

Summary of Bonn AFF Measurements

CENWP-EC-HD SJS 5/27/2015

EXIT CHANEL u/s of Trashrack

Data collectors: SJS, SCS, JGR, IMR, RJC, JMA, IMA, TLS, AWT

Depth below WS (ft)	Test Number and Date							
	ORIGINAL	2013 OP	Test	Test	2014 OP	Test	2015	2015 OP
	Baseline	TEST 5	6	7	TEST 8	9	TEST 10	TEST 11
	10/31/2012	4/16/2013	1/21/2014	1/27/2014	2/3/2014	3/27/2014	4/13/2015	5/26/2015
	baseline	18" baffle & 100% plates	18" baffle & 67% plates	No baffle & 67% plating	10" baffle 67% Plates	# 8 with BH part closed	10" baffle, FINAL DESIGN	Full Sampling Operation ***
0.5	2.8	0.5	0.4	1.8	0.4	0.4	0.4	0.9
1.5	2.4	0.5	0.4	1.5	1.0	0.6	0.7	0.9
2.5	1.6	1.0	0.9	1.5	1.3	1.0	0.9	1.3
3.5	0.9	1.5	1.4	1.3	1.6	1.2	1.2	1.5
4.4	0.7	2.2	1.9	0.8	1.2	1.4	1.4	1.4
Average	1.69	1.08	0.96	1.33	1.02	0.88	0.87	1.19
% reduction *		36%	43%	21%	39%	48%	48%	29%
Discharge**	66	43	38	53	41	37	36	46
% reduction		35%	42%	19%	38%	43%	46%	31%

*% reduction compared to ORIGINAL Oct 2012 test
 ** Discharge rates in Test 5 -10 are uncertain due to variable angles of flow
 *** TEST 11 is likely only full sampling operation since original test

Depth below WS (ft)	Detailed Test 6 Data on 01/21/14			Detailed Test 7 Data on 01/27/14			Detailed Test 9 Data on 03/27/14		
	Test Number: 6			Test Number: 7			Test Number: 9		
	18" Baffle with 67% floor plates			67% floor plates (No Baffle)			Same as 8 with BH part closed		
	Average	Max	Min	Average	Max	Min	Average	Max	Min
0.5	0.40	0.9	-0.5	1.77	2.9	0.9	0.43	0.9	-0.6
1.5	0.45	1.1	-0.4	1.53	2.3	1.0	0.61	0.8	0.6
2.5	0.92	1.5	0.7	1.48	2.3	0.9	0.99	1.6	1.0
3.5	1.36	1.5	1.2	1.26	1.8	0.9	1.20	1.4	1.1
4.4	1.87	2.2	1.5	0.77	1.2	0.5	1.37	1.4	1.1

Depth below WS (ft)	ORIGINAL OPERATION: Baseline Test Data on 10/31/12			2015 TEST (Test 10 Data on 04/13/15)		
	Test Number: 5			Test Number: 10		
	18" Baffle with 100% floor plates			Final Design (No Flumes on)		
	Average	Max	Min	Average	Max	Min
0.5	2.81	3.4	2.1	0.41	0.8	-0.6
1.5	2.44	3.2	1.8	0.70	0.8	0.5
2.5	1.57	2.0	1.0	0.92	1.2	0.4
3.5	0.91	1.4	0.6	1.17	1.5	0.9
4.4	0.65	0.9	0.5	1.38	1.7	0.9

Depth below WS (ft)	2013 Operation (Test 5 Data on 4/16/13)			2014 Operation (Test 8 on 02/03/14)			2015 FINAL DESIGN (Test 11 on 05/26/15)		
	Test Number: 5			Test Number: 8			Test Number: 11		
	18" Baffle with 100% floor plates			10" Baffle with 67% floor plates			FULL SAMPLING OPEARATION		
	Average	Max	Min	Average	Max	Min	Average	Max	Min
0.5	0.48	1.0	-0.5	0.35	0.9	-0.6	0.86	1.1	0.6
1.5	0.47	1.2	-0.5	1.04	1.3	0.9	0.89	1.1	0.7
2.5	1.02	1.6	0.7	1.33	1.7	1.1	1.26	1.5	1.0
3.5	1.46	1.6	1.2	1.56	2.1	1.0	1.53	2.1	1.3
4.4	2.23	2.4	2.1	1.23	2.0	0.8	1.43	2.3	0.8

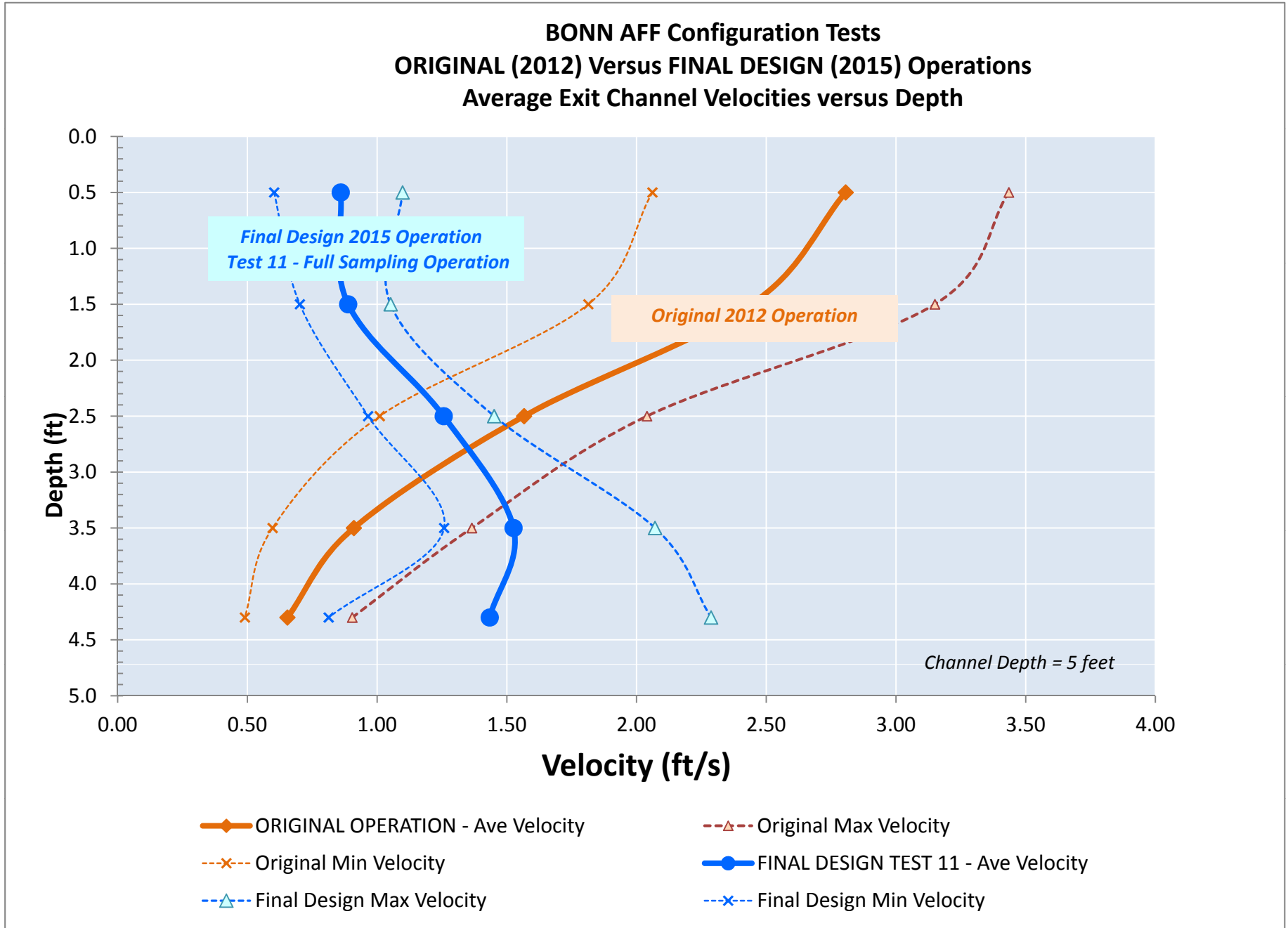
Notes:

