

GS 8 B On-Site Verification Record

GS 8 B STANDARD SETTINGS

This spreadsheet is protected, thus entry is only allowed in the drop-down boxes & bright green cells.
 To use this calculator, you will only need to input the requested information in the bright green cells from your data tags.
 The Converter type, engineering units, diameter and frequency have drop down boxes, allowing the user to simply choose from the list.
 This spreadsheet will automatically choose inch or metric (depending upon the converter), and state which GK(L) to use.
 Printing of the programming results is allowed by simply choosing "Print" through your File menu.

Important: If there is a flowrate value present at the zero setting, you must compensate to obtain proper evaluation values.
 You can zero your converter, but this might mean that you would have to redo a zero calibration once you reconnect with your primary head.
 If you are unable to redo a zero calibration after reconnecting, then you should use the offset-compensated tables on the second sheet of this spreadsheet (Calculator + Zero Compensation).

Date Recorded: 6/15/18

Serial #: A17017964

Tag #: Rose Valley Flow

Flow Tube Model #:

Commission #:

Tested by: W Doleski/J Mullins

DATA INPUT AREAS (in green)			
INPUT VARIABLES			
Converter	=	IFC 300(GK)	
Q Fullscale	=	600	USGal/min
Select Meter Dia.	=	Inch mm	
		4 100	
DN	=	100	mm
Diameter	=	4.0	inch (ref only)
I _{0%}	=	4	mA
I _{100%}	=	20	mA
P _{100%} (Hz)	=	1000	Hz
GK	=	2.4860	<use GK
GKL	=		<do not use
K	=	Value automatically chosen from K value table	

$$X = \frac{Q_{100\%} * K * F}{GK(L) * DN^2} = \frac{158127.8214}{24860} = 6.361$$

Y_{MAX} = 5.0
 Max Knob Setting D

Output Current

I = 16.577 mA

Output Frequency

Freq_{MAX} = 786.073 Hz

Calibrated Flowrate

Q = 471.644 USGal/min

GS 8 B Knob Setting	Current Output (mA)	Frequency Output (Hz)	Calculated Flowrate (USGal/min)	Observed Flowrate (USGal/min)	Deviation
0	4.00	0.00	0.00	0.000	
A	5.26	78.61	47.16	47.000	-0.35%
B	6.52	157.21	94.33	94.200	-0.14%
C	9.03	314.43	188.66	188.500	-0.08%
D	16.58	786.07	471.64	471.000	-0.14%
E					

William Doleski

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Version: Rev 1.3.2-USA

Calibration Report



ICEA

Instrument Contracting
and Engineering Association

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Rose Valley Flow Recoder

Instrument Data

Customer Name: Delcora
Instrument Tag: Rose Valley Flow Recoder
Manufacturer: Honeywell
Model Number: MiniTrend
Serial Number: 17W36000005396025
Calibrated Range: 4-20 Ma
Description: Rose Valley Discharge Flow
Instrument Accuracy: 0.5000%

Test Results

Cal. Date: 06/15/18
Next Due: 09/15/18

	As Found	As Left
Zero Error	0.0000%	0.0000%
Span Error	-0.0283%	-0.0283%
Max. Error	0.0000%	0.0000%
Min. Error	-0.0367%	-0.0367%

Calibration Data

	Low	High	Unit	Calibrator	Serial #
Input Value	4.0000	20.0000	mA	Martel MC1200	9474060
Output Value	0.0000	600.0000	GPDX1000	Visual from Chart	

Input		As Found Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	4.0000	4.0000	0.0000	0.0000	0.0000%
25%	8.0000	8.0000	150.0000	149.7900	-0.0350%
50%	12.0000	12.0000	300.0000	299.7900	-0.0350%
75%	16.0000	16.0000	450.0000	449.7800	-0.0367%
100%	20.0000	20.0000	600.0000	599.8300	-0.0283%

Input		As Left Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	4.0000	4.0000	0.0000	0.0000	0.0000%
25%	8.0000	8.0000	150.0000	149.7900	-0.0350%
50%	12.0000	12.0000	300.0000	299.7900	-0.0350%
75%	16.0000	16.0000	450.0000	449.7800	-0.0367%
100%	20.0000	20.0000	600.0000	599.8300	-0.0283%

Tag Notes

SCADA
4 mA = 0
8 mA = 150
12 mA = 301
16 mA = 452
20 mA = 600

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GS 8 B On-Site Verification Record

GS 8 B STANDARD SETTINGS

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 If you are unable to redo a zero calibration after reconnecting, then you should use the offset-compensated tables on the second sheet of this spreadsheet (Calculator + Zero Compensation).

Date Recorded: June 15, 2018

Serial #: A17017964

Tag #: Rose Valley Flow Transmitter

Flow Tube Model #: IFC 300

Commission #:

Tested by: W Doleski/J Mullins

DATA INPUT AREAS (in green)			
INPUT VARIABLES			
Converter	=	IFC 300(GK)	
Q Fullscale	=	600	USGal/min
Select Meter Dia.	=	Inch	mm
		4	100
DN	=	100	mm
Diameter	=	4.0	inch (ref only)
I _{0%}	=	4	mA
I _{100%}	=	20	mA
P _{100%} (Hz)	=	1000	Hz
GK	=	2.4860	<use GK
GKL	=		<do not use
K	=	Value automatically chosen from K value table	

$$X = \frac{Q_{100\%} * K * F}{GK(L) * DN^2} = \frac{158127.8214}{24860} = 6.361$$

$$Y_{MAX} = \begin{matrix} 5.0 \\ D \end{matrix}$$

Max Knob Setting

Output Current

I = 16.577 mA

Output Frequency

Freq MAX = 786.073 Hz

Calibrated Flowrate

Q = 471.644 USGal/min

GS 8 B Knob Setting	Current Output (mA)	Frequency Output (Hz)	Calculated Flowrate (USGal/min)	Observed Flowrate (USGal/min)	Deviation
0	4.00	0.00	0.00	0.000	
A	5.26	78.61	47.16	47.100	-0.14%
B	6.52	157.21	94.33	94.200	-0.14%
C	9.03	314.43	188.66	188.300	-0.19%
D	16.58	786.07	471.64	471.300	-0.07%
E					

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Calibration Report



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SWDCMA Flow Recorder

Instrument Data

Customer Name: Delcora
Instrument Tag: SWDCMA Flow Recorder
Manufacturer: Honeywell
Model Number: Minitrend XQ
Serial Number:
Calibrated Range: 4-20 Ma
Description: SWDCMA Flow Recorder
Instrument Accuracy: 0.5000%

Test Results

Cal. Date: 06/19/18
Next Due: 09/19/18

	As Found	As Left
Zero Error	0.0467%	0.0467%
Span Error	0.0267%	0.0267%
Max. Error	0.0467%	0.0467%
Min. Error	-0.0933%	-0.0933%

Calibration Data

	Low	High	Unit	Calibrator	Serial #
Input Value	4.0000	20.0000	mA	Martel MC1200	9474060
Output Value	0.0000	15.0000	MGD	Visual from LOI	

Input		As Found Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	4.0000	4.0000	0.0000	0.0070	0.0467%
25%	8.0000	8.0000	3.7500	3.7360	-0.0933%
50%	12.0000	12.0000	7.5000	7.4920	-0.0533%
75%	16.0000	16.0000	11.2500	11.2410	-0.0600%
100%	20.0000	20.0000	15.0000	14.9970	-0.0200%

Input		As Left Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	4.0000	4.0000	0.0000	0.0070	0.0467%
25%	8.0000	8.0000	3.7500	3.7360	-0.0933%
50%	12.0000	12.0000	7.5000	7.4920	-0.0533%
75%	16.0000	16.0000	11.2500	11.2410	-0.0600%
100%	20.0000	20.0000	15.0000	14.9970	-0.0200%

Tag Notes

LOI:
4.00 mA = 0.00 MGD
8.00 mA = 3.679 MGD
12.00 mA = 7.455 MGD
16.00 mA = 11.218 MGD
20.00 mA = 14.968 MGD

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Broomall Street Flowmeter

Instrument Data

Customer Name: Delcora
Instrument Tag: Broomall Street Flowmeter
Manufacturer: Krohne
Model Number: IFC 300
Serial Number: C13501915
Calibrated Range: 0-6100 GPM
Description: Broomall Street Flowmeter
Instrument Accuracy: 1.5000%

Test Results

Cal. Date: 09/19/18
Next Due: As Required

	As Found	As Left
Zero Error	0.0000%	-0.0062%
Span Error	0.0672%	0.0609%
Max. Error	0.0672%	0.0672%
Min. Error	-0.0480%	-0.0980%

Calibration Data

	Low	High	Unit	Calibrator	Serial #
Input Value	0.0000	6100.0000	GPM	Krohne GS8B	U1127700018808
Output Value	4.0000	20.0000	mA	Martel MC1200	9474060

Input		As Found Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	0.0000	0.0000	4.0000	4.0000	0.0000%
2.4850%	151.6300	151.9000	4.3970	4.4000	0.0232%
4.9710%	303.2600	303.0000	4.7950	4.7880	-0.0480%
9.9420%	606.5100	607.1500	5.5900	5.5940	0.0355%
49.7100%	3032.5700	3034.0000	11.9540	11.9610	0.0672%

Input		As Left Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	0.0000	0.0000	4.0000	3.9990	-0.0062%
2.4850%	151.6300	151.9000	4.3970	4.4000	0.0232%
4.9710%	303.2600	303.0000	4.7950	4.7800	-0.0980%
9.9420%	606.5100	607.1500	5.5900	5.5940	0.0355%
49.7100%	3032.5700	3034.0000	11.9540	11.9610	0.0672%

Tag Notes

GK 2.486

Shutdown:
Recorder = 0.0
mA = 4.001
FT = 0.0
LOI = 0.0

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Calibration Report



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Chester Ridley Flowmeter

Instrument Data

Customer Name: Delcora
Instrument Tag: Chester Ridley Flowmeter
Manufacturer: Krohne
Model Number: IFC 300
Serial Number: 104691375
Calibrated Range: 0-25 MGD
Description: Main Flow
Instrument Accuracy: 1.5000%

Test Results

Cal. Date: 09/21/18
Next Due: 12/21/18

	As Found	As Left
Zero Error	0.0125%	0.0125%
Span Error	0.1213%	0.1213%
Max. Error	0.1088%	0.1088%
Min. Error	0.0125%	-9.1013%

Calibration Data

	Low	High	Unit	Calibrator	Serial #
Input Value	0.0000	25.0000	MGD	Krohne GS8B	U1127700018808
Output Value	4.0000	20.0000	mA	Martel MC1200	9474060

Input		As Found Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	0.0000	0.0000	4.0000	4.0020	0.0125%
7.8800%	1.9700	1.9700	5.2600	5.2630	0.0188%
15.7600%	3.9400	3.9500	6.5210	6.5280	0.0837%
31.5600%	7.8900	7.8900	9.0490	9.0560	0.0437%
78.8800%	19.7200	19.7300	16.6270	16.6380	0.1088%

Input		As Left Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	0.0000	0.0000	4.0000	4.0020	0.0125%
7.8800%	4.2500	1.9700	5.2600	5.2630	-9.1013%
15.7600%	3.9400	3.9500	6.5210	6.5280	0.0837%
31.5600%	7.8900	7.8900	9.0490	9.0560	0.0437%
78.8800%	19.7200	19.7300	16.6270	16.6380	0.1088%

Tag Notes

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Chester Ridley Flume A Middletown

Instrument Data

Customer Name: Delcora
Instrument Tag: Chester Ridley Flume A Middletown
Manufacturer: Siemens
Model Number: Hydromanager 200
Serial Number: PBD/E1210028
Calibrated Range: 0-15 MGD
Description: Middletown Flow
Instrument Accuracy: 1.0000%

Test Results

Cal. Date: 09/21/18
Next Due: 12/21/18
Accuracy: 1.0150%
As Found
Zero Error: 0.0000%
Span Error: 0.0909%
Max. Error: 0.0909%
Min. Error: 0.0000%
As Left
Zero Error: 0.0000%
Span Error: 0.0909%
Max. Error: 0.0909%
Min. Error: 0.0000%

Calibration Data

	Low	High	Unit	Calibrator	Serial #
Input Value	0.0000	15.0000	MGD	Actual Flow	
Output Value	4.0000	15.0000	MGD	Martel MC1200	9474060

