @ start of image collection: 4:44

Time @ start of PCADP: 4:45

Time @ start of Exp: 4:46

Time @ end of exp: 5:16

Large reservoir while circulating to full CHT & mixer on has 160 G @ end of experiment
aux has 10 G left, so 705 G of slurry used

opened perforated pipe drain at distal end of basin ~ 10 min into flow

For some unknown reason, overhead images did not collect.

5/17/21 Notes on Flow 2 of TDWB-21-3

Reference map of post flow 1 conditions TDWB-21-3(KEY)-

Scan parameters same as scan0086.CSV scan0009.CSV

Flow is being run on top of TDWB-21-3 Flow 1

Aim: discharge ~~12.6~~^{23.6} GPM of slurry into basin for 30 min. Flow will exit entrance box through funnel that is 26 cm wide & 3.7 cm tall

Will deploy PCADP @ suite of locations given in

script file: TDWB-21-2-ADP.SCP

Timing of moves given in trigger file: ADP-Triggers_TDWB21-2

Configuration Parameters - F2.m

Meas/Burst Interval (s): 1

cell size (mm): 8

Averaging Interval (s): 1

Blanking Distance (m): 0.1

Pulse Distance (m): 0.45

coordinate system: (x, y, z)

#cell: 42

Prof.itz Range (m): 0.336

No Siphons deployed

Cameras: one image from each of 3 cameras above
basin every 4 sec for 600 frames

<u>Dist</u>	<u>Prox</u>	<u>Med</u>
Exposure Mode: TV	TV	TV
TV: 0.8	1/10	1/8
ISO: Auto	Auto	Auto
Exp Mode: None	None	None
Large/super fine	Large/super fine	Large/super fine
Tungsten	Tungsten	Tungsten
Evaluate	Evaluate	Evaluate
Auto	Auto	Auto
Auto	Auto	Auto
off	off	off

Dye, w/ salt dissolved into it released 15 min into flow
opened trickle drains @ start of experiment &
Large mixer on during full experiment

Large reservoir before circulation & no pump on has
645 G of slurry that is 17% by volume Alumina
oxide sediment w/ defloculant in slurry @ mass
% used in TDWB-20-1 Flows. Aux reservoir has
275 G @ start

@ end of experiment (Volumes left over)

Main Reservoir 153 G

Aux Reservoir 18 G

Time @ start of image collection: 11:24

Time @ start of PLADP Data Recording: 11:25

Time @ start of experiment: 11:26

Time @ end of experiment: 11:56

opened up distal hole out drains @ 10 min into flow

PCADP appeared to be giving error messages during flow of check valve nature

5/21/21 \Rightarrow I had assumed PCADP datum was at base of PCADP. Turns out datum is at base of line on instrument marked at X. Thus, I f I stated head was @ $z = -1340$, actual datum of instrument was @ -1326 (a positive shift of 14mm)

5/24/21 Surfactant ratio 0.02% of fresh water

5/27/21 Notes on Flow 1 of TDWB-21-~~4~~
Keyence map of initial conditions TDWB-21-4 (Key). Scan 0011.csv
Scan parameters same as scan 0086.csv
Flow is being run on freshly carved surface
Aim: discharge 12.6 GPM of slurry into basin for 30 min. Flow will exit entrance channel through tunnel that is 13cm wide \pm 3.7cm tall

Will deploy PCADP @ basin center $(x, y) = 2660, 1980$
for full duration of flow, z of PCADP head is @ -1340 , z of sediment interface is -1608

Configuration Parameters

Meas/Burst Interval (s) : 1

cell size (mm) : 8

Averaging Interval (s) : 1

Blanking Distance (m) : 0.1

Pulse Distance (m) : 0.32

coordinate system : (x, y, z)

cells : 26

profile range : 0.208 m

Siphons will be @ $(2660, 2250)$ currently sediment interface here is @ -1604 , 10 siphons on rde

w/ 15 mm spacing btw. Aim is for btm siphon
to sit 10 mm above sediment surface, so-1594 mm
siphons started sampling @ time 1 = 1:30

time 2 = 3:13

time 3 = 6:45

time 4 = 26:00

siphons stopped sampling @ time 1 = 2:22

time 2 = 4:35

time 3 = 8:08

time 4 = 27:34

Cameras: one image from each of 3 cameras above
basin every 4 sec. for 600 frames

Dist	Mod	Prex
Exposure Mode: TV	TV	TV
TV: 0.8	1/10	1/8
ISO: Auto	Auto	Auto
Exp Mode: None	None	None
Large/superfine	Large/superfine	Large/superfine
Tungsten	Tungsten	Tungsten
Evaluate	Evaluate	Evaluate
Auto	Auto	Auto
Auto	Auto	Auto
off	off	off

Dye w/ salt dissolved in it released 15 min into flow

opened trickle drains @ start of experiment & Large
mixer on during full experiment

Large reservoir while not circulating to CHT & mixer off
has 600 L of slurry that is 1% by volume
alumina oxide w/ deflocculant in slurry @
mass % used in TDWB-20-1 Flow

Time @ Start of image collection: 2:16

Time @ start of PCAPP: 2:18

Time @ start of experiment: 2:19

Time @ end of experiment: 2:49

Large reservoir while ~~circulating~~^{not} circulating to
 CHT & mixer off las 218.6 @ end of experiment

5/31/21 Notes on Flow 2 of TDWB-21-4

Keyence map of post flow 1 conditions TDWB-21-4(KEY)-Scan0012.OSV

Scan Parameters same as scan 0086.OSV.