Exit Channel 2-foot Depth Channel

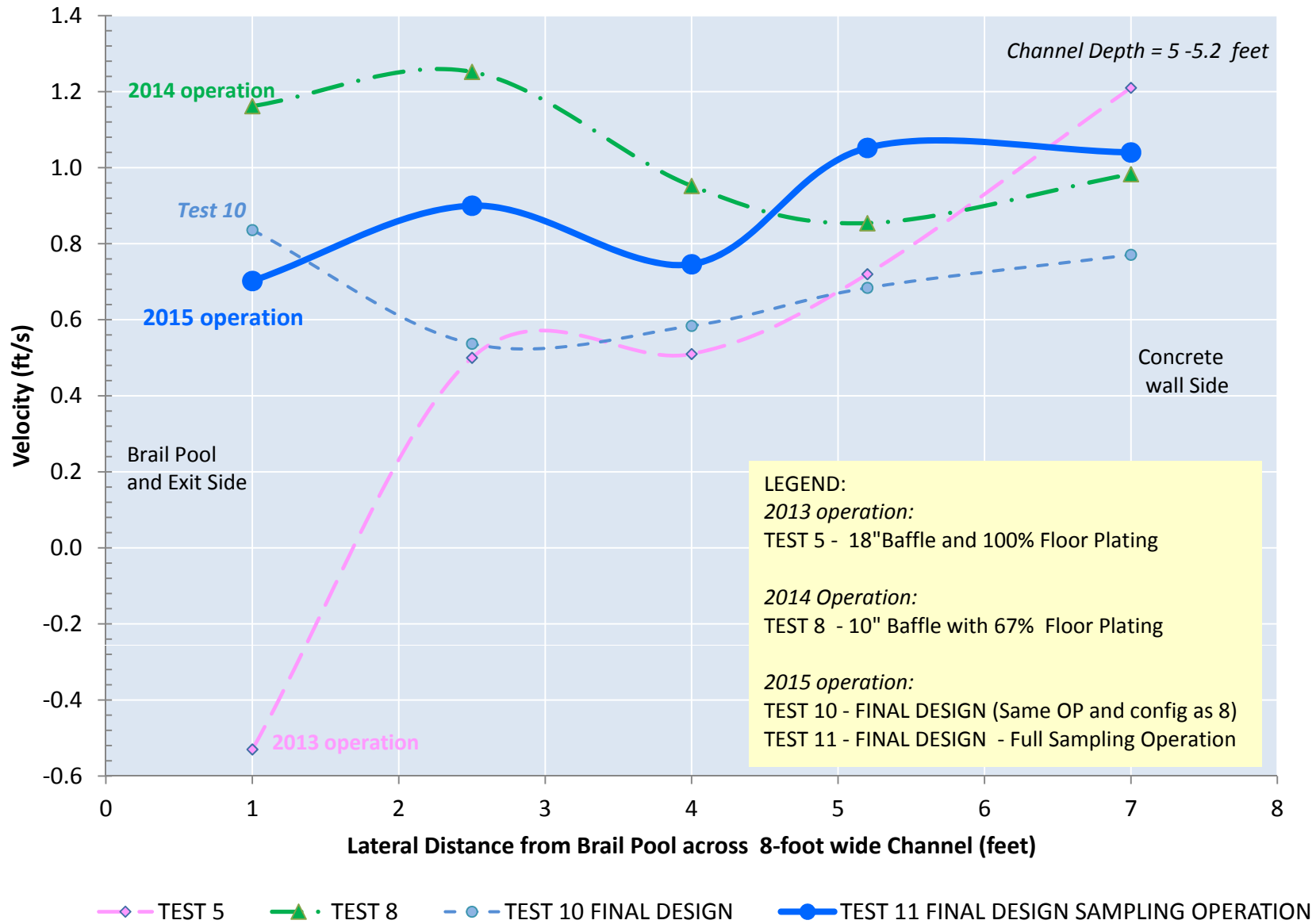
	Test 1a	Test 2a	Test 5a	Test 6a	Test 7a	Test 8a	Test 9a	Test 11a
	3/20/13	3/21/13	4/16/13	1/21/14	1/27/14	2/3/14	3/27/14	5/26/15
Max Velocity	4.4	4.3	4.3	4.1	4.1	3.8	3.3	4.4
Ave Velocity	2.9	2.7	3.0	2.6	2.5	2.3	2.0	3.0
Discharge****	47	43	47	42	41	39	37	48
Depth (ft)	2.0	2.0	2.0	2.0	2.0	2.1	2.3	2.0