Input		As Found Data		Output	
% Value	Calculated	Actual		Calculated	Actual
0%	0.0000	0.0000		0.0000	0.0000
14.52%	2.1780	2.1780		2.1780	2.1880
					% Error
					0.0000%
					0.0909%

Output		As Left Data		Output	
% Value	Calculated	Actual		Calculated	Actual
0%	0.0000	0.0000		0.0000	0.0000
14.52%	2.1780	2.1780		2.1780	2.1880
					% Error
					0.0000%
					0.0909%

Tag Notes

Checked calibration using actual flowing conditions.
Simulated signals to the SCADA, displayed MGD indication follows:
4.00 mA = 0.038
8.00 mA = 3.774
12.00 mA = 7.547
16.00 mA = 11.288
20.00 mA = 15.066

Zero Flow Reading not obtained, Data Sheet Zero Point for Information Purposes only

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Certification ISA Level III Certified

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Chester Ridley Flume B SWDCMA

Instrument Data

Customer Name: Delcora
Instrument Tag: Chester Ridley Flume B SWDCMA
Manufacturer: Siemens
Model Number: Hydromanager 200
Serial Number: PBD/E1210029
Calibrated Range: 0-15 MGD
Description: SWDCMA Flow
Instrument Accuracy: 1.0000%

Test Results

Cal. Date: 09/21/18
Next Due: 12/21/18
Accuracy: 1.0150%
As Found
Zero Error: 0.0000%
Span Error: 0.1182%
Max. Error: 0.1182%
Min. Error: 0.0000%
As Left
Zero Error: 0.0000%
Span Error: 0.1182%
Max. Error: 0.1182%
Min. Error: 0.0000%

Calibration Data

	Low	High	Unit	Calibrator	Serial #
Input Value	0.0000	15.0000	MGD	Actual Flow	
Output Value	4.0000	15.0000	MGD	Martel MC1200	9474060

Input		As Found Data		Output	
% Value	Calculated	Actual		Calculated	Actual
0%	0.0000	0.0000		0.0000	0.0000
20.46660%	3.0700	3.0700		3.0700	3.0830

Output		As Left Data		Output	
% Value	Calculated	Actual		Calculated	Actual
0%	0.0000	0.0000		0.0000	0.0000
20.4666%	3.0700	3.0700		3.0700	3.0830

Tag Notes

Checked calibration using actual flowing conditions.
Simulated signals to the SCADA, displayed MGD indication follows:
4.00 mA = -0.052
8.00 mA = 3.7
12.00 mA = 7.457
16.00 mA = 11.190
20.00 mA = 14.965

Zero Flow Reading not obtained, Data Sheet Zero Point for Information Purposes only

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Chester Ridley Recorder

Instrument Data

Customer Name: Delcora
Instrument Tag: Chester Ridley Recorder
Manufacturer: Honeywell
Model Number: Minitrend XQ
Serial Number:
Calibrated Range: 4-20 Ma
Description: Chester Ridley Flow
Instrument Accuracy: 0.5000%

Test Results

Cal. Date: 09/21/18
Next Due: 12/21/18

	As Found	As Left
Zero Error	0.0520%	0.0520%
Span Error	0.0520%	0.0520%
Max. Error	0.0520%	0.0520%
Min. Error	-0.0400%	-0.0400%

Calibration Data

	Low	High	Unit	Calibrator	Serial #
Input Value	4.0000	20.0000	mA	Martel MC1200	9474060
Output Value	0.0000	25.0000	MGD	Visual from LOI	

Input		As Found Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	4.0000	4.0000	0.0000	0.0130	0.0520%
25%	8.0000	8.0000	6.2500	6.2400	-0.0400%
50%	12.0000	12.0000	12.5000	12.4940	-0.0240%
75%	16.0000	16.0000	18.7500	18.7470	-0.0120%
100%	20.0000	20.0000	25.0000	25.0000	0.0000%

Input		As Left Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	4.0000	4.0000	0.0000	0.0130	0.0520%
25%	8.0000	8.0000	6.2500	6.2400	-0.0400%
50%	12.0000	12.0000	12.5000	12.4940	-0.0240%
75%	16.0000	16.0000	18.7500	18.7470	-0.0120%
100%	20.0000	20.0000	25.0000	25.0000	0.0000%

Tag Notes

SCADA:
4.00 mA = -0.005 MGD
8.00 mA = 6.213 MGD
12.00 mA = 12.453 MGD
16.00 mA = 18.750 MGD
20.00 mA = 24.938 MGD

Shutdown

FT = 0.0 MGD
SCADA = 0.172
mA = 4.002
Recorder = 0.01

11299

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CHI Pit Flow Recorder

Instrument Data

Customer Name: Delcora
Instrument Tag: CHI Pit Flow Recorder
Manufacturer: Chesell
Model Number: 5100V
Serial Number: 11
Calibrated Range: 4-20 Ma
Description: CHI Pit Flow Recorder
Instrument Accuracy: 0.5000%

Test Results

Cal. Date: 09/20/18
Next Due: 12/20/18

	As Found	As Left
Zero Error	#VALUE!	#VALUE!
Span Error	#VALUE!	#VALUE!
Max. Error	#VALUE!	#VALUE!
Min. Error	#VALUE!	#VALUE!

Calibration Data

	Low	High	Unit	Calibrator	Serial #
Input Value	4.0000	20.0000	mA	Martel MC1200	9474060
Output Value	0.0000	1300.0000	GPM	Visual from Chart	

Input		As Found Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	4.0000	4.0000	0.0000	XXX	#VALUE!
25%	8.0000	8.0000	325.0000	XXX	#VALUE!
50%	12.0000	12.0000	650.0000	XXX	#VALUE!
75%	16.0000	16.0000	975.0000	XXX	#VALUE!
100%	20.0000	20.0000	1300.0000	XXX	#VALUE!

Input		As Left Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	4.0000	4.0000	0.0000	XXX	#VALUE!
25%	8.0000	8.0000	325.0000	XXX	#VALUE!
50%	12.0000	12.0000	650.0000	XXX	#VALUE!
75%	16.0000	16.0000	975.0000	XXX	#VALUE!
100%	20.0000	20.0000	1300.0000	XXX	#VALUE!

Tag Notes

Recorder Failed, no visual display

Readings on the SCADA follow:

0 = 0
325 = 327
650 = 655
975 = 984
1300 = 1312

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Eddystone Flow Recorder #2

Instrument Data

Customer Name: Delcora
Instrument Tag: Eddystone Flow Recorder #2
Manufacturer: Chesell
Model Number: 392
Serial Number: 950750713
Calibrated Range: 4-20 Ma
Description: Eddystone Flow Recorder
Instrument Accuracy: 0.5000%

Test Results

Cal. Date: 09/18/18
Next Due: 12/18/18

	As Found	As Left
Zero Error	0.0000%	0.0000%
Span Error	-0.0500%	-0.0500%
Max. Error	0.0000%	0.0000%
Min. Error	-0.0500%	-0.0500%

Calibration Data

	Low	High	Unit	Calibrator	Serial #
Input Value	4.0000	20.0000	mA	Martel MC1200	9474060
Output Value	0.0000	2000.0000	GPM	Visual from Chart	

Input		As Found Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	4.0000	4.0000	0.0000	0.0000	0.0000%
25%	8.0000	8.0000	500.0000	499.0000	-0.0500%
50%	12.0000	12.0000	1000.0000	999.0000	-0.0500%
75%	16.0000	16.0000	1500.0000	1499.0000	-0.0500%
100%	20.0000	20.0000	2000.0000	1999.0000	-0.0500%

Input		As Left Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	4.0000	4.0000	0.0000	0.0000	0.0000%
25%	8.0000	8.0000	500.0000	499.9990	0.0000%
50%	12.0000	12.0000	1000.0000	999.0000	-0.0500%
75%	16.0000	16.0000	1500.0000	1499.0000	-0.0500%
100%	20.0000	20.0000	2000.0000	1999.0000	-0.0500%

Tag Notes

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Eddystone Flow Recorder

Instrument Data

Customer Name: Delcora
Instrument Tag: Eddystone Flow Recorder
Manufacturer: Chesell
Model Number:
Serial Number:
Calibrated Range: 4-20 Ma
Description: Eddystone Flow Recorder
Instrument Accuracy: 0.5000%

Test Results

Cal. Date: 09/18/18
Next Due: 12/18/18

	As Found	As Left
Zero Error	#VALUE!	#VALUE!
Span Error	#VALUE!	#VALUE!
Max. Error	#VALUE!	#VALUE!
Min. Error	#VALUE!	#VALUE!

Calibration Data

	Low	High	Unit	Calibrator	Serial #
Input Value	4.0000	20.0000	mA	Martel MC1200	9474060
Output Value	0.0000	2000.0000	GPM	Visual from Chart	

Input		As Found Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	4.0000	4.0000	0.0000	XXX	#VALUE!
25%	8.0000	8.0000	500.0000	XXX	#VALUE!
50%	12.0000	12.0000	1000.0000	XXX	#VALUE!
75%	16.0000	16.0000	1500.0000	XXX	#VALUE!
100%	20.0000	20.0000	2000.0000	XXX	#VALUE!

Input		As Left Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	4.0000	4.0000	0.0000	XXX	#VALUE!
25%	8.0000	8.0000	500.0000	XXX	#VALUE!
50%	12.0000	12.0000	1000.0000	XXX	#VALUE!
75%	16.0000	16.0000	1500.0000	XXX	#VALUE!
100%	20.0000	20.0000	2000.0000	XXX	#VALUE!

Tag Notes

Recorder not operational reading > Range

Readings displayed on the LOI follow in GPM:

04 mA = 0.0
08 mA = 498
12 mA = 1002
16 mA = 1505
20 mA = 2009

SCADA MGD

MGD= 0.0
MGD= .72
MGD= 1.45
MGD= 2.17
MGD= 2.89

Recorder totalizers not verified

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Eddystone Flowmeter

Instrument Data

Customer Name: Delcora
Instrument Tag: Eddystone Flowmeter
Manufacturer: Krohne
Model Number: IFC090
Serial Number: 422226
Calibrated Range: 0-2000 GPM
Description: Eddystone Flowmeter
Instrument Accuracy: 1.5000%

Test Results

Cal. Date: 09/18/18
Next Due: 12/18/18

	As Found	As Left
Zero Error	0.0188%	0.0188%
Span Error	-5.9350%	-5.9350%
Max. Error	0.0188%	0.0188%
Min. Error	-5.9537%	-5.9537%

Calibration Data

	Low	High	Unit	Calibrator	Serial #
Input Value	0.0000	2000.0000	GPM	Martel MC1200	9474060
Output Value	4.0000	20.0000	mA	Krohne GS8B	U1127700018808

Input		As Found Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	0.0000	0.0000	4.0000	4.0030	0.0188%
8.7%	173.3200	167.0000	5.3860	5.3460	-0.5660%
17.3%	346.6600	335.0000	6.7730	6.6860	-1.1268%
34.7%	693.3000	669.0000	9.5460	9.3740	-2.2900%
86.7%	1733.2000	1672.0000	17.8650	17.4020	-5.9537%

Input		As Left Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	0.0000	0.0000	4.0000	4.0030	0.0188%
8.7%	173.3200	167.0000	5.3860	5.3460	-0.5660%
17.3%	346.6600	335.0000	6.7730	6.6860	-1.1268%
34.7%	693.3000	669.0000	9.5460	9.3740	-2.2900%
86.7%	1733.2000	1672.0000	17.8650	17.4020	-5.9537%

Tag Notes

Shutdown:
mA = 4.003
SCADA = 0.0
LOI = 0.0
FT = -23 GPM

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Marcus Hook Flowmeter

Instrument Data

Customer Name: Delcora
Instrument Tag: Marcus Hook Flowmeter
Manufacturer: Krohne
Model Number: IFC 090F/D/HART/6
Serial Number: A09 62974
Calibrated Range: 0-6944 GPM
Description: Marcus Hook Flow
Instrument Accuracy: 1.5000%

Test Results

Cal. Date: 09/19/18
Next Due: 12/19/18

	As Found	As Left
Zero Error	-0.0188%	-0.0188%
Span Error	-0.0188%	-0.0188%
Max. Error	0.0560%	0.0560%
Min. Error	-0.0240%	-0.0238%

Calibration Data

	Low	High	Unit	Calibrator	Serial #
Input Value	0.0000	6944.0000	GPM	Krohne GS8B	U1127700018808
Output Value	4.0000	20.0000	mA	Martel MC1200	9474060

Input		As Found Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	0.0000	0.0000	4.0000	3.9970	-0.0188%
10.5429%	732.0990	730.0000	5.6860	5.6870	-0.0240%
21.0850%	1464.1424	1465.0000	7.3730	7.3780	0.0436%
42.1700%	2928.2848	2930.0000	10.7470	10.7520	0.0560%

Input		As Left Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	0.0000	0.0000	4.0000	3.9970	-0.0188%
10.5429%	732.0900	730.0000	5.6860	5.6870	-0.0238%
21.0850%	1464.1424	1465.0000	7.3730	7.3780	0.0436%
42.1700%	2928.2848	2930.0000	10.7470	10.7520	0.0560%

Tag Notes

Shutdown:
mA = 3.997
SCADA = 0
FT = 0.0
LOI = 0

GK 4.2876

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Marcus Hook Flow Recorder

Instrument Data

Customer Name: Delcora
Instrument Tag: Marcus Hook Flow Recorder
Manufacturer: Chesell
Model Number: 5100V
Serial Number: 21932001
Calibrated Range: 4-20 Ma
Description: Marcus Hook Flow Recorder
Instrument Accuracy: 2.0000%

Test Results

Cal. Date: 09/19/18
Next Due: 12/19/18

	As Found	As Left
Zero Error	0.0000%	0.0000%
Span Error	0.0000%	0.0000%
Max. Error	0.0000%	0.0000%
Min. Error	-0.1000%	-0.1000%

Calibration Data

	Low	High	Unit	Calibrator	Serial #
Input Value	4.0000	20.0000	mA	Martel MC1200	9474060
Output Value	0.0000	10.0000	MGD	Visual from Chart	

Input		As Found Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	4.0000	4.0000	0.0000	0.0000	0.0000%
25%	8.0000	8.0000	2.5000	2.5000	0.0000%
50%	12.0000	12.0000	5.0000	4.9900	-0.1000%
75%	16.0000	16.0000	7.5000	7.5000	0.0000%
100%	20.0000	20.0000	10.0000	10.0000	0.0000%

Input		As Left Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	4.0000	4.0000	0.0000	0.0000	0.0000%
25%	8.0000	8.0000	2.5000	2.5000	0.0000%
50%	12.0000	12.0000	5.0000	4.9900	-0.1000%
75%	16.0000	16.0000	7.5000	7.5000	0.0000%
100%	20.0000	20.0000	10.0000	10.0000	0.0000%

Tag Notes

SCADA Readings in MGD follow:

0 = 0
2.5 = 2.49
5.0 = 5.00
7.5 = 7.5
10.0 = 10.00

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Rose Valley Flow Recoder

Instrument Data

Customer Name: Delcora
Instrument Tag: Rose Valley Flow Recoder
Manufacturer: Honeywell
Model Number: MiniTrend
Serial Number: 17W36000005396025
Calibrated Range: 4-20 Ma
Description: Rose Valley Discharge Flow
Instrument Accuracy: 0.5000%

Test Results

Cal. Date: 09/21/18
Next Due: 12/21/18

	As Found	As Left
Zero Error	0.0000%	0.0000%
Span Error	-0.0400%	-0.0400%
Max. Error	0.0000%	0.0000%
Min. Error	-0.0467%	-0.0467%

Calibration Data

	Low	High	Unit	Calibrator	Serial #
Input Value	4.0000	20.0000	mA	Martel MC1200	9474060
Output Value	0.0000	600.0000	GPDX1000	Visual from Chart	

Input		As Found Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	4.0000	4.0000	0.0000	0.0000	0.0000%
25%	8.0000	8.0000	150.0000	149.7900	-0.0350%
50%	12.0000	12.0000	300.0000	299.7900	-0.0350%
75%	16.0000	16.0000	450.0000	449.7200	-0.0467%
100%	20.0000	20.0000	600.0000	599.7600	-0.0400%

Input		As Left Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	4.0000	4.0000	0.0000	0.0000	0.0000%
25%	8.0000	8.0000	150.0000	149.7900	-0.0350%
50%	12.0000	12.0000	300.0000	299.7900	-0.0350%
75%	16.0000	16.0000	450.0000	449.7200	-0.0467%
100%	20.0000	20.0000	600.0000	599.7600	-0.0400%

Tag Notes

SCADA
4 mA = 0
8 mA = 150
12 mA = 300
16 mA = 450
20 mA = 600

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SWDCMA Flow Recorder

Instrument Data

Customer Name: Delcora
Instrument Tag: SWDCMA Flow Recorder
Manufacturer: Honeywell
Model Number: Minitrend XQ
Serial Number:
Calibrated Range: 4-20 Ma
Description: SWDCMA Flow Recorder
Instrument Accuracy: 0.5000%

Test Results

Cal. Date: 09/21/18
Next Due: 12/21/18

	As Found	As Left
Zero Error	0.0200%	0.0200%
Span Error	0.2067%	0.2067%
Max. Error	0.1867%	0.1867%
Min. Error	0.0200%	0.0200%

Calibration Data

	Low	High	Unit	Calibrator	Serial #
Input Value	4.0000	20.0000	mA	Martel MC1200	9474060
Output Value	0.0000	15.0000	MGD	Visual from LOI	

Input		As Found Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	4.0000	4.0000	0.0000	0.0030	0.0200%
25%	8.0000	8.0000	3.7500	3.7540	0.0267%
50%	12.0000	12.0000	7.5000	7.5130	0.0867%
75%	16.0000	16.0000	11.2500	11.2600	0.0667%
100%	20.0000	20.0000	15.0000	15.0280	0.1867%

Input		As Left Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	4.0000	4.0000	0.0000	0.0030	0.0200%
25%	8.0000	8.0000	3.7500	3.7540	0.0267%
50%	12.0000	12.0000	7.5000	7.5130	0.0867%
75%	16.0000	16.0000	11.2500	11.2600	0.0667%
100%	20.0000	20.0000	15.0000	15.0280	0.1867%

Tag Notes

LOI:
4.00 mA = 0.00 MGD
8.00 mA = 3.6975 MGD
12.00 mA = 7.465 MGD
16.00 mA = 11.150 MGD
20.00 mA = 14.920 MGD

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PS 6

Instrument Data

Customer Name: Delcora
Instrument Tag: PS 6
Manufacturer: Krohne
Model Number: IFC 300
Serial Number: A18030242
Calibrated Range: 0-36 MGD
Description: PS 6 Flow
Instrument Accuracy: 1.5000%

Test Results

Cal. Date: 10/18/19
Next Due: 12/18/19

	As Found	As Left
Zero Error	-0.0062%	-0.0062%
Span Error	-0.0062%	-0.0062%
Max. Error	-0.0062%	-0.0002%
Min. Error	-53.6602%	-0.0470%

Calibration Data

	Low	High	Unit	Calibrator	Serial #
Input Value	0.0000	36.0000	MGD	Krohne GS8B	U1127700018808
Output Value	4.0000	20.0000	mA	Martel MC1200	9474060

Input		As Found Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	0.0000	0.0000	4.0000	3.9990	-0.0062%
11.4166%	4.1100	0.9700	5.8266	4.4300	-17.4509%
22.8333%	8.2200	1.9300	7.6533	4.8650	-34.8991%
45.6388%	16.4300	9.6700	11.3022	5.7210	-53.6602%

Input		As Left Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	0.0000	0.0000	4.0000	3.9990	-0.0062%
11.4166%	4.1100	4.1000	5.8266	5.8310	-0.0002%
22.8333%	8.2200	8.2000	7.6533	7.6580	-0.0261%
45.6388%	16.4300	16.4000	11.3022	11.3080	-0.0470%

Tag Notes

Meter had incorrect GK and Pipe size.
Corrected and recalibrated

GK 4.1767

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Beech Street Flow

Instrument Data

Customer Name: Delcora
Instrument Tag: Beech Street Flow
Manufacturer: Krohne
Model Number: IFC 100
Serial Number: C11-069
Calibrated Range: 0-2000 GPM
Description: Beech Street Flow
Instrument Accuracy: 1.5000%

Test Results

Cal. Date: 12/06/18
Next Due: 12/06/19

	As Found	As Left
Zero Error	0.0063%	0.0063%
Span Error	0.0063%	0.0063%
Max. Error	0.0362%	0.0362%
Min. Error	-0.0138%	-0.0138%

Calibration Data

	Low	High	Unit	Calibrator	Serial #
Input Value	0.0000	2000.0000	GPM	GD8B	U1127700018808
Output Value	4.0000	20.0000	mA	Martel	9474060

Input		As Found Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	0.0000	0.0000	4.0000	4.0010	0.0063%
32.54%	650.8000	649.7000	9.2064	9.2210	0.0362%
65.09%	1301.8000	1300.7000	14.4144	14.4210	-0.0138%

Input		As Left Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	0.0000	0.0000	4.0000	4.0010	0.0063%
32.54%	650.8000	649.7000	9.2064	9.2210	0.0362%
65.09%	1301.8000	1300.7000	14.4144	14.4210	-0.0138%

Tag Notes

Shutdown:
mA = 4001
FT= -22
SCADA = 0.0

LOI scaled incorrectly. Scaled 0-1500 GPM, should be 0-2000 GPM

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Chester Flowmeter

Instrument Data

Customer Name: Delcora
Instrument Tag: Chester Flowmeter
Manufacturer: Krohne
Model Number: IFC090
Serial Number: 42417
Calibrated Range: 0-50 MGD
Description: Chester Flowmeter
Instrument Accuracy: 1.5000%

Test Results

Cal. Date: 12/05/18
Next Due: 12/05/19

	As Found	As Left
Zero Error	-0.0062%	-0.0062%
Span Error	0.0037%	0.0037%
Max. Error	0.0688%	0.0688%
Min. Error	-0.0513%	-0.0513%

Calibration Data

	Low	High	Unit	Calibrator	Serial #
Input Value	0.0000	50.0000	MGD	Krohne GS8B	U127700018808
Output Value	4.0000	20.0000	mA	Martel MC1200	9474060

Input		As Found Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	0.0000	0.0000	4.0000	3.9990	-0.0062%
8.78%	4.3900	4.3900	5.4048	5.4030	-0.0113%
17.58%	8.7900	8.7700	6.8128	6.8110	-0.0513%
35.14%	17.5700	17.5900	9.6224	9.6270	0.0688%
87.86%	43.9300	43.9400	18.0576	18.0560	0.0100%

Input		As Left Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	0.0000	0.0000	4.0000	3.9990	-0.0062%
8.78%	4.3900	4.3900	5.4048	5.4030	-0.0113%
17.58%	8.7900	8.7700	6.8128	6.8110	-0.0513%
35.14%	17.5700	17.5900	9.6224	9.6270	0.0688%
87.86%	43.9300	43.9400	18.0576	18.0560	0.0100%

Tag Notes

GK 4.4666

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Chester Flow Recorder

Instrument Data

Customer Name: Delcora
Instrument Tag: Chester Flow Recorder
Manufacturer: Honeywell
Model Number: Minitrend QX
Serial Number:
Calibrated Range: 4-20 Ma
Description: Chester Flow Recorder
Instrument Accuracy: 0.5000%

Test Results

Cal. Date: 12/05/18
Next Due: 12/05/19

	As Found	As Left
Zero Error	0.7800%	0.7800%
Span Error	4.6800%	4.6800%
Max. Error	3.9000%	3.9000%
Min. Error	0.7800%	0.7800%

Calibration Data

	Low	High	Unit	Calibrator	Serial #
Input Value	4.0000	20.0000	mA	Martel MC1200	9474060
Output Value	0.0000	50.0000	MGD	Visual from Chart	

Input		As Found Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	4.0000	4.0000	0.0000	0.3900	0.7800%
25%	8.0000	8.0000	12.5000	13.2800	1.5600%
50%	12.0000	12.0000	25.0000	26.1700	2.3400%
75%	16.0000	16.0000	37.5000	39.0600	3.1200%
100%	20.0000	20.0000	50.0000	51.9500	3.9000%

Input		As Left Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	4.0000	4.0000	0.0000	0.3900	0.7800%
25%	8.0000	8.0000	12.5000	13.2800	1.5600%
50%	12.0000	12.0000	25.0000	26.1700	2.3400%
75%	16.0000	16.0000	37.5000	39.0600	3.1200%
100%	20.0000	20.0000	50.0000	51.9500	3.9000%

Tag Notes

Readings displayed on the SCADA in MGD follow:

4.0 mA = 0
8.0 mA = 12.5
12.0 mA = 25.0
16.0 mA = 37.5
20.0 mA = 50.0

Shutdown:
mA = 3.998
SCADA = 0.0
Recorder = 0.0
FT = -0.6

Access code unknown to calibrate recorder
Technician
Certification

William Doleski

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Calibration Report



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Chester Ridley Flowmeter

Instrument Data

Customer Name: Delcora
Instrument Tag: Chester Ridley Flowmeter
Manufacturer: Krohne
Model Number: IFC 300
Serial Number: 104691375
Calibrated Range: 0-25 MGD
Description: Main Flow
Instrument Accuracy: 1.5000%

Test Results

Cal. Date: 12/10/18
Next Due: 03/10/19

	As Found	As Left
Zero Error	0.0063%	0.0063%
Span Error	0.0000%	0.0000%
Max. Error	0.0775%	0.0775%
Min. Error	-0.0062%	-9.1075%

Calibration Data

	Low	High	Unit	Calibrator	Serial #
Input Value	0.0000	25.0000	MGD	Krohne GS8B	U1127700018808
Output Value	4.0000	20.0000	mA	Martel MC1200	9474060

Input		As Found Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	0.0000	0.0000	4.0000	4.0010	0.0063%
7.8800%	1.9700	1.9700	5.2600	5.2620	0.0125%
15.7600%	3.9400	3.9500	6.5210	6.5270	0.0775%
31.5600%	7.8900	7.8900	9.0490	9.0520	0.0188%
78.8800%	19.7200	19.7200	16.6270	16.6260	-0.0062%

Input		As Left Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	0.0000	0.0000	4.0000	4.0010	0.0063%
7.8800%	4.2500	1.9700	5.2600	5.2620	-9.1075%
15.7600%	3.9400	3.9500	6.5210	6.5270	0.0775%
31.5600%	7.8900	7.8900	9.0490	9.0520	0.0188%
78.8800%	19.7200	19.7200	16.6270	16.6260	-0.0062%

Tag Notes

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Chester Ridley Flume A Middletown

Instrument Data

Customer Name: Delcora
Instrument Tag: Chester Ridley Flume A Middletown
Manufacturer: Siemens
Model Number: Hydorranger 200
Serial Number: PBD/E1210028
Calibrated Range: 0-15 MGD
Description: Middletown Flow
Instrument Accuracy: 1.0000%

Test Results

Cal. Date: 12/10/18
Next Due: 03/10/18
Accuracy: 1.0150%

	As Found	As Left
Zero Error	0.0000%	0.0000%
Span Error	-0.3715%	-0.3715%
Max. Error	0.0000%	0.0000%
Min. Error	-0.3715%	-0.3715%

Calibration Data

	Low	High	Unit	Calibrator	Serial #
Input Value	0.0000	15.0000	MGD	Actual Flow	
Output Value	4.0000	15.0000	MGD	Martel MC1200	9474060

Input		As Found Data		Output	
% Value	Calculated	Actual		Calculated	Actual
0%	0.0000	0.0000		0.0000	0.0000
15.90%	2.3850	2.3620		2.3860	2.3620
					% Error
					0.0000%
					-0.3715%

Output		As Left Data		Output	
% Value	Calculated	Actual		Calculated	Actual
0%	0.0000	0.0000		0.0000	0.0000
15.90%	2.3850	2.3620		2.3860	2.3620
					% Error
					0.0000%
					-0.3715%

Tag Notes

Checked calibration using actual flowing conditions.
Simulated signals to the SCADA, displayed MGD indication follows:
4.00 mA = 0.047
8.00 mA = 3.796
12.00 mA = 7.578
16.00 mA = 11.291
20.00 mA = 15.046

Zero Flow Reading not obtained, Data Sheet Zero Point for Information Purposes only
Head .73 Feet

Technician
Certification ISA Level III Certified

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Chester Ridley Flume B SWDCMA

Instrument Data

Customer Name: Delcora
Instrument Tag: Chester Ridley Flume B SWDCMA
Manufacturer: Siemens
Model Number: Hydromanager 200
Serial Number: PBD/E1210029
Calibrated Range: 0-15 MGD
Description: SWDCMA Flow
Instrument Accuracy: 1.0000%

Test Results

Cal. Date: 12/10/18
Next Due: 03/10/19
Accuracy: 1.0150%

	As Found	As Left
Zero Error	0.0000%	0.0000%
Span Error	-0.1418%	-0.1418%
Max. Error	0.0000%	0.0000%
Min. Error	-0.1418%	-0.1418%

Calibration Data

	Low	High	Unit	Calibrator	Serial #
Input Value	0.0000	15.0000	MGD	Actual Flow	
Output Value	4.0000	15.0000	MGD	Martel MC1200	9474060

Input		As Found Data		Output	
% Value	Calculated	Actual		Calculated	Actual
0%	0.0000	0.0000		0.0000	0.0000
23.08%	3.4620	3.4530		3.4620	3.4530
					% Error
					0.0000%
					-0.1418%

Output		As Left Data		Output	
% Value	Calculated	Actual		Calculated	Actual
0%	0.0000	0.0000		0.0000	0.0000
23.08%	3.4620	3.4530		3.4620	3.4530
					% Error
					0.0000%
					-0.1418%

Tag Notes

Checked calibration using actual flowing conditions.
Simulated signals to the SCADA, displayed MGD indication follows:
4.00 mA = -0.03
8.00 mA = 3.728
12.00 mA = 7.494
16.00 mA = 11.22
20.00 mA = 14.999

Zero Flow Reading not obtained, Data Sheet Zero Point for Information Purposes only
Head .93 Feet

Technician
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Chester Ridley Recorder

Instrument Data

Customer Name: Delcora
Instrument Tag: Chester Ridley Recorder
Manufacturer: Honeywell
Model Number: Minitrend XQ
Serial Number:
Calibrated Range: 4-20 Ma
Description: Chester Ridley Flow
Instrument Accuracy: 0.5000%

Test Results

Cal. Date: 12/10/18
Next Due: 03/10/19

	As Found	As Left
Zero Error	0.0160%	0.0160%
Span Error	0.0720%	0.0720%
Max. Error	0.0560%	0.0560%
Min. Error	-0.0400%	-0.0400%

Calibration Data

	Low	High	Unit	Calibrator	Serial #
Input Value	4.0000	20.0000	mA	Martel MC1200	9474060
Output Value	0.0000	25.0000	MGD	Visual from LOI	

Input		As Found Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	4.0000	4.0000	0.0000	0.0040	0.0160%
25%	8.0000	8.0000	6.2500	6.2500	0.0000%
50%	12.0000	12.0000	12.5000	12.4900	-0.0400%
75%	16.0000	16.0000	18.7500	18.7500	0.0000%
100%	20.0000	20.0000	25.0000	25.0140	0.0560%

Input		As Left Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	4.0000	4.0000	0.0000	0.0040	0.0160%
25%	8.0000	8.0000	6.2500	6.2500	0.0000%
50%	12.0000	12.0000	12.5000	12.4900	-0.0400%
75%	16.0000	16.0000	18.7500	18.7500	0.0000%
100%	20.0000	20.0000	25.0000	25.0140	0.0560%

Tag Notes

SCADA:
4.00 mA = -0.009 MGD
8.00 mA = 6.222 MGD
12.00 mA = 12.491 MGD
16.00 mA = 18.738 MGD
20.00 mA = 24.959 MGD

Shutdown

FT = 0.023 MGD
SCADA = 0.172
mA = 4.002
Recorder = 0.017

11299

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CHI Pit Flow Recorder

Instrument Data

Customer Name: Delcora
Instrument Tag: CHI Pit Flow Recorder
Manufacturer: Chesell
Model Number: 5100V
Serial Number: 11
Calibrated Range: 4-20 Ma
Description: CHI Pit Flow Recorder
Instrument Accuracy: 0.5000%

Test Results

Cal. Date: 12/06/18
Next Due: 03/06/19

	As Found	As Left
Zero Error	#VALUE!	#VALUE!
Span Error	#VALUE!	#VALUE!
Max. Error	#VALUE!	#VALUE!
Min. Error	#VALUE!	#VALUE!

Calibration Data

	Low	High	Unit	Calibrator	Serial #
Input Value	4.0000	20.0000	mA	Martel MC1200	9474060
Output Value	0.0000	1300.0000	GPM	Visual from Chart	

Input		As Found Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	4.0000	4.0000	0.0000	XXX	#VALUE!
25%	8.0000	8.0000	325.0000	XXX	#VALUE!
50%	12.0000	12.0000	650.0000	XXX	#VALUE!
75%	16.0000	16.0000	975.0000	XXX	#VALUE!
100%	20.0000	20.0000	1300.0000	XXX	#VALUE!

Input		As Left Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	4.0000	4.0000	0.0000	XXX	#VALUE!
25%	8.0000	8.0000	325.0000	XXX	#VALUE!
50%	12.0000	12.0000	650.0000	XXX	#VALUE!
75%	16.0000	16.0000	975.0000	XXX	#VALUE!
100%	20.0000	20.0000	1300.0000	XXX	#VALUE!

Tag Notes

Recorder Failed, no visual display

Readings on the SCADA follow:

0 = 0
325 = 327
650 = 655
975 = 984
1300 = 1312

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Eddystone Flow Recorder #2

Instrument Data

Customer Name: Delcora
Instrument Tag: Eddystone Flow Recorder #2
Manufacturer: Chesell
Model Number: 392
Serial Number: 950750713
Calibrated Range: 4-20 Ma
Description: Eddystone Flow Recorder
Instrument Accuracy: 0.5000%

Test Results

Cal. Date: 12/05/18
Next Due: 03/05/19

	As Found	As Left
Zero Error	0.0000%	0.0000%
Span Error	-0.0500%	-0.0500%
Max. Error	0.0000%	0.0000%
Min. Error	-0.0500%	-0.0500%

Calibration Data

	Low	High	Unit	Calibrator	Serial #
Input Value	4.0000	20.0000	mA	Martel MC1200	9474060
Output Value	0.0000	2000.0000	GPM	Visual from Chart	

Input		As Found Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	4.0000	4.0000	0.0000	0.0000	0.0000%
25%	8.0000	8.0000	500.0000	500.0000	0.0000%
50%	12.0000	12.0000	1000.0000	1000.0000	0.0000%
75%	16.0000	16.0000	1500.0000	1500.0000	0.0000%
100%	20.0000	20.0000	2000.0000	1999.0000	-0.0500%

Input		As Left Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	4.0000	4.0000	0.0000	0.0000	0.0000%
25%	8.0000	8.0000	500.0000	500.0000	0.0000%
50%	12.0000	12.0000	1000.0000	1000.0000	0.0000%
75%	16.0000	16.0000	1500.0000	1500.0000	0.0000%
100%	20.0000	20.0000	2000.0000	1999.0000	-0.0500%

Tag Notes

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Eddystone Flow Recorder

Instrument Data

Customer Name: Delcora
Instrument Tag: Eddystone Flow Recorder
Manufacturer: Chesell
Model Number:
Serial Number:
Calibrated Range: 4-20 Ma
Description: Eddystone Flow Recorder
Instrument Accuracy: 0.5000%

Test Results

Cal. Date: 12/05/18
Next Due: 03/05/19

	As Found	As Left
Zero Error	#VALUE!	#VALUE!
Span Error	#VALUE!	#VALUE!
Max. Error	#VALUE!	#VALUE!
Min. Error	#VALUE!	#VALUE!

Calibration Data

	Low	High	Unit	Calibrator	Serial #
Input Value	4.0000	20.0000	mA	Martel MC1200	9474060
Output Value	0.0000	2000.0000	GPM	Visual from Chart	

Input		As Found Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	4.0000	4.0000	0.0000	XXX	#VALUE!
25%	8.0000	8.0000	500.0000	XXX	#VALUE!
50%	12.0000	12.0000	1000.0000	XXX	#VALUE!
75%	16.0000	16.0000	1500.0000	XXX	#VALUE!
100%	20.0000	20.0000	2000.0000	XXX	#VALUE!

Input		As Left Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	4.0000	4.0000	0.0000	XXX	#VALUE!
25%	8.0000	8.0000	500.0000	XXX	#VALUE!
50%	12.0000	12.0000	1000.0000	XXX	#VALUE!
75%	16.0000	16.0000	1500.0000	XXX	#VALUE!
100%	20.0000	20.0000	2000.0000	XXX	#VALUE!

Tag Notes

Recorder not operational reading > Range

Readings displayed on the LOI follow in GPM:

04 mA = 0.0
08 mA = 501
12 mA = 1004
16 mA = 1506
20 mA = 2010

SCADA MGD

MGD= 0.0
MGD= .72
MGD= 1.45
MGD= 2.17
MGD= 2.90

Recorder totalizers not verified

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Eddystone Flowmeter

Instrument Data

Customer Name: Delcora
Instrument Tag: Eddystone Flowmeter
Manufacturer: Krohne
Model Number: IFC090
Serial Number: 422226
Calibrated Range: 0-2000 GPM
Description: Eddystone Flowmeter
Instrument Accuracy: 1.5000%

Test Results

Cal. Date: 12/05/18
Next Due: 03/05/19

	As Found	As Left
Zero Error	0.0188%	0.0188%
Span Error	-7.3287%	-7.3287%
Max. Error	0.0188%	0.0188%
Min. Error	-7.3475%	-7.3475%

Calibration Data

	Low	High	Unit	Calibrator	Serial #
Input Value	0.0000	2000.0000	GPM	Martel MC1200	9474060
Output Value	4.0000	20.0000	mA	Krohne GS8B	U1127700018808

Input		As Found Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	0.0000	0.0000	4.0000	4.0030	0.0188%
8.7%	173.3200	166.0000	5.3860	5.3340	-0.6910%
17.3%	346.6600	332.0000	6.7730	6.6660	-1.4018%
34.7%	693.3000	664.0000	9.5460	9.3270	-2.8338%
86.7%	1733.2000	1658.0000	17.8650	17.2910	-7.3475%

Input		As Left Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	0.0000	0.0000	4.0000	4.0030	0.0188%
8.7%	173.3200	166.0000	5.3860	5.3340	-0.6910%
17.3%	346.6600	332.0000	6.7730	6.6660	-1.4018%
34.7%	693.3000	664.0000	9.5460	9.3270	-2.8338%
86.7%	1733.2000	1658.0000	17.8650	17.2910	-7.3475%

Tag Notes

Recommend head replacement

Shutdown:
mA = 4.003
SCADA = 0.0
LOI = 0.0
FT = -10 GPM

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Marcus Hook Flowmeter

Instrument Data

Customer Name: Delcora
Instrument Tag: Marcus Hook Flowmeter
Manufacturer: Krohne
Model Number: IFC 090F/D/HART/6
Serial Number: A09 62974
Calibrated Range: 0-6944 GPM
Description: Marcus Hook Flow
Instrument Accuracy: 1.5000%

Test Results

Cal. Date: 12/06/18
Next Due: 03/06/19

	As Found	As Left
Zero Error	-0.0312%	-0.0312%
Span Error	-0.0312%	-0.0312%
Max. Error	0.0579%	0.0579%
Min. Error	-0.0312%	-0.0312%

Calibration Data

	Low	High	Unit	Calibrator	Serial #
Input Value	0.0000	6944.0000	GPM	Krohne GS8B	U1127700018808
Output Value	4.0000	20.0000	mA	Martel MC1200	9474060

Input		As Found Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	0.0000	0.0000	4.0000	3.9950	-0.0312%
10.5429%	732.0990	733.0000	5.6860	5.6810	-0.0183%
21.0850%	1464.1424	1465.0000	7.3730	7.3740	0.0186%
42.1700%	2928.2848	2931.0000	10.7470	10.7500	0.0579%

Input		As Left Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	0.0000	0.0000	4.0000	3.9950	-0.0312%
10.5429%	732.0900	733.0000	5.6860	5.6810	-0.0181%
21.0850%	1464.1424	1465.0000	7.3730	7.3740	0.0186%
42.1700%	2928.2848	2931.0000	10.7470	10.7500	0.0579%

Tag Notes

Shutdown:
mA = 3.996
SCADA = 0
FT = 0.0
LOI = 0

GK 4.2876

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Marcus Hook Flow Recorder

Instrument Data

Customer Name: Delcora
Instrument Tag: Marcus Hook Flow Recorder
Manufacturer: Chesell
Model Number: 5100V
Serial Number: 21932001
Calibrated Range: 4-20 Ma
Description: Marcus Hook Flow Recorder
Instrument Accuracy: 2.0000%

Test Results

Cal. Date: 12/06/18
Next Due: 03/06/19

	As Found	As Left
Zero Error	0.0000%	0.0000%
Span Error	0.0000%	0.0000%
Max. Error	0.0000%	0.0000%
Min. Error	-0.1000%	-0.1000%

Calibration Data

	Low	High	Unit	Calibrator	Serial #
Input Value	4.0000	20.0000	mA	Martel MC1200	9474060
Output Value	0.0000	10.0000	MGD	Visual from Chart	

Input		As Found Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	4.0000	4.0000	0.0000	0.0000	0.0000%
25%	8.0000	8.0000	2.5000	2.5000	0.0000%
50%	12.0000	12.0000	5.0000	4.9900	-0.1000%
75%	16.0000	16.0000	7.5000	7.5000	0.0000%
100%	20.0000	20.0000	10.0000	10.0000	0.0000%

Input		As Left Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	4.0000	4.0000	0.0000	0.0000	0.0000%
25%	8.0000	8.0000	2.5000	2.5000	0.0000%
50%	12.0000	12.0000	5.0000	4.9900	-0.1000%
75%	16.0000	16.0000	7.5000	7.5000	0.0000%
100%	20.0000	20.0000	10.0000	10.0000	0.0000%

Tag Notes

SCADA Readings in MGD follow:

0 = 0
2.5 = 2.50
5.0 = 5.00
7.5 = 7.51
10.0 = 10.01

Technician ISA Level III
Certification

William Doleski

Technician Signature

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Reason: I have reviewed this document

Calibration Report



ICEA

Instrument Contracting
and Engineering Association

Smith Instrument Company, Inc.
P.O. Box 404
Downingtown, PA 19335
Phone: 610-594-6650
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Price Street Flow

Instrument Data

Customer Name: Delcora
Instrument Tag: Price Street Flow
Manufacturer: Krohne
Model Number: IFC300
Serial Number: C092563
Calibrated Range: 0-2083 GPM
Description: Price Street Flow
Instrument Accuracy: 1.5000%

Test Results

Cal. Date: 12/05/18
Next Due: 12/05/19

	As Found	As Left
Zero Error	0.0000%	0.0000%
Span Error	0.1660%	0.1660%
Max. Error	0.1660%	0.1660%
Min. Error	0.0000%	0.0000%

Calibration Data

	Low	High	Unit	Calibrator	Serial #
Input Value	0.0000	2083.0000	GPM	GS8B	U1127700018808
Output Value	4.0000	20.0000	mA	Martel	9474060

Input		As Found Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	0.0000	0.0000	4.0000	4.0000	0.0000%
6.47%	134.7701	135.5000	5.0352	5.0390	0.0588%
12.94%	269.5402	269.7000	6.0704	6.0730	0.0239%
25.88%	539.0804	539.7000	8.1408	8.1470	0.0685%
64.67%	1346.9928	1348.7000	14.3466	14.3600	0.1660%

Input		As Left Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	0.0000	0.0000	4.0000	4.0000	0.0000%
6.47%	134.7701	135.5000	5.0352	5.0390	0.0588%
12.94%	269.5402	269.7000	6.0704	6.0730	0.0239%
25.88%	539.0804	539.7000	8.1408	8.1470	0.0685%
64.67%	1346.9928	1348.7000	14.3466	14.3600	0.1660%

Tag Notes

Shutdown:
mA = 4001
FT= 0.0
SCADA = 0.0

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Rose Valley Flowmeter

Instrument Data

Customer Name: Delcora
Instrument Tag: Rose Valley Flowmeter
Manufacturer: Krohne
Model Number: IFC 300
Serial Number: A17017964
Calibrated Range: 0-600 GPM
Description: Rose Valley Flowmeter
Instrument Accuracy: 1.5000%

Test Results

Cal. Date: 12/07/18
Next Due: 03/07/19

	As Found	As Left
Zero Error	-0.0062%	-0.0062%
Span Error	0.0621%	0.0621%
Max. Error	0.0775%	0.0775%
Min. Error	-0.0062%	-0.0062%

Calibration Data

	Low	High	Unit	Calibrator	Serial #
Input Value	0.0000	600.0000	GPM	Krohne GS8B	U1127700018808
Output Value	4.0000	20.0000	mA	Martel MC1200	9474060

Input		As Found Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	0.0000	0.0000	4.0000	3.9990	-0.0062%
7.8600%	47.1600	47.4000	5.2570	5.2630	0.0775%
15.7200%	94.3300	94.5000	6.5150	6.5160	0.0346%
31.4700%	188.6600	188.6000	9.0300	9.0320	0.0025%
78.6000%	471.6400	471.9000	16.5770	16.5810	0.0683%

Input		As Left Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	0.0000	0.0000	4.0000	3.9990	-0.0062%
7.8600%	47.1600	47.4000	5.2570	5.2630	0.0775%
15.7200%	94.3300	94.5000	6.5150	6.5160	0.0346%
31.4700%	188.6600	188.6000	9.0300	9.0320	0.0025%
78.6000%	471.6400	471.9000	16.5770	16.5810	0.0683%

Tag Notes

GK 2.486

Shutdown:
Recorder = 0.21
mA = 3.999
FT = 0.0
LOI = 0.0
SCADA = 1

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Calibration Report



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Rose Valley Flow Recoder

Instrument Data

Customer Name: Delcora
Instrument Tag: Rose Valley Flow Recoder
Manufacturer: Honeywell
Model Number: MiniTrend
Serial Number: 17W36000005396025
Calibrated Range: 4-20 Ma
Description: Rose Valley Discharge Flow
Instrument Accuracy: 0.5000%

Test Results

Cal. Date: 12/07/18
Next Due: 03/07/19

	As Found	As Left
Zero Error	-0.0167%	-0.0167%
Span Error	0.0117%	0.0117%
Max. Error	0.1667%	0.1667%
Min. Error	-0.0167%	-0.0167%

Calibration Data

	Low	High	Unit	Calibrator	Serial #
Input Value	4.0000	20.0000	mA	Martel MC1200	9474060
Output Value	0.0000	600.0000	GPDX1000	Visual from Chart	

Input		As Found Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	4.0000	4.0000	0.0000	-0.1000	-0.0167%
25%	8.0000	8.0000	150.0000	149.9300	-0.0117%
50%	12.0000	12.0000	300.0000	301.0000	0.1667%
75%	16.0000	16.0000	450.0000	450.0300	0.0050%
100%	20.0000	20.0000	600.0000	600.1700	0.0283%

Input		As Left Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	4.0000	4.0000	0.0000	-0.1000	-0.0167%
25%	8.0000	8.0000	150.0000	149.9300	-0.0117%
50%	12.0000	12.0000	300.0000	301.0000	0.1667%
75%	16.0000	16.0000	450.0000	450.0300	0.0050%
100%	20.0000	20.0000	600.0000	600.1700	0.0283%

Tag Notes

SCADA
4 mA = 1
8 mA = 151
12 mA = 300
16 mA = 452
20 mA = 600

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Stadium Pump Station

Instrument Data

Customer Name: Delcora
Instrument Tag: Stadium Pump Station
Manufacturer: Krohne
Model Number: IFC300
Serial Number: C10-1035
Calibrated Range: 0-1500 GPM
Description: Stadium Pump Station
Instrument Accuracy: 1.5000%

Test Results

Cal. Date: 12/07/18
Next Due: 12/07/19

	As Found	As Left
Zero Error	0.0479%	-0.0188%
Span Error	0.0479%	-0.0188%
Max. Error	0.3171%	0.3171%
Min. Error	-0.1058%	-0.1058%

Calibration Data

	Low	High	Unit	Calibrator	Serial #
Input Value	0.0000	1500.0000	GPM	GS8B	U1127700018808
Output Value	4.0000	20.0000	mA	Martel	9474060

Input		As Found Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	0.0000	1.0000	4.0000	3.9970	0.0479%
21.15%	317.2500	318.6000	7.3840	7.3950	0.1587%
42.30%	634.5000	631.6000	10.7680	10.7820	-0.1058%
84.60%	1269.0000	1271.6000	17.5360	17.5590	0.3171%

Input		As Left Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	0.0000	0.0000	4.0000	3.9970	-0.0188%
21.15%	317.2500	318.6000	7.3840	7.3950	0.1587%
42.30%	634.5000	631.6000	10.7680	10.7820	-0.1058%
84.60%	1269.0000	1271.6000	17.5360	17.5590	0.3171%

Tag Notes

Shutdown:
mA = 3.998
FT= 0.0
SCADA = 0.0

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SWDCMA Flow Recorder

Instrument Data

Customer Name: Delcora
Instrument Tag: SWDCMA Flow Recorder
Manufacturer: Honeywell
Model Number: Minitrend XQ
Serial Number:
Calibrated Range: 4-20 Ma
Description: SWDCMA Flow Recorder
Instrument Accuracy: 0.5000%

Test Results

Cal. Date: 12/10/18
Next Due: 03/10/19

	As Found	As Left
Zero Error	0.0667%	0.0667%
Span Error	0.6000%	0.6000%
Max. Error	0.5333%	0.5333%
Min. Error	0.0667%	0.0667%

Calibration Data

	Low	High	Unit	Calibrator	Serial #
Input Value	4.0000	20.0000	mA	Martel MC1200	9474060
Output Value	0.0000	15.0000	MGD	Visual from LOI	

Input		As Found Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	4.0000	4.0000	0.0000	0.0100	0.0667%
25%	8.0000	8.0000	3.7500	3.7700	0.1333%
50%	12.0000	12.0000	7.5000	7.5400	0.2667%
75%	16.0000	16.0000	11.2500	11.3100	0.4000%
100%	20.0000	20.0000	15.0000	15.0800	0.5333%

Input		As Left Data		Output	
% Value	Calculated	Actual	Calculated	Actual	% Error
0%	4.0000	4.0000	0.0000	0.0100	0.0667%
25%	8.0000	8.0000	3.7500	3.7700	0.1333%
50%	12.0000	12.0000	7.5000	7.5400	0.2667%
75%	16.0000	16.0000	11.2500	11.3100	0.4000%
100%	20.0000	20.0000	15.0000	15.0800	0.5333%

Tag Notes

LOI:
4.00 mA = 0.00 MGD
8.00 mA = 3.74 MGD
12.00 mA = 7.51 MGD
16.00 mA = 11.25 MGD
20.00 mA = 14.98 MGD

William Doleski

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CSL Field Calibration/Verification Procedure

As part of the operation of flow meters, verifications of meter accuracy are to be performed on a regular basis. Regular can be defined by an interval agreed upon with the client or some other interval based on the length of the project or frequency of site visits. Generally, long term projects should be verified at least quarterly and short term projects, monthly.

Below is the procedure for performing meter calibrations. This procedure only defines the required result and any specific equipment function issues should be referred to the equipment manual or the manufacturer technical support department.

Manually Downloaded Meters

This method should be used for any meter that cannot be interrogated remotely by the data analyst. The field technician should use the *Daily Field Download Sheet* for recording the calibration results.

- Record the date
- Record the field time, which is the local time
- Record the meter time
- Measure the depth of flow
- Record the instantaneous depth reading from the meter
- Measure the peak the velocity
- Record the instantaneous average or peak, whichever is applicable
- Note any service performed at the site, included sensor scrubbing

The resulting meter readings should be within 0.25" for depth and within 10% for peak-to-peak or average-to-average for velocity. Should be readings be outside these guidelines, troubleshoot per the manufacturer guidelines. Should this not resolve the discrepancy, notify the data manager.

Remote Connection Meters

This method should be used for any meter that can be interrogated from the office. The data analyst should use the *Daily Field Download Sheet* for single depth and velocity meters or the *Multi- Sensor Calibration Sheet* for meter types that record multiple depth and/or velocity readings.

- Fill all site visit information fields on form
- Have the field tech measure the depth of flow and record with time
- Record the time and instantaneous depth reading from the meter or fire the depth sensor, whichever is applicable. All available depth sensors should be fired and compared to the field measurement.
- Have the field tech measure the peak the velocity or have them perform a velocity profile if the depth is sufficient and record with time
- Record the time and instantaneous velocity reading from the meter or fire the velocity sensor, whichever is applicable. All available velocity sensors should be fired and compared to the field measurement.
- Note any service performed at the site, included sensor scrubbing

The resulting meter readings should be within 0.25" for depth and within 10% for peak-to-peak or average-to-average for velocity. Should be readings be outside these guidelines, troubleshoot per the manufacturer guidelines. Should this not resolve the discrepancy, notify the data manager.

Special Cases

- **Blind Verifications**
A blind verification is when a field technician's only role is to measure the depth and velocity of the flow and report the values to the data analyst. In these cases, the crew is "blind" to what the meter is reading. The data analyst will then compare the readings to current/recent data or live readings. Should the blind verification be out of tolerance, the analyst can direct the crew to perform additional blind verifications, or perform a conventional verification and/or troubleshoot as necessary.
- **Installations/Removals**
When installing or removing meters, the above calibration method should be used except that 3 consecutive verifications should be performed at 5 minute intervals.
- **Third Party Audit**
When performing a calibration at a meter that is not maintained by CSL and where CSL is to verify the meter function, the CSL Audit report should be used.

Meter Type: ISCO Telog Serial #:
Site: BROOKHAVEN MH-01

Date	Time	Meter time	Meter Depth	Field Depth	Meter Vel.	Field Vel.	Silt	Battery	Initials	Service Comments
1/2/2018	9:14			1.25		1.4	0	-	GW/CP	CB ISCO/CD
2/27/2018	8:46		1.61	1.75	1.36	1.35	0	-	GW/DN	V1
4/10/2018	15:06			1.75		1.41	0	-	GW/DN	CB Telog/CB Isco
6/4/2018	12:25		1.59	1.5	1.38	1.6	0	-	GW/CP	V1
8/14/2018	11:21			2.00		1.5	0	-	GW/DN	CD/CB Telog/Depth of Air 7.5"
10/9/2018	10:37			1.25		1.6	0	-	GW/JA	CD
12/4/2018	11:08			1.75		1.6	0	-	GW/AP	CD/CB Telog/CB Isco

Meter Type: ISCO Telog Serial #:
Site: BROOKHAVEN MH-03

Date	Time	Meter time	Meter Depth	Field Depth	Meter Vel.	Field Vel.	Silt	Battery	Initials	Service Comments
1/19/2018	10:15	-	1.17	1.25	0.59	0.6	0	-	GM/DN	CB Isco
1/23/2018	12:24	-	2.56	2.5	1.8	1.81	0	-	GW/CP	CD
3/8/2018	16:08	-	-	4.25	-	1.9	0	-	GW/SD	CB Telog
4/2/2018	10:05	-	-	2	-	1.26	0	-	GW/DG	CD
4/2/2018	10:07	-	-	2	-	1.44	-	-	GW/DG	
4/12/2018	12:19	-	-	1.75	-	0.9	0	-	GW/MS	CD
5/10/2018	-	-	-	-	-	-	-	-	GW/CP	CD/CB Isco
5/15/2018	-	-	-	-	-	-	-	-	Gary/Qasim	Download Isco/CB Isco
5/17/2018	-	-	-	-	-	-	-	-	GW/Qasim	Download Isco
6/6/2018	15:28	-	-	1.5	-	1.08	0	-	GW/CP	CD
6/22/2018	-	-	-	-	-	-	-	-	SD/MH	Scrub
7/16/2018				1.5		0.79				CB telog/CD
9/11/2018	8:55	-	-	2.75	-	1.12	0	-	SD/BA	
10/26/2018	9:10	-	-	2.5	-	0.97	0	-	SD/JA	CB Isco/Depth of Air 5"
10/30/2018	13:50	-	1.43	2.5	1.31	1.2	0	-	GW/CP	V1
10/30/2018	13:55	-	2.08	2.5	1.28	1.3	-	-	GW/CP	V2
10/30/2018	14:03	-	2.13	2.5	1.38	1.2	-	-	GW/CP	V3
12/21/2018	10:50	-	-	5.5	-	2.7	0	-	GW/AP	CD/CB Telog

Meter Type: ISCO Telog Serial #: 291601
Site: BROOKHAVEN MH-04

Date	Time	Meter time	Meter Depth	Field Depth	Meter Vel.	Field Vel.	Silt	Battery	Initials	Service Comments
1/29/2018	14:04	-	-	5.75	-	1.43	0	-	SD/CP	CD
3/26/2018	10:29	-	-	5.75	-	1.90	0	-	GW/MH	
4/5/2018	11:40	-	5.67	5.75	1.74	1.74	0	-	GW/JP	CD/V1
4/5/2018	11:43	-	6.08	6.00	1.86	1.91	0	-	GW/JP	V2
4/10/2018	14:18	-	5.41	5.50	1.60	1.50	0	-	GW/DN	V1
4/10/2018	14:29	-	5.47	5.50	1.61	1.60	0	-	GW/DN	V2
4/10/2018	14:33	-	5.44	5.50	1.63	1.54	0	-	GW/DN	V3
5/24/2018	-	-	-	-	-	-	-	-	GW/MS	CD/CB Telog/Replaced antenna
6/4/2018	13:09	-	4.87	5.00	2.10	2.20	0	-	GW/CP	V1
6/6/2018	-	-	-	-	-	-	-	-	GW/CP	DL Isco
7/20/2018	10:54	-	4.90	4.75	1.86	1.96	0	-	GW/JA	CD/V1
7/20/2018	10:58	-	4.72	4.75	2.09	2.01	0	-	GW/JA	V2
8/16/2018	14:00	-	5.46	5.50	1.79	1.83	0	-	KE/JA	CD/CB ISCO/V1
8/16/2018	14:10	-	5.74	5.75	1.86	1.82	0	-	KE/JA	V2
8/22/2018	-	-	-	-	-	-	-	-	KE/AB	Replaced antenna/Download Isco
9/10/2018	15:17	-	7.18	7.00	2.15	2.01	0	-	LP/JA	CD/V1
9/17/2018	12:40	-	5.83	5.75	1.73	1.71	0	-	GW/JA	V1
9/17/2018	12:43	-	5.80	5.75	1.63	1.62	0	-	GW/JA	V2
9/17/2018	12:46	-	5.84	5.75	1.62	1.80	0	-	GW/JA	V3
10/26/2018	9:46	-	-	6.00	-	1.48	0	-	SD/JA	CD/CB Isco/depth of air 11.5"
12/21/2018	11:24	-	-	8.50	-	2.61	0	-	GW/AP	CD/CB Telog/Download Isco

Meter Type: FloWav Telog Serial #: 291666
 Site: BROOKHAVEN MH-05

Date	Time	Meter time	Meter Depth	Field Depth	Meter Vel.	Field Vel.	Silt	Battery	Initials	Service Comments
1/25/2018	11:08	-	-	2.25	-	1.91	0	-	GW/CP	CD/CB Telog
3/22/2018	13:03	-	-	3.00	-	3.07	0	-	GW/JA	CD/CB Telog
5/1/2018	12:16	-	-	2.25	-	3.50	0	-	DM/JP	
5/15/2018	3:02	-	-	-	-	-	-	-	Gary/Qasim	CD
6/26/2018	14:16	-	-	2.00	-	3.15	0	-	GW/JA	CD/CB Telog
8/16/2018	12:48	-	-	2.00	-	2.97	0	-	KE/JA	CD/CB Telog
10/11/2018	12:28	-	-	2.00	-	3.70	0	-	GW/JA	CD
12/4/2018	11:44	-	-	2.00	-	2.71	0	-	GW/AP	CD

Meter Type: ISCO Telog Serial #:
Site: BROOKHAVEN MH-06

Date	Time	Meter time	Meter Depth	Field Depth	Meter Vel.	Field Vel.	Silt	Battery	Initials	Service Comments
1/2/2018	10:23			2.00		1.43	0		GW/CP	CD/CB Telog
2/27/2018	9:31			2.25		1.46	0		GW/DN	CD
4/24/2018	10:57			2.00		1.41	trace		GW/DG	CD/CB Telog
6/19/2018	10:05			1.75		1.36	0		MH/MS	CD/CB Telog
8/14/2018	11:59			2.00		1.45	0		GW/DN	CD
10/9/2018	11:12			2.00		1.54	0		GW/JA	CD/CB Telog
12/4/2018	12:16			2.50		1.53	0		GW/AP	CD/CB Telog

Meter Type: ISCO Telog Serial #: 292112 Site: NETHER PROVIDENCE
MH-05

DL= Download CB=Change Battery
VIS=Visual PM=Program Meter
LA=Level Adjust V =Verify Readings

[illegible]

Meter Type: ISCO Telog Serial #: 293158 Site: NETHER
PROVIDENCE MH-06

DL= Download	CB=Change Battery
VIS=Visual	PM=Program Meter
LA=Level Adjust	V =Verify Readings

[illegible]

Meter Type: ISCO Telog Serial #: 293157 Site: NETHER
PROVIDENCE MH-07

DL= Download	CB=Change Battery
VIS=Visual	PM=Program Meter
LA=Level Adjust	V =Verify Readings

[illegible]

Meter Type: ISCO Telog Serial #: 293171 Site:
NETHER PROVIDENCE MH-08

DL= Download	CB=Change Battery
VIS=Visual	PM=Program Meter
LA=Level Adjust	V =Verify Readings

[illegible]

Meter Type: ISCO Telog Serial #: 293163 Site: NETHER
PROVIDENCE MH-09

DL= Download	CB=Change Battery
VIS=Visual	PM=Program Meter
LA=Level Adjust	V =Verify Readings

[illegible]

Meter Type: FloWav Telog Serial #: 293136 Site:
Rose Valley MH-01

DL= Download CB=Change Battery
VIS=Visual PM=Program Meter
LA=Level Adjust V =Verify Readings

Date	Time	Meter time	Meter Depth	Field Depth	Meter Vel.	Field Vel.	Silt	Battery	Initials	Service Comments
1/19/2018	8:53	-	2.23	2.25	3.09	2.85	0	-	GW/DN	CB Telog/Download Isco/V1
2/2/2018	11:11	-	1.64	1.75	2.86	2.51	0	-	GW/CP	CD/V1
2/16/2018	11:51		0.75	2.00	2.38	2.45	0	-	GW/DN	CD/V1
2/16/2018	11:58		2.04	2.00	3.03	2.76	0		GW/DN	V2
3/1/2018	-	-	-	-	-	-	0	-	GW/DN	CD/CB Isco
4/10/2018	8:55	-	-	2.00	-	2.45	0	-	MH/CP	CB Isco
5/10/2018	12:08	-	2.2	2.25	1.78	1.7	0	-	GW/CP	CB Isco/CB Telog/V1
5/24/2018	12:08	-	2.02	1.75	2.88	2.7	0	-	GW/MS	CD/V1
5/24/2018	12:34	-	1.98	1.75	2.83	2.6	0	-	GW/MS	V1
6/22/2018	10:57	-	-	2.00	-	2.94	0	-	SD/MH	CD/CB Isco
6/22/2018	11:01	-	-	1.75	-	-	0	-	SD/MH	Depth of Air 13.25
7/20/2018	12:10	-	1.83	2.00	3.01	2.9	0	-	GW/JA	CD/CB Isco/V1
7/20/2018	12:14	-	1.7	2.00	2.93	2.7	0	-	GW/JA	V1
8/14/2018	-	-	-	-	-	-	0	-	GW/DN	Download Isco/CB Isco/CB Telog
9/14/2018	14:04	-	-	1.75	-	2.7	0	-	GW/JA	CD/CB Isco/Depth of Air 13"
10/29/2018	14:23	-	-	1.75	-	2.4	0	-	GW/CP	CD/CB Isco
12/4/2018	14:12		1.89	1.75	3.04	2.8	0	-	GW/AP	CD/CB Isco/V1

Meter Type: FloWav Telog Serial #: 291687 Site: Rose Valley MH-01

DL= Download CB=Change Battery
VIS=Visual PM=Program Meter
LA=Level Adjust V =Verify Readings

Date	Time	Meter time	Meter Depth	Field Depth	Meter Vel.	Field Vel.	Silt	Battery	Initials	Service Comments
2/14/2018	11:09	-	-	2.00	-	0.90	0	-	GW/CP	CD/CB Telog
4/10/2018	9:18	-	-	2.50	-	0.90	0	-	MH/CP	CB Telog
6/4/2018	14:38	-	-	2.00	-	0.80	0	-	GW/CP	CD/CB Telog
7/20/2018	13:01	-	-	2.25	-	0.60	0	-	GW/JA	CD/CB Telog
9/14/2018	15:00	-	-	2.50	-	0.60	0	-	GW/JA	CD/CB Telog/depth of air 7.5"
10/29/2018	15:16	-	-	2.00	-	0.54	0	-	GW/CP	CD/CB Telog
12/21/2018	12:54	-	-	2.50	-	0.80	0	-	GW/AP	CD/CB Telog

Meter Type: FL900 Telog Serial #: 291668
Site: SWDCMA MH-01

[illegible]

Meter Type: Flowav Telog Serial #: 294500
Site: SWDCMA MH-02

[illegible]

Meter Type: FL900 Telog Serial #: 294501
Site: SWDCMA MH-03

[illegible]

Meter Type: Flowav Telog Serial #: 294529 Site: SWDCMA MH-04

[illegible]

Meter Type: Flowav Telog Serial #: 291604 Site: SWDCMA MH-05A Pipe Size: 20"

[illegible]

Meter Type: Flowav Telog Serial #: 295713
Site: SWDCMA MH-05 Flume Pipe Size: 26"

[illegible]

Meter Type: FL900 Telog Serial #: 294496
Site: SWDCMA MH-06

[illegible]

Bethel Township Sewer Authority

Bethel Township Sewer Authority

**1082 Bethel Road
Garnet Valley, PA 19060**

TRIBUTARY MUNICIPALITY

“2018 Chapter 94 Report”

February 2019

Prepared By:

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Table of Contents

TOPIC	PAGE
1. PaDEP Chapter 94 Report Form	1
2. Introduction	5
3. Current Hydraulic Loading.....	6
4. 5 Year Hydraulic Loading Projections	7
5. Sewer Extensions.....	7
6. Program for Sanitary Sewer Monitoring, Maintenance and Repair	8
7. Condition of The Sewer System	9
8. Sewage Pumping Stations	9
9. Calibration Reports.....	11
10. Sanitary Sewer Overflows (SSO)	11

Map of Sewer System Attachment A

Flow Meter Calibration..... Attachment B

Sanitary Sewer Overflow Reports..... Attachment C



CHAPTER 94 MUNICIPAL WASTELOAD MANAGEMENT ANNUAL REPORT

For Calendar Year: 2018

- ☐ Permittee is owner and/or operator of a POTW or other sewage treatment facility
☒ Permittee is owner and/or operator of a collection system tributary to a POTW not owned/operated by permittee

GENERAL INFORMATION

Permittee Name:	Bethel Township Sewer Authority	Permit No.:	PA
Mailing Address:	1082 Bethel Road	Effective Date:	
City, State, Zip:	Garnet Valley, PA 19060	Expiration Date:	
Contact Person:	Donna Vance	Renewal Due Date:	
Title:	Chairman	Municipality:	Bethel Township
Phone:	610.358.5893	County:	Delaware County
Email:	donna@advancedesg.com	Consultant Name:	Bradford Engineering

CHAPTER 94 REPORT COMPONENTS

1. Attach to this report a line graph depicting the monthly average flows (expressed in MGD) for each month for the past 5 years and projecting the flows for the next 5 years. The graph must also include a line depicting the hydraulic design capacity per the WQM permit. (25 Pa. Code § 94.12(a)(1))

Check the appropriate boxes:

- ☐ Line graph for flows attached (**Attachment**)
☐ DEP Chapter 94 Spreadsheet used (**Attachment**)
☒ Section 1 is not applicable (report is for a collection system).

2. Attach to this report a line graph depicting the monthly average organic loads (express as lbs BOD5/day) for each month for the past 5 years and projecting the organic loads for the next 5 years. The graph must also include a line depicting the organic design capacity of the treatment plant per the WQM permit. (25 Pa. Code § 94.12(a)(2))

Check the appropriate boxes:

- ☐ Line graph for organic loads attached (**Attachment**)
☐ DEP Chapter 94 Spreadsheet used (**Attachment**)
☒ Section 2 is not applicable (report is for a collection system).

3. If the DEP Chapter 94 Spreadsheet was not used to determine projections, discuss the basis for the hydraulic and organic projections. In all cases, include a description of the time needed to expand the plant to meet the load projections, if necessary, and data used to support the projections should be included in an appendix to this report. (25 Pa. Code § 94.12(a)(3))

See Section 3 of the report

1. Attach a map showing all sewer extensions constructed within the past calendar year, sewer extensions approved or exempted in the past year in accordance with Act 537 and Chapter 71, but not yet constructed, and all known proposed projects which require public sewers but are in the preliminary planning stages. The map must be accompanied by a list summarizing each extension or project and the population to be served by the extension or project. If a sewer extension approval or proposed project includes schedules describing how the project will be completed over time, the listing should include that information and the effect this build-out-rate will have on populations served. (25 Pa. Code § 94.12(a)(4))

Check the appropriate boxes:

- ☒ Map showing sewer extensions constructed, approved/exempted but not yet constructed, and proposed projects attached (**Attachment A**)
- ☐ List summarizing each extension or project attached (**Attachment**)
- ☐ Schedules describing how each project will be completed over time and effects attached (**Attachment**)

Comments:

5. Discuss the permittee's program for sewer system monitoring, maintenance, repair and rehabilitation, including routine and special activities, personnel and equipment used, sampling frequency, quality assurance, data analyses, infiltration/inflow monitoring, and, where applicable, maintenance and control of combined sewer regulators during the past year. Attach a separate sheet if necessary. (25 Pa. Code § 94.12(a)(5))

See attached report.

6. Discuss the condition of the sewer system including portions of the system where conveyance capacity is being exceeded or will be exceeded in the next 5 years and portions where rehabilitation or cleaning is needed or is underway to maintain the integrity of the system and prevent or eliminate bypassing, CSOs, SSOs, excessive infiltration and other system problems. Attach a separate sheet if necessary. (25 Pa. Code § 94.12(a)(6))

Check the appropriate boxes:

- ☒ System experienced capacity-related bypassing, SSOs or surcharging during the report year. On a separate sheet, list the date, location, and reason for each bypass, SSO or surcharge event.
- ☐ System did not experience capacity-related bypassing, SSOs or surcharging during the report year.

Comments:

See attached report

7. Attach a discussion on the condition of sewage pumping (pump) stations. Include a comparison of the maximum pumping rate with present maximum flows and the projected 2-year maximum flows for each station. (25 Pa. Code § 94.12(a)(7))

Check the appropriate boxes:

- ☐ The collection system does not contain pump stations
☒ The collection system does contain pump stations (Number – 8)
☒ Discussion of condition of each pump station attached (**Attachment**)

8. If the sewage collection system receives industrial wastes (i.e., non-sanitary wastes), attach a report with the information listed below. (25 Pa. Code § 94.12(a)(8))

- a. A copy of any ordinance or regulation governing industrial waste discharges to the sewer system or a copy of amendments adopted since the initial submission of the ordinance or regulation under Chapter 94, if it has not previously been submitted.
- b. A discussion of the permittee's or municipality's program for surveillance and monitoring of industrial waste discharges into the sewer system during the past year.
- c. A discussion of specific problems in the sewer system or at the plant, known or suspected to be caused by industrial waste discharges and a summary of the steps being taken to alleviate or eliminate the problems. The discussion shall include a list of industries known to be discharging wastes which create problems in the plant or in the sewer system and action taken to eliminate the problem or prevent its recurrence. The report may describe pollution prevention techniques in the summary of steps taken to alleviate current problems caused by industrial waste dischargers and in actions taken to eliminate or prevent potential or recurring problems caused by industrial waste dischargers.

Check the appropriate boxes:

- ☐ Industrial waste report as described in 8 a., b. and c. attached (**Attachment**)
☐ Industrial pretreatment report as required in an NPDES permit attached (**Attachment**)

9. Existing or Projected Overload.

Check the appropriate boxes:

- ☐ This report demonstrates an existing hydraulic overload condition.
☐ This report demonstrates a projected hydraulic overload condition.
☐ This report demonstrates an existing organic overload condition.
☐ This report demonstrates a projected organic overload condition.

If one or more boxes above have been checked, attach a Corrective Action Plan (CAP) to reduce or eliminate present or projected overloaded conditions under §§ 94.21 and/or 94.22 (relating to existing overload and projected overload). (25 Pa. Code § 94.12(a)(9))

- ☐ Corrective Action Plan attached (**Attachment**)

10. Where required by the NPDES permit, attach a Sewage Sludge Management inventory that demonstrates a mass balance of solids coming in and leaving the facility over the previous calendar year.

- ☐ Sewage Sludge Management Inventory attached (**Attachment**)

11. For facilities with CSOs and where required by the NPDES permit, attach an Annual CSO Report (including satellite combined sewer systems).

☐ Annual CSO Report attached (**Attachment**)

12. For POTWs, attach a calibration report documenting that flow measuring, indicating and recording equipment has been calibrated annually. (25 Pa. Code § 94.13(b))

☐ Flow calibration report attached (**Attachment**)

RESPONSIBLE OFFICIAL CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowledge of violations. See 18 Pa. C.S. § 4904 (relating to unsworn falsification).

Donna Vance

Name of Responsible Official

Signature

610.358.5893

Telephone No.

Date

PREPARER CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared by me or otherwise under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. The information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowledge of violations. See 18 Pa. C.S. § 4904 (relating to unsworn falsification).

Walter Fazler, PE

Name of Preparer

Signature

610.497.6200

Telephone No.

2-18-19

Date

2. Introduction

The service area covered by this report includes all sections of Bethel Township that are currently served by public sewers. Maps identifying the limits of the service area and other features are included in the Appendix. The initial phase of sewer installation in the Township was completed in 1975. Major expansions of the system have been completed in four phases since 1980 along with other minor extensions completed by the Authority and subdivision developers.

Wastewater generated in Bethel Township is conveyed to two other municipalities for treatment and final disposal. Wastewater generated in Sewer District 9 is conveyed to the New Castle County (Delaware) Department of Special Services (NCCDSS) for conveyance and ultimate treatment at the wastewater treatment plant in the City of Wilmington. Sewer District 9, also known in the Township as Flat Iron Point, was the first section of the Township to receive public sewers. There are two major metered connection points to the NCCDSS system and two minor un-metered connection points. The metered points are an open channel flow meter in the Sharon Subdivision and a volume meter at the Pyle Road Pump Station. The un-metered connections are at Pinecrest Lane and four homes in the Beau Tree subdivision that connect on Belvedere Drive.

The remaining areas of the Township connect to the Southern Delaware County Authority (SDCA) system in Upper Chichester Township. These flows are ultimately conveyed to the DELCORA Western Regional Treatment Plant for final treatment and disposal. BTSA discharges to the SDCA system via the seven un-metered connection points listed below:

1. West Branch Naamans Creek Connection.
2. Naamans Creek Interceptor/Goodley Manor Connection.
3. Spring Run/DuPont Line.
4. East Branch Naamans Creek Connection.
5. Garnet Oaks Force Main (currently inactive)
6. Chelsea Road Connection.
7. Chichester Avenue Connection.

3. Current Hydraulic Loading

The sum of the average daily flows from all connection points for the year 2016 is summarized in the following tables. The flow was calculated using an average daily flow of 262.5 gallons per day per EDU for the SDCA connections. Meter flow from the two flow meter totalizers were used for the NCCDSS connections.

Connected to Southern Delaware County Authority

Note: Total is based upon billing reports and accounting of total EDUs connected

Total EDUS (2018)	2214.98 EDUs
Total Average Daily Flow	581,432 GPD

Connected to New Castle County Department of Special Services

Date		Total Flow	Days	ADF (GPD)
12/30/17	4/26/18	34,611,600	117	295,826
4/26/18	6/30/18	17,165,200	65	264,080
6/30/18	9/28/18	19,689,800	90	218,776
9/28/18	12/31/19	23,822,200	92	258,937
Total		95,288,800	364	261,782

Based on the totalizer flow meter readings at the Pyle Road Pump Station and Sharon Flow meter.

Pinecrest Drive / Beau Tree Connections

EDU Classification	Number of EDUs	Average Daily Flow (GPD)
Residential	106	27,825
Commercial	24.49	6,429
Total	130.49	34,254

4. 5 Year Hydraulic Loading Projections

The following table was developed utilizing Section 4 of this report. The flow was calculated using an average daily flow of 262.5 gallons per day per EDU.

Connected to Southern Delaware County Authority

EDU Classification	Number of EDUs	Average Daily Flow (GPD)
Total EDUS (2018)	2214.98	581,432.25
Future Residential	53	13,912.50
Future Commercial	36	9,450.00
Total	2303.98	604,794.75

Connected to New Castle County Department of Special Services

EDU Classification	Number of EDUs	Average Daily Flow (GPD)
Metered ADF		261,782
Unmetered	130.49	34,254
Future Residential	15	3,938
Commercial	0	0
Total		299,974

5. Sewer Extensions

Maps showing all sewer extensions constructed in the past calendar year, approved extensions not yet constructed, and projects in preliminary planning but not yet with Permits are included in the Appendix. The tables below present this information in tabular form.

SUBDIVISION NAME	CONNECTION POINT	TOTAL EDU'S	EDU'S CONNECTED	ESTIMATED ADF REMAINING (gpd)
<u>SDCA</u>				
ANDREW SUB	Chelsea Road	2	1	262.5
1515 LIMITED PARTNERS, L.P.	Spring Run/DuPont	48	12	9450
BANTA/BETHEL ROAD	Spring Run/DuPont	2	1	262.5
CLARK/LAUGHEAD LANE	Spring Run/DuPont	3	2	262.5
GASTER/GRAND OAK LANE	Spring Run/DuPont	3	2	262.5
IACONO CONST./LAUGHEAD LANE	Spring Run/DuPont	2	1	262.5
JENNINGS	Spring Run/DuPont	4	2	525
McCLENAHAN/LAUGHEAD LANE	Spring Run/DuPont	3	2	262.5
Garnet Mine LP	Spring Run/DuPont	38	0	9975
1386 Naamans Creek Road	W. Branch Naaman's Creek	3	0	787.5
Foult Manor	E. Branch Naaman's Creek	12	9	787.5
2012 Foult Road	E. Branch Naaman's Creek	1	0	262.5
Misc Connections	Various	61	61	0
TOTAL		182	93	23362.50
<u>NCCDSS</u>				
Linton Farm II	NCCDSS - Pyle Rd PS	6	3	787.5
SARAH BANTA-KIRK ROAD	NCCDSS-Pyle Road PS	3	1	525
Misc	Various	12	0	3150
TOTAL		21	4	4462.50

6. Program for Sanitary Sewer Monitoring, Maintenance and Repair

The following is a discussion of the Authority's program for sanitary sewer system monitoring, maintenance, repair and rehabilitation, including routine and special activities.

➤ *Collection System Operation*

The Bethel Township Sewage Collection System is monitored continuously by a team of outside contractors. In addition, the sewer system is monitored by Township employees, officials and the Police Department.

The Team includes:

KBX Golden, LLC, mechanics who visit large horsepower pump stations at least 3 times per week and smaller pump station at least weekly. All stations have telephone or radio dialers keeping mechanics apprised of any abnormal operating conditions.

Authority Engineers and Inspectors at Bradford Engineering Associates, Inc. monitor flow meters; system maintenance and repair procedures; Infiltration & Inflow Programs, etc.

➤ *Pennsylvania One Call System*

The State of Pennsylvania requires that public utilities mark the location of service lines to properties prior to any excavation on a property. Approximately 568 PaOne Call System notifications were received in 2018. Each time we visit a property to mark out the sanitary sewer, we locate and inspect the vent and any clean-out caps in the lawns. If caps are found broken, missing, or not water tight, we notify the property owners of the condition and that it must be repaired under the Township's Plumbing Codes.

➤ *Capital Improvements*

The Authority is in the process of implementing a capital improvement plan for the entire sewer system. Slated for 2019 is the replacement of the Trotters Lea and Pyle Road pump stations. These stations are over 30 years old and have reached the end of their useful life. In addition, a manhole rehabilitation program will be completed along with various easement clearing.

7. Condition of The Sewer System

Most of the Authority's interceptors are 8" diameter sewers with the exception of the DuPont Interceptor which is 10". Flows from BTSA are spread out over 10 separate connection points to adjacent systems which keeps the average flow per sewer district relatively low. Only two of the connections are metered at the present time. Both of these are for billing purposes under the treatment agreement with NCCDSS. The remainder of the system is charged on a per EDU basis by the receiving Authority. Pump Station flows are monitored via hour meter readings combined with the pump nameplate discharge capacity. Pump station capacity is discussed further in section 7.

The system is in good condition overall. There are no known surcharge conditions and most of the system is fairly new.

Sewer District 9, Flat Iron Point, is the oldest section of BTSA's system. This part of the system was completed in the early 1980's starting with the privately constructed Sharon Subdivision and extended by a major Authority project to serve the rest of District 9. The entire District was inspected under an outside CCTV contractor and was completed in 2016. The project found a number of defects, including some major infiltration leaks that were repaired by the Authority. An inspection of house laterals in the area was also completed and deficiencies were corrected.

8. Sewage Pumping Stations

The following is a discussion of the Authority's 8 pump stations. The tables below are based on hour meter readings for each pump and the nameplate output capacity listed for each pump. This method does not permit the determination of actual peak flows received by the stations. The tables indicate an estimated peak flow based on a 2.5 peaking factor. The tables also list the available peaking factor showing the ratio of pump capacity to average daily flow with one pump.

ALL FLOWS REPORTED IN GALLONS PER DAY (GPD)

PUMP STATION	PUMP CAPACITY	AVG. DAILY FLOW	PEAK DAILY FLOW	2 YR. PEAK FLOW	PUMP GPM	AVAIL. PEAK
PYLE ROAD	864,000	93,605	234,012	356,346	600	9.2
TROTTERS LEA	144,000	10,784	26,961	50,120	100	13.4
ZEBLEY ROAD	316,800	111,717	279,293	164,385	220	2.8
HEATHFEILD CLOSE	144,000	11,921	29,801	42,355	100	12.1
LUHMAN CIRCLE	144,000	1,316	3,291	1,316	100	109.4
NORTHBROOK	504,000	66,490	166,226	159,078	350	7.6
SCOTS GLEN	144,000	6,488	16,221	35,320	100	22.2
GREEN GLEN	115,200	2,562	6,405	14,978	80	45.0

NOTES:

1. PUMP CAPACITY LISTED FOR ONE PUMP RUNNING.
2. AVERAGE DAILY FLOW BASED ON HOUR METER TOTALS MULTIPLIED BY RATED PUMP CAPACITY.
3. PEAK DAILY FLOW BASED ON AVERAGE DAILY FLOW MULTIPLIED BY 2.5.
4. 2 YEAR PEAK FLOW BASED ON 2013 CHAPTER 94 GROWTH PROJECTIONS.
5. AVAILABLE PEAK = PUMP CAPACITY/AVG. DAILY FLOW

In most cases the available peak flow factor exceeds 4, a level considered conservatively safe when reviewing station capacity. This level of reserve is felt to be adequate for even the most severe wet weather conditions.

The Zebley Road Pump Station currently has an available peak flow rate of approximately 2.8. The station is projected to receive additional flows from future growth. Future flows to the station will be monitored as part of the Chapter 94 reporting process as additional growth occurs in the tributary drainage area. The Pyle Road Pump Station will also be receiving additional flows from future growth and will need to be regularly monitored.

The tables also list the two year estimated growth for each station based on the subdivision lists from Section 4. Since Bethel Township is nearly built out and there is very little land that is not served by the public sewer system, mostly fill-in connections are expected in the future.

9. Calibration Reports

Copies of the Sharon and Pyle Road meter calibration reports are included in the appendix.

10. Sanitary Sewer Overflows (SSO)

The Authority reported 1 SSO event during 2018. The event was due to a failure of the sewer pipe. None of the SSOs were capacity related. See attached reports for reference.

APPENDIX A