Flow is being run on top of TDWB-21-4 Flow 1

Aim: discharge 12.6 GPM of slurry into basin for
 30 min. Flow will exit entrance box through
 tunnel that is 13 cm wide & 3.7 cm tall

Will deploy PCADR @ suite of locations given in
 script file: TDWB-21-2-ADP.SCP

Timing of moves given in trigger file: ADP-Triggers-

Configuration Parameters

TDWB-21-2-F2.m

Meas/Burst Interval (s): 1

cell size (mm): 8

Averaging interval (s): 1

Blanking distance (m): 0.1

Pulse Distance (m): 0.45

coordinate system: (x, y, z)

cells: 42

Profile Range (m): 0.336

No siphons deployed

Cameras: one image from each of 3 cameras above
 basin every 4 sec for 600 frames

<u>Dist</u>	<u>Prox</u>	<u>Med</u>
Exposure Mode: TV	TV	TV
TV: 0.8	1/10	1/8
ISO: Auto	Auto	Auto
Exp Mode: None	None	None
Large/super fine	Large/super fine	Large/super fine

Tungsten	Tungsten	Tungsten
Evaluate	Evaluate	Evaluate
Auto	Auto	Auto
Auto	Auto	Auto
off	off	off

Dye w/ dissolved salt in it released 15 min into flow
 opened trickle drains @ start of experiment &
 large mixer on during full experiment

Large reservoir before circulation & no pump on has
~~600 G~~ 600 G of slurry that is 1% by volume Alumina
 oxide sediment w/ defloculant in slurry @ mass
 % used in TDWB-20-1 Flows. To attempt to get better
 W velocities added 15 lbs of Talisman 30 black
 particles that are close to neutrally buoyant. These
 particles are hard to wet, so added surfactant
 to flow at 0.04% concentration. This equal to
 900 mL to 600 G. Surfactant: Drexel Surf-Ac 910

Time @ start of image collection: 1:59
 Time @ start of PLADP Data recording: 2:00:20
 Time @ start of experiment: 2:01
 Time @ end of experiment: 2:31

Estimate of porosity: 10%

@ end of experiment (Volume left over) in
 main Reservoir: 230G

6/8/21 Notes on Flow 1 of TDWB-21-S
 Keyence map of initial conditions TDWB-21-S(REV)-Scan0021.CSV
 Scan parameters same as scan0086.CSV
 Flow is being run on freshly carved surface
 Aim: discharge 12.6 GPM of Slurry into basin

for 30 min. Flow will enter elliptical basin that has $L = 2W$ but same basin area as TDWB-21-1. Flow will exit entrance channel through tunnel that is 13 cm wide & 3.7 cm tall

Will deploy PCADP @ basin center $(x, y) = 3285, 2000$ for full duration of flow. z of PCADP head is @ -1340 . z of sediment interface is -1609
Configuration Params same as TDWB-21-4 F1

Siphons will be @ $(3285, 2270)$ current sediment interface here is @ -1598 . 10 siphons on rake w/ 15 mm spacing btw. Aim is for botm siphon to sit 10 mm above sediment surface, so -1588 , but actual is $\frac{1}{2}$ mm above surface, so -1586.9

Siphons started sampling @ time 1 = 1:30

time 2 = 3:13

time 3 = 6:45

time 4 = 26:00

Siphons ended sampling @ time 1 = 2:22

time 2 = 4:35

time 3 = 8:08

time 4 = 27:34

Cameras: overhead. Params same as TDWB-21-4 F2

Dye w/ salt dissolved in it released 15 min into flow

opened trickle drains @ start of experiment & large mixer on during full experiment

Large reservoir while not circulating to CHT & mixer off has 600F of slurry that is 1% by volume alumina oxide w/ deflocculant in slurry @ mass % used in TDWB-20-1 Flow

Time @ start of image collection: 2:35

Time @ start of PCADP collection: 2:36

Time @ start of experiment: 2:37

Time @ end of experiment: 3:07

Large reservoir while not circulating to CHT & mixer off
has 233 G @ end of experiment

6/10/21 Notes on Flow 2 of TDWB-21-5

Keyence map of ^{post flow 1} initial conditions: TDWB-21-5(KEY)-Scan0022.CSV

Scan parameters same as scan 0086.CSV

Flow is being run out of Flow 1

Aim: discharge 12.6 GPM of slurry into basin for 30 min

will deploy PCADP at suite of locations given in

script file TDWB-21-5-ADP.SCP

Timing of moves given in Trigger file: ADP-Triggers-TDWB-21-5-F2.m

Configuration Parameters same as TDWB-21-3 F2.