**** Discharge rates are uncertain due to excessive movement of price meter and west side eddy

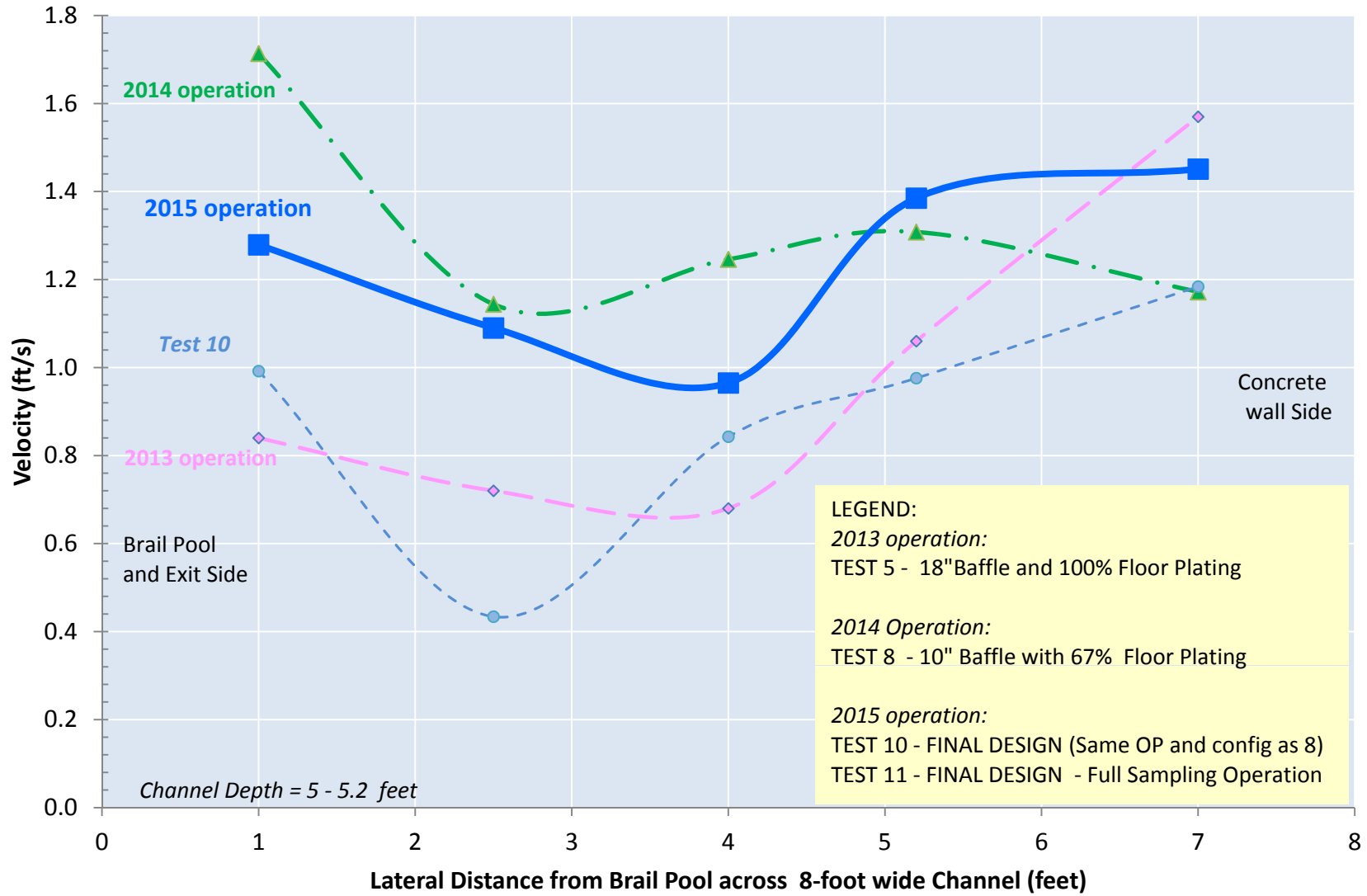
Bonneville AFF Test Operation Settings										
Ladder Head = 1 ft			Percent Open		Flow Depth (ft)	Baffle (inches into water)	Plating Percent	Flume Flushing on?	False Weirs On?	Other Adjustments
TEST No.	Date	Operation represented	Valve 2	Valve 15						
Baseline	10/31/12	2012 ≤	50%	75%	4.9			no	probably	
1	3/1/13		50%	78%	5.0			no	probably	Valve 14 open to 20%
2	3/21/13		50%	72%	5.0			no	unkown	
3	4/11/13		50%	85%	5.0			no	unlikely	
4	4/11/13		50%	84%	5.1			no	unlikely	
5	4/16/13	2013	50%	84%	5.0	18"	100%	no	unlikely	
6	1/21/14		50%	78%	5.0	18"	67%	unlikely	unlikely	
7	1/27/14		46%	70%	5.0	out	67%	unlikely	unlikely	
8	2/3/14	2014	48%	70%	5.0	10"	67%	unlikely	unlikely	
9	3/27/14		48%	70%	5.3	10"	67%	unlikely	unlikely	U/S Bulkhead Partially Closed
10	4/13/15		34%	68%	5.1	10"	67%	no	no	
11	5/26/15	2015	35%	75%	5.0	10"	67%	YES	YES	



BONN AFF Configuration Tests in 2013 - 2015 Exit Channel Velocities at Depth 1.5 feet

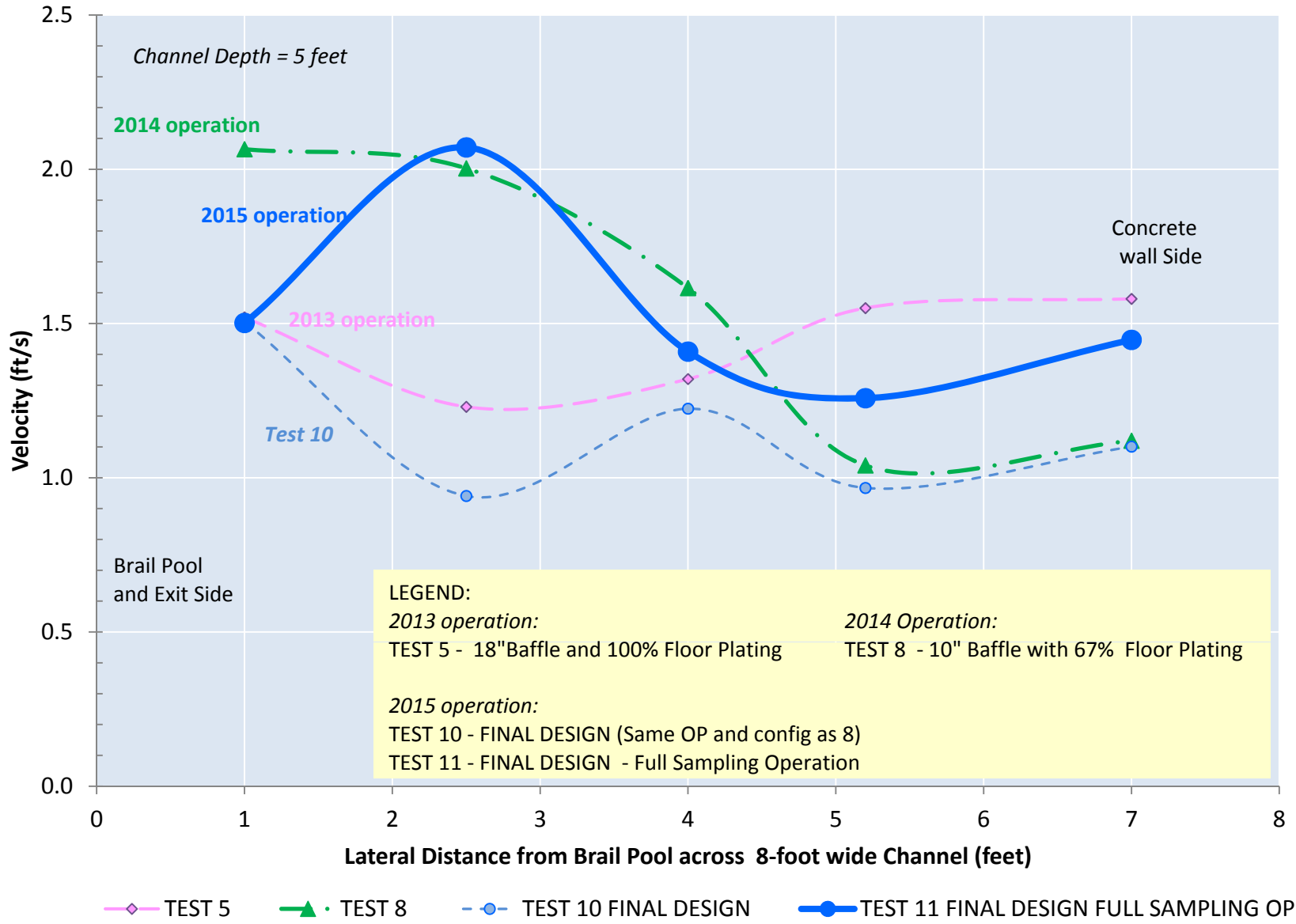


BONN AFF Configuration Tests in 2013 - 2015 Exit Channel Velocities at Depth 2.5 feet

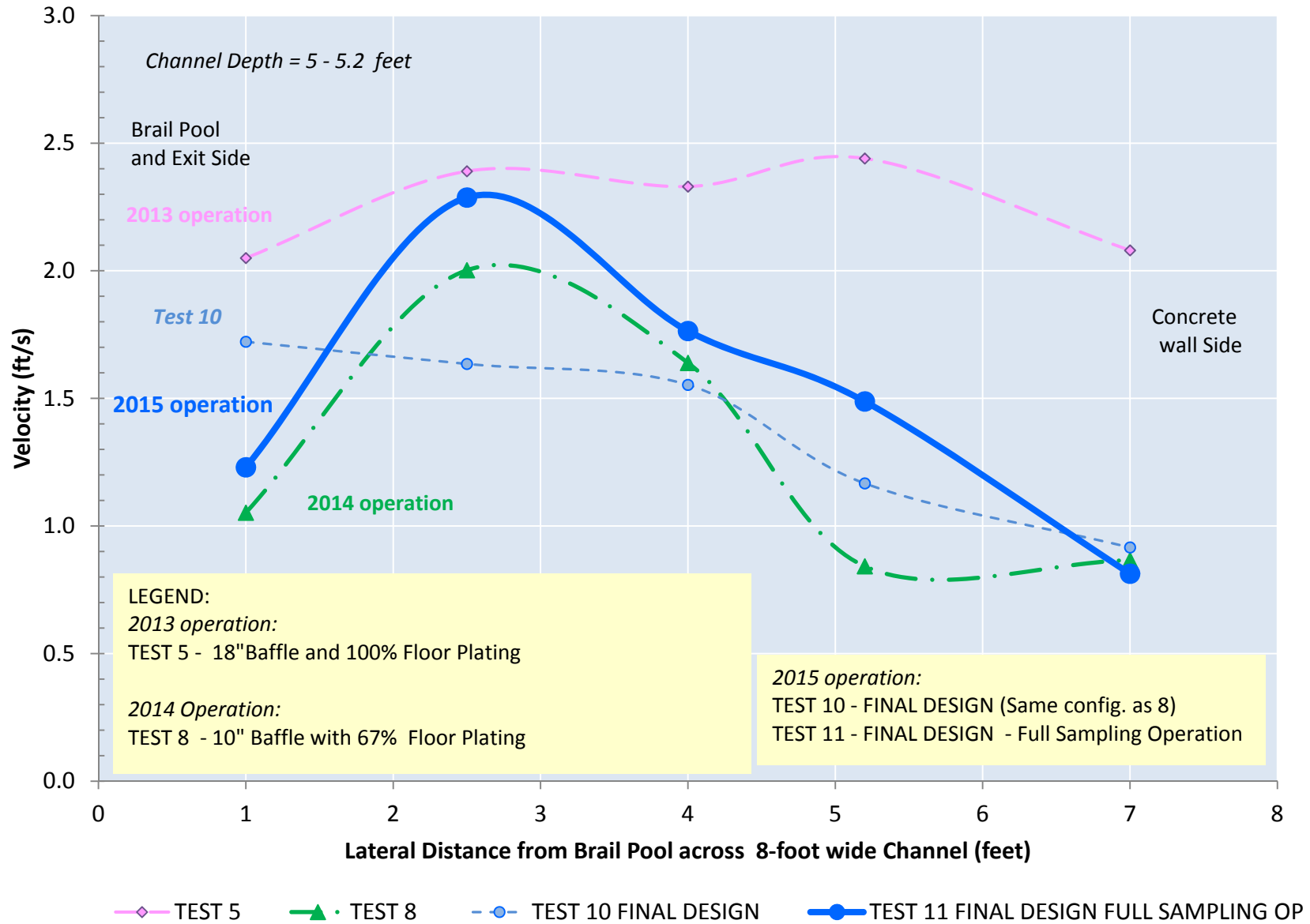


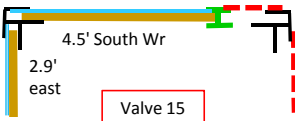

◆ TEST 5
 ▲ TEST 8
 ● TEST 10 FINAL DESIGN
 ■ TEST 11 FINAL DESIGN FULL SAMPLING OP

BONN AFF Configuration tests in 2014 Exit Channel Velocities at Depth 3.5 feet



BONN AFF Configuration Tests in 201 - 2015 Exit Channel Velocities at Depth 4.3 - 4.4 feet



BONNEVILLE AFF VELOCITY DATA										
AFF EXIT CHANNEL U/S of SLOPING TRASHRACK & D/S of BRAIL EXIT										
Date:	26-May-15	Time:	13:30	start 	Data Collectors:					
				4.5' South Wr 2.9' east	Valve 15	JGR	SJS	assumed		
TEST NUMBER		11				Head on Control Weir = 1 feet				
U/S Bulkhead Raised out of water										
Final Design Measurement 2015 Sampling Operation- CRITFIC operation, tested right after sampling										
Exit Ladder Head (ft)	Valve 2 Oper.	Stop Log Weir Height		US Bulkhead Opening	Head on Weir (in)	Valve 15 Operation				
	% Open	Final			Valve 14	Distance to WS (in)				
	1.0	East Weir	9' 4"		% Open	% Open	U/S	D/S	DH (ft)	
	35%	South Weir	9' 4"	Full Open	0	75%	<i>weir not drowned out</i>			
False Weir Valves*		Valve*		Flume Flushing Ball Valves *		* It is believed that none of the valves to the left were open in any of the previous tests, and this more accurately reflects a sampling operation.				
Valve no.	#9	#10	#12	Both 100%						
% Open	50%	60%	28%							
INSTRUMENT		Price Meter		X	Price Meter Rotations per Count = 1					
					V = 0.0178 + 2.2048 * (rotations/time)					
POINT VELOCITY AND FLOW MEASUREMENTS:										
Y = Measured Channel Depth =		5.00		ft <i>Depth steady at 5' 1.5"</i>		B = Channel Width =		8.00		
WS = Water Surface Elevation =		44.00		ft (= Y + 39)		Work Platform Grating EL =		45.0		
						Zi = Grating INVERT =		39.0		
X1 = Side Edge width incr =		2		ft		Approx internal dimension =		1.5 ft		
Y1 = Vertical edge height incr =		2		ft		Number of Internal X Increments =		4.0		
						Number of Internal Y Increments =		2.0		
								Div by 8		
								4		
Horiz. No.:	Formula for depth below surface (pm)	Depth from Surface (ft)	Vert. Sect. No. : Actual Dist (ft) from Right side	1	2	3	4	5	Average Velocity	
1	0.5 * Y1	1.00	Counts	12	13	16	18	20	0.86 ft/s	
			duration	45.2	41.9	40.9	40.5	40.8		
			VELOCITY	0.60	0.70	0.88	1.00	1.10		
2	Y1 + (Y-2*Y1)/3	1.50	Counts	13	16	14	19	19	0.89 ft/s	
			duration	41.9	40.0	42.4	40.5	41.0		
			VELOCITY	0.70	0.90	0.75	1.05	1.04		
3	Y1 + 2*(Y-2*Y1)/3	2.50	Counts	23	21	18	25	26	1.26 ft/s	
			duration	40.2	43.2	41.9	40.3	40.0		
			VELOCITY	1.28	1.09	0.97	1.39	1.45		
4	Y - 0.5*Y1	3.50	Counts	27	38	26	23	26	1.53 ft/s	
			duration	40.1	40.8	41.2	40.9	40.1		
			VELOCITY	1.50	2.07	1.41	1.26	1.45		
5	Y - 0.5*Y1	4.40	Counts	22	42	32	27	15	1.43 ft/s	
			duration	40.0	40.8	40.4	40.5	41.6		
			VELOCITY	1.23	2.29	1.76	1.49	0.81		
Total Average Integrated Velocity =				1.15 ft/s		Average Total Velocity =		1.19		
Total Computed FLOW RATE =				46 cfs		(= B * Y * V)		Difference = 4%		
Surface Direction at Measurement Location (4- feet Upstream of Trashrack and 2.5 feet d/s of CL Brail Exit):										
										
Notes	Water discharge from 1" pipe over brail exit									

BONNEVILLE AFF VELOCITY DATA

AFF EXIT CHANNEL U/S of SLOPING TRASHRACK & D/S of BRAIL EXIT

Date: Time: start

4.5' South Wr
2.9' east
Valve 15

Data Collectors: JGR SJS

TEST NUMBER **11-a** Head on Control Weir = feet

Exit Ladder Head (ft)	Valve 2 Oper.	Stop Log Weir Height		Bulkhead Opening	Head on Weir (in)	Valve 15 Operation			
	% Open	Final	Valve 14			Distance to WS (in)			
	1.0	35%	East Weir			% Open	% Open	U/S	D/S
		South Weir	9' 4"	Full Open	0	75%			

INSTRUMENT Price Meter Price Meter Rotations per Count =
 $V = 0.0178 + 2.2048 * (\text{rotations/time})$

POINT VELOCITY AND FLOW MEASUREMENTS:

Y = Measured Channel Depth = ft
 WS = Water Surface Elevation = ft (= Y + 39)

B = Channel Width = ft
 Work Platform Grating EL = ft
 Zi = INVERT = ft

X1 = Side Edge width incr = ft Aprox internal dimension = ft Div by
 Y1 = Vertical edge height incr = ft Number of Internal X Increments = 8
 Number of Internal Y Increments = 4

Horiz. No.:	Formula for depth below surface (pm)	Depth from Surface (ft)	Vert. Sect. No. : Actual Dist (ft) from Right side	1	2	3	4	5	Average Velocity
1	0.5 * Y1	1.00	Counts	1.3	2.5		5.2	7.0	2.98 ft/s
			duration	20	59		79	80	
			VELOCITY	41.9	40.0		40.5	40.1	

Total Average Integrated Velocity = 2.98 ft/s
Total Computed FLOW RATE = 48 cfs (= B * Y * V)

BONNEVILLE AFF VELOCITY DATA

AFF EXIT CHANNEL U/S of SLOPING TRASHRACK & D/S of BRAIL EXIT

Date: 13-Apr-15 Time: 15:00 start

TEST NUMBER 10

4.5' South Wr
2.9' east
Valve 15

Data Collectors: SCS, JGR, IMR, SJS

Head on Control Weir = 1 feet

STRUCTURAL CHANGES SINCE PREVIOUS TEST Feb 3, 2014: **2015 Operation without Flume Flow**

Exit Ladder Head (ft)	Valve 2 Oper. % Open	Stop Log Weir Height		US Bulkhead Opening	Head on Weir (in)	Valve 15 Operation			
		Final	East Weir			Valve 14 % Open	% Open	U/S	D/S
1.0	34%	9' 4"	9' 4"	Full Open	0	68%	Weir largely drowned out -- Variable depth		

INSTRUMENT Price Meter X Price Meter Rotations per Count = 1
 $V = 0.0178 + 2.2048 * (\text{rotations/time})$

POINT VELOCITY AND FLOW MEASUREMENTS:

Y = Measured Channel Depth = 5.13 ft
 Depth steady at 5' 1.5"

WS = Water Surface Elevation = 44.13 ft (= Y + 39)

B = Channel Width = 8.00 ft
 Work Platform Grating EL = 45.0 ft
 Zi = Grating INVERT = 39.0 ft

X1 = Side Edge width incr = 2 ft
 Y1 = Vertical edge height incr = 2 ft

Approx internal dimension = 1.5 ft
 Number of Internal X Increments = 4.0
 Number of Internal Y Increments = 2.0

Horiz. No.:	Formula for depth below surface (pm)	Depth from Surface (ft)	Vert. Sect. No. : Actual Dist (ft) from Right side	1	2	3	4	5	Average Velocity
1	0.5 * Y1	1.00	Counts	11	14	13	14	14	0.41 ft/s
			duration	40.8	42.1	43.3	42.0	41.7	
			VELOCITY	-0.61	0.75	0.68	0.75	0.76	
2	Y1 + (Y-2*Y1)/3	1.50	Counts	15	10	11	13	14	0.70 ft/s
			duration	40.4	42.5	42.8	43.0	41.0	
			VELOCITY	0.84	0.54	0.58	0.68	0.77	
3	Y1 + 2*(Y-2*Y1)/3	2.50	Counts	18	8	16	18	22	0.92 ft/s
			duration	40.7	42.4	42.7	41.4	41.6	
			VELOCITY	0.99	0.43	0.84	0.98	1.18	
4	Y - 0.5*Y1	3.50	Counts	27	17	22	18	20	1.17 ft/s
			duration	40.0	40.6	40.2	41.8	40.7	
			VELOCITY	1.51	0.94	1.22	0.97	1.10	
5	Y - 0.5*Y1	4.40	Counts	32	30	28	22	17	1.38 ft/s
			duration	41.4	40.9	40.2	42.2	41.7	
			VELOCITY	1.72	1.64	1.55	1.17	0.92	

Total Average Integrated Velocity = 0.87 ft/s
 Total Computed FLOW RATE = 36 cfs
 Average Total Velocity = 0.92
 Difference = 5%

Surface Direction at Measurement Location (4- feet Upstream of Trashrack and 2.5 feet d/s of CL Brail Exit):

Notes

BONNEVILLE AFF VELOCITY DATA

AFF EXIT CHANNEL U/S of SLOPING TRASHRACK & D/S of BRAIL EXIT

Date: 13-Apr-15 Time: 14:00 start

TEST NUMBER **10-B**

4.5' South Wr
2.9' east
Valve 15

Data Collectors:
SCS JGR IMR SJS
assumed

Head on Control Weir = 1 feet

STRUCTURAL CHANGES SINCE **2014 Bypass Operation**
PREVIOUS TEST Feb 3, 2014: **(later reduced to 10% Valve 15 with depth = 5' 11", 0% overtopped)**

Exit Ladder Head (ft)	Valve 2 Oper. % Open	Stop Log Weir Height		US Bulkhead Opening	Head on Weir (in)	Valve 15 Operation				
		Final	East Weir			South Weir	Valve 14 % Open	% Open	U/S	D/S
1.0	34%	9' 4"	9' 4"	Full Open		0	20%	Weir drowned out -- Variable depth		

INSTRUMENT Price Meter X Price Meter Rotations per Count = 1
 $V = 0.0178 + 2.2048 * (\text{rotations/time})$

POINT VELOCITY AND FLOW MEASUREMENTS:

Y = Measured Channel Depth = 5.58 ft
 Depth steady at 5' 7"

WS = Water Surface Elevation = 44.58 ft (= Y + 39)

B = Channel Width = 8.00 ft
 Work Platform Grating EL = 45.0 ft
 Zi = Grating INVERT = 39.0 ft

X1 = Side Edge width incr = 2 ft
 Y1 = Vertical edge height incr = 2 ft

Approx internal dimension = 1.5 ft
 Number of Internal X Increments = 4.0
 Number of Internal Y Increments = 2.0

Div by 8
 4

Horiz. No.:	Formula for depth below surface (pm)	Depth from Surface (ft)	Vert. Sect. No. : Actual Dist (ft) from Right side	1	2	3	4	5	Average Velocity
1	0.5 * Y1	1.00	Counts	3	4	3	4	2	0.15 ft/s
			duration	66.7	55.4	46.5	48.4	43.1	
			VELOCITY	0.12	0.18	0.16	0.20	0.12	
2	Y1 + (Y-2*Y1)/3	1.50	Counts	3	2	3	2	2	0.12 ft/s
			duration	52.4	45.4	50.0	65.6	43.1	
			VELOCITY	0.14	0.12	0.15	0.09	0.12	
3	Y1 + 2*(Y-2*Y1)/3	2.50	Counts	3	1	4	3	2	0.13 ft/s
			duration	54.1	60.9	54.4	40.8	43.1	
			VELOCITY	0.14	0.05	0.18	0.18	0.12	
4	Y - 0.5*Y1	3.50	Counts	2	3	5	5	4	0.17 ft/s
			duration	-1574.9	44.3	47.5	49.6	41.6	
			VELOCITY	0.02	0.17	0.25	0.24	0.23	
5	Y - 0.5*Y1	4.40	Counts	32	30	28	22	17	0.29 ft/s
			duration	215.6	277.7	191.6	299.0	128.3	
			VELOCITY	0.35	0.26	0.34	0.18	0.31	

Total Average Integrated Velocity = 0.18 ft/s
Total Computed FLOW RATE = 8 cfs
Average Total Velocity = 0.17
Difference = -4%
 (= B * Y * V)

Surface Direction at Measurement Location (4- feet Upstream of Trashrack and 2.5 feet d/s of CL Brail Exit):

Notes

BONNEVILLE AFF VELOCITY DATA

AFF EXIT CHANNEL U/S of SLOPING TRASHRACK & D/S of BRAIL EXIT

Date: Time: start

TEST NUMBER

Data Collectors: JMA, JGR, SJS

assumed

Head on Control Weir = feet

STRUCTURAL CHANGES SINCE 10" Deep Baffle 2014 SAMPLING OPERATION
 PREVIOUS TEST April 16/2013: (4) 67% Floor Plating(1/3 of floor paneling removed at d/s end)

Exit Ladder Head (ft)	Valve 2 Oper. % Open	Stop Log Weir Height		US Bulkhead Opening	Head on Weir (in)	Valve 15 Operation				
		Final	East Weir			South Weir	Valve 14 % Open	Distance to WS (in)		
1.0	48%	9' 4"	9' 4"	full	100	0	73%			

INSTRUMENT Price Meter Price Meter Rotations per Count =
 $V = 0.0178 + 2.2048 * (\text{rotations}/\text{time})$

POINT VELOCITY AND FLOW MEASUREMENTS:

Y = Measured Channel Depth = ft
 WS = Water Surface Elevation = ft (= Y + 39)

B = Channel Width = ft
 Work Platform Grating EL = ft
 Zi = Grating INVERT = ft

X1 = Side Edge width incr = ft
 Y1 = Vertical edge height incr = ft

Aprox internal dimension = ft Div by
 Number of Internal X Increments = 8
 Number of Internal Y Increments = 4

Horiz. No.:	Formula for depth below surface (pm)	Depth from Surface (ft)	Vert. Sect. No. : Actual Dist (ft) from Right side	1	2	3	4	5	Average Velocity
1	0.5 * Y1	1.00	Counts	11	9	10	16	18	0.35 ft/s
			duration	42.3	42.7	41.0	41.1	43.5	
			VELOCITY	0.59	-0.48	-0.56	0.88	0.93	
2	Y1 + (Y-2*Y1)/3	1.50	Counts	22	23	17	16	18	1.04 ft/s
			duration	42.4	41.1	40.1	42.2	41.1	
			VELOCITY	1.16	1.25	0.95	0.85	0.98	
3	Y1 + 2*(Y-2*Y1)/3	2.50	Counts	31.3	21	23	24	21	1.33 ft/s
			duration	40.7	41.1	41.3	41.0	40.1	
			VELOCITY	1.71	1.14	1.25	1.31	1.17	
4	Y - 0.5*Y1	3.50	Counts	37.5	37	30	19	21	1.56 ft/s
			duration	40.4	41.1	41.4	41.0	42.0	
			VELOCITY	2.07	2.00	1.62	1.04	1.12	
5	Y - 0.5*Y1	4.40	Counts	19	36	30	15	16	1.23 ft/s
			duration	40.5	40.0	40.8	40.1	41.6	
			VELOCITY	1.05	2.00	1.64	0.84	0.87	

Total Average Integrated Velocity = 1.02 ft/s
Total Computed FLOW RATE = 41 cfs (= B * Y * V)

Surface Direction at Measurement Location (4- feet Upstream of Trashrack and 2.5 feet d/s of CL Brail Exit):



Notes

The depth was made slightly deeper to assure submergence of upper gaps in 10" baffle.

BONNEVILLE AFF VELOCITY DATA													
AFF EXIT CHANNEL U/S of SLOPING TRASHRACK & D/S of BRAIL EXIT													
Date:	3-Feb-14	Time:	start 10:30		Data Collectors:								
TEST NUMBER		8a		Valve 15	Head on Control Weir = <input style="width: 50px;" type="text"/> feet								
Exit Ladder Head (ft)	Valve 2 Oper.	Stop Log Weir Height		US Bulhead Opening	Head on Weir (in)	Valve 15 Operation							
	% Open	Final				Valve 14		Distance to WS (in)					
	1.0	48%	East Weir			9' 4"	% Open	% Open	U/S	D/S	DH (ft)		
		South Weir	9' 4"	full	0	73							
INSTRUMENT		Price Meter <input style="width: 50px;" type="text"/> X		Price Meter Rotations per Count = <input style="width: 50px;" type="text"/> 1									
POINT VELOCITY AND FLOW MEASUREMENTS:													
Y = Measured Channel Depth =		<input style="width: 50px;" type="text"/> 2.1 ft		B = Channel Width =		<input style="width: 50px;" type="text"/> 8.00 ft							
WS = Water Surface Elevation =		<input style="width: 50px;" type="text"/> 44.1 ft (= Y + 39)		Work Platform Grating EL =		<input style="width: 50px;" type="text"/> 45.0 ft							
				Zi = INVERT =		<input style="width: 50px;" type="text"/> 42.0 ft							
X1 = Side Edge width incr =		2 ft		Aprox internal dimension =		1.5 ft		Div by					
Y1 = Vertical edge height incr =		2 ft		Number of Internal X Increments =		4.0		8					
				Number of Internal Y Increments =		2.0		4					
Horiz. No.:	Formula for depth below surface (pm)	Depth from Surface (ft)	Vert. Sect. No. : Actual Dist (ft) from Right side	1	2	3	4	5	Average Velocity				
1	0.5 * Y1	1.00	Counts	25	30	59	70	62					
				duration	41.1	41.7	40.4	40.5	40.8				
				VELOCITY	-1.36	1.60	3.24	3.83	3.37	2.33 ft/s			
Total Average Integrated Velocity =				2.33 ft/s									
Total Computed FLOW RATE =				39 cfs (= B * Y * V)									

BONNEVILLE AFF VELOCITY DATA

AFF EXIT CHANNEL U/S of SLOPING TRASHRACK & D/S of BRAIL EXIT

Date: 16-Apr-13 Time: 10:40 start

TEST NUMBER 5

Head on Control Weir = 1 feet

Data Collectors: JGR, SJS, JMA (assumed)

18" Deep Baffle (2013 Operation)
100% Floor Plating

Exit Ladder Head (ft)	Valve 2 Oper. % Open	Stop Log Weir Height		Head on Weir (in)	Valve 14 % Open	Valve 15 Operation			
		Initial	Modified			Distance to WS (in)			
1.15	50%	East Weir 9' 4"	9' 4"	8	0	% Open 84	U/S 14.0	D/S 33.0	DH (ft) 1.7
		South Weir 9' 8"	9' 4"	8	0				

INSTRUMENT Price Meter X Price Meter Rotations per Count = 1
 $V = 0.0178 + 2.2048 * (\text{rotations/time})$

POINT VELOCITY AND FLOW MEASUREMENTS:

Y = Measured Channel Depth = 4.95 ft
 WS = Water Surface Elevation = 43.95 ft (= Y + 39)
 B = Channel Width = 8.00 ft
 Work Platform Grating EL = 45.0 ft
 Zi = Grating INVERT = 39.0 ft

X1 = Side Edge width incr = 2 ft
 Y1 = Vertical edge height incr = 2 ft

Approx internal dimension = 1.5 ft
 Number of Internal X Increments = 4.0
 Number of Internal Y Increments = 2.0

Div by 8
 4

Horiz. No.:	Formula for depth below surface (pm)	Depth from Surface (ft)	Vert. Sect. No. : Actual Dist (ft) from Right side	1	2	3	4	5	Average Velocity
				1	0.5 * Y1	1.00	Counts	9	
			duration	40.3	41.9	41.4	44.0	40.4	
			VELOCITY	-0.51	0.65	0.71	0.72	1.00	
2	Y1 + (Y-2*Y1)/3	1.50	Counts	10	9	10	13	22	0.47 ft/s
			duration	43.0	41.2	44.8	40.8	40.7	
			VELOCITY	-0.53	0.50	0.51	0.72	1.21	
3	Y1 + 2*(Y-2*Y1)/3	2.50	Counts	15	13	13	19	29	1.02 ft/s
			duration	40.2	40.8	43.3	40.2	41.2	
			VELOCITY	0.84	0.72	0.68	1.06	1.57	
4	Y - 0.5*Y1	3.50	Counts	28	23	24	29	29	1.46 ft/s
			duration	41.1	41.8	40.6	41.7	40.9	
			VELOCITY	1.52	1.23	1.32	1.55	1.58	
5	Y - 0.5*Y1	4.30	Counts	38	43	42	44	38	2.23 ft/s
			duration	41.2	40.0	40.0	40.1	40.6	
			VELOCITY	2.05	2.39	2.33	2.44	2.08	

Total Average Integrated Velocity = 1.08 ft/s
Total Computed FLOW RATE = 43 cfs (= B * Y * V) #DIV/0!

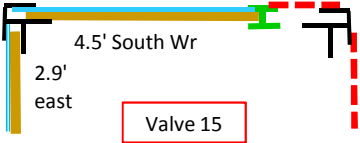
Surface Direction at Measurement Location (4- feet Upstream of Trashrack and 2.5 feet d/s of CL Brail Exit):

Notes (1) Clockwise surface eddy remains in spite of addition of side vertical plate between baffle and ledge; (2) Significant flow through vertical side trashrack between main sloping trashrack and brail pool; (3) Flow 2 - 2.5 feet and lower was in positive (downstream direction); (4) Surface flow d/s of baffle is stronger on west (concrete) side of channel.

BONNEVILLE AFF VELOCITY DATA

AFF EXIT CHANNEL U/S of SLOPING TRASHRACK & D/S of BRAIL EXIT

Date: 16-Apr-13 Time: 14:00 start



4.5' South Wr
2.9' east
Valve 15

Data Collectors: JGR SJS JMA

TEST NUMBER: 5a

Head on Control Weir = 1.0 feet

Exit Ladder Head (ft)	Valve 2 Oper. % Open	Stop Log Weir Height		Head on Weir (in)	Valve 14 % Open	Valve 15 Operation			
		Initial	Modified			Distance to WS (in)			
1.15	50%	East Weir 9 ft	9' 4"	8	% Open	% Open	U/S	D/S	DH (ft)
		South Weir 9' 8"	9' 4"	8	0	84	14.0	33.0	1.7

INSTRUMENT Price Meter X

Price Meter Rotations per Count = 1

$V = 0.0178 + 2.2048 * (\text{rotations/time})$

POINT VELOCITY AND FLOW MEASUREMENTS:

Y = Measured Channel Depth = 2.0 ft

WS = Water Surface Elevation = 44.0 ft (= Y + 39)

B = Channel Width = 8.00 ft

Work Platform Grating EL = 45.0 ft

Zi = INVERT = 42.0 ft

X1 = Side Edge width incr = 2 ft

Y1 = Vertical edge height incr = 2 ft

Aprox internal dimension = 1.5 ft

Number of Internal X Increments = 4.0

Number of Internal Y Increments = 2.0

Div by 8

Div by 4

Horiz. No.:	Formula for depth below surface (pm)	Depth from Surface (ft)	Vert. Sect. No. : Actual Dist (ft) from Right side	1	2	3	4	5	Average Velocity
1	0.5 * Y1	1.00		1.3	2.5	3.3	5.2	7.0	
			Counts	23	54	73	78	78	
			duration	40.8	40.6	40.5	40.1	40.2	
			VELOCITY	-1.26	2.95	3.99	4.31	4.30	2.97 ft/s

Total Average Integrated Velocity = 2.97 ft/s

Total Computed FLOW RATE = 47 cfs (= B * Y * V)

BONNEVILLE AFF VELOCITY DATA

AFF EXIT CHANNEL U/S of SLOPING TRASHRACK & D/S of BRAIL EXIT

Date: Time: start

TEST NUMBER

Head on Control Weir = feet

Data Collectors: SCS, JGR, SJS

assumed

STRUCTURAL CHANGES SINCE PREVIOUS TEST Feb 3, 2014: (4) **BYPASS OPERATION - NO FLOW OPERATION**

Exit Ladder Head (ft)	Valve 2 Oper. % Open	Stop Log Weir Height		US Bulkhead Opening	Head on Weir (in)	Valve 15 Operation			
		Final				Valve 14 % Open	Distance to WS (in)		
		East Weir	South Weir			% Open	U/S	D/S	DH (ft)
1.0	35%	9' 4"	9' 4"	Full open		0	0%		

INSTRUMENT Price Meter Price Meter Rotations per Count =
 $V = 0.0178 + 2.2048 * (\text{rotations/time})$

POINT VELOCITY AND FLOW MEASUREMENTS:

Y = Measured Channel Depth = ft

WS = Water Surface Elevation = ft (= Y + 39)

B = Channel Width = ft

Work Platform Grating EL = ft

Zi = Grating INVERT = ft

Total Average Integrated Velocity = **0.00** ft/s

Total Computed FLOW RATE = **0** cfs

Average Total Velocity = **0.00**

Notes Closure of Valve 15 adssured 0 flow into EXIT Channel; higher depth (9" above 5') resulted from this operation.

BONNEVILLE AFF VELOCITY DATA

AFF EXIT CHANNEL U/S of SLOPING TRASHRACK & D/S of BRAIL EXIT

Date: Time: start

TEST NUMBER **9-B**

4.5' South Wr
2.9' east
Valve 15

Data Collectors: SCS, JGR, SJS

Head on Control Weir = feet

STRUCTURAL CHANGES SINCE PREVIOUS TEST Feb 3, 2014: (4) **BYPASS OPERATION**

Exit Ladder Head (ft)	Valve 2 Oper. % Open	Stop Log Weir Height		US Bulkhead Opening	Head on Weir (in)	Valve 15 Operation			
		Final	East Weir			South Weir	Valve 14 % Open	Distance to WS (in)	
1.0	35%	9' 4"	9' 4"	Full open	0	20%	10.0	10.0	0.0

INSTRUMENT Price Meter Price Meter Rotations per Count =
 $V = 0.0178 + 2.2048 * (\text{rotations/time})$

POINT VELOCITY AND FLOW MEASUREMENTS:

Y = Measured Channel Depth = ft
 WS = Water Surface Elevation = ft (= Y + 39)

B = Channel Width = ft
 Work Platform Grating EL = ft
 Zi = Grating INVERT = ft

X1 = Side Edge width incr = ft
 Y1 = Vertical edge height incr = ft

Aprox internal dimension = ft
 Number of Internal X Increments = Div by 8
 Number of Internal Y Increments = Div by 4

Horiz. No.:	Formula for depth below surface (pm)	Depth from Surface (ft)	Vert. Sect. No. : Actual Dist (ft) from Right side	1	2	3	4	5	Average Velocity
1	0.5 * Y1	1.00	Counts	1.0	2.5	4.0	5.2	7.0	0.10 ft/s
			duration	0	1	3	2	4	
			VELOCITY	0.00	0.05	0.17	0.12	0.18	
2	Y1 + (Y-2*Y1)/3	1.50	Counts	0	1	3	2	4	0.20 ft/s
			duration	5	4	2	3	4	
			VELOCITY	0.30	0.18	0.06	0.17	0.23	
3	Y1 + 2*(Y-2*Y1)/3	2.50	Counts	7	0	7	3	4	0.22 ft/s
			duration	43.7	0.0	56.9	41.8	49.5	
			VELOCITY	0.37	0.00	0.29	0.18	0.20	
4	Y - 0.5*Y1	3.50	Counts	9	5	4	5	6	0.32 ft/s
			duration	42.7	44.6	42.4	41.7	49.5	
			VELOCITY	0.48	0.27	0.23	0.28	0.29	
5	Y - 0.5*Y1	4.40	Counts	10	6	6	5	7	0.37 ft/s
			duration	45.7	40.2	41.6	45.9	43.9	
			VELOCITY	0.50	0.35	0.34	0.26	0.37	

Total Average Integrated Velocity = **0.23 ft/s** Average Total Velocity = **0.24**
 Total Computed FLOW RATE = **10 cfs** (= B * Y * V) Difference = **4%**

Surface Direction at Measurement Location (4- feet Upstream of Trashrack and 2.5 feet d/s of CL Brail Exit):

Notes: The depth was made slightly deeper to assure submergence of upper gaps in 10" baffle.