

TECHNICAL MEMORANDUM

TASKS 5

East Kaweah Groundwater Sustainability Agency
Groundwater Metering and Well Monitoring Program

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Introduction

This report presents the results of laboratory testing of five agricultural water flow meters installed in *non-standard configurations* that represent the worst-case scenarios for these installations. The report discusses the impetus for the testing of these flow meters in non-standard configurations, the results of the testing conducted, and the conclusions that were derived from the testing.

Background

This is the second phase of the study conducted. Phase 1, included tasks 1 – 4 of the contract and have been completed and a report was prepared to document the results of that work. Phase 1, explored the qualities of the various meters available on the market for irrigation systems and evaluated them based on agreed upon criteria. The work included testing the accuracy of each meter when installed in the manufacturer's recommended configuration. In addition to the evaluation and testing of the meters, the work also included testing and evaluation of the various telemetry and data management platforms available to the GSAs for acquiring and analyzing the data obtained from the flow meters.

This work, Phase 2, explored the impact of installing five of the meters tested in tasks 1 – 4 in non-standard installation configurations. Non-standard being defined as not installed in conformance with the manufacturer's recommendations. Flow meters tend to be sensitive to excessive turbulence in the pipeline upstream and downstream of the meter. The turbulence tends to induce errors in the meter's determination of the discharge rate. For that