No siphons deployed

Cameras & same as TDWB-21-3-F2.

Dye, with dissolved salt in it released @ 15 min into Flow

opened trickle drains at start of exp. & Large mixer on

Starting w/ 600 G of slurry

Time of start of photo collection: 2:33

Time of start of PCADP collection: 2:34

Time of start of experiment: 2:35

Time of end of experiment: 3:05

Large reservoir has 258 G left @ end of run

7/1/21 Notes on Flow 1 of TDWB-21-6

Keyence map of initial conditions: TDWB-21-6(KEY)-Scan0018.CSV

Scan parameters: min x: 1160 max x: 35510 dx: 5

min y: 310 max y: 3283 dy: 5

Script for mapping: TDWB-21-6-High Resolution.SCP

Flow is being run on freshly carved surface

Aim: discharge 12.6 GPM of slurry into basin

for 3d min. Flow will enter elliptical basin that has $L = 0.5W$ but same basin area as TDWB-21-1. Flow will exit entrance channel through tunnel that is 13 cm wide & 3.7 cm tall

will deploy FADP @ basin center $(x,y) = (2.285, 2.000)$ for full duration of flow. Before flow I rotated ADP so that U will continue to point in

the direction of dominant flow. Z of FADP head is @ -1340. Z of sediment interface is -1611

Configuration farms same as TDWB-21-4 F1

Siphons will be @ (3555, 2000) current sediment interface here is @ -1608. 10 siphons on rake w/ 15 mm spacing betw. Aim is for btm siphon to sit 10 mm above sediment surface, so -1598, but actual is 10 mm above surface, so -1598

Siphons started sampling @ time 1 = 1:30

time 2 = 3:13

time 3 = 6:45

time 4 = 26:00

Siphons ended sampling @

time 1 = 2:22

time 2 = 4:35

time 3 = 8:08

time 4 = 27:34

Cameras: overhead farms same as TDWB-21-4 F2

Dye w/ salt added & dissolved in it released 15 min into flow

opened trickle drains @ start of experiment & large

operated mixer on during full experiment

Large reservoir while not dissolving to pH 2 mixer off

has 600g of slurry that is 1% by volume

aluminum oxid w/ defloculant in slurry @

mess % used in TDWB-20-1 Flow

Time @ start of image collection: 4:14

Time @ start of PCADP collection: 4:15

Time @ start of experiment: 4:16

Time @ end of experiment: 4:46

Large reservoir while not circulating to CHT & mix off
has 233G @ end of experiment.

~~7/19~~

7/19/21 Notes on Flow 2 of TDWB-21-6

Keyence map of initial conditions: TDWB_21-6 (KEY) Scan 0020.CSV

Scan parameters same as TDWB-21-6 F1

3:03

Flow is being run on top of fluvial deposit.

Aim: discharge 12.6 GPM of slurry into basin

for 30 min. Flow will enter elliptical basin that

has $L=0.5W$ & same basin area as TDWB-21-1

Flow will exit entrance channel through tunnel that is
13 cm wide & 3.7 cm tall

will deploy PCADP at suite of locations given in
script file: TDWB-21-6_ADP_SCF.

Timing of moves given in Trigger file: ADP-Triggers_TDWB_21-6

Configuration Params same as TDWB_21-3 F2. -F2.M

Siphons will be @ (1675, 2000) current sediment
interface here is @ -1522. 10 siphons on rake
w/ 15 mm spacing btw. Aim is for btm siphon
to sit 10 mm above sediment surface so -1512.

Siphons started sampling @ time 1 = 1:30

time 2 = 3:13

time 3 = 6:45

time 4 = 26:00

Siphons ended sampling @ time 1 = 2:22

time 2 = 4:37

time 3 = 8:08

time 4 = 27:54

Camera S: overhead Params same as TDWB-21-4 F2

Dye w/ salt added & dissolved in it released ¹⁶ 5 min into flow

opened trickle drains @ start of experiment & large mixer on during full experiment

off

Large reservoir while not circulating to CHT & mixer off has 500 of slurry that is 1% by volume alumina oxide. Concentration of SHIP same as earlier flows. Concentration of carbonate =

020.05V

3:03

Time @ start of image collection: ~~2:30~~ ~~2:32~~ 2:55

Time @ end start of experi PCADP collection: 2:57

Time @ start of experiment:

Time @ end of experiment:

is

Large reservoir while not recirculating to CHT & mixer off has ~706 @ end of experiment

221.6
2.1M

rate
lon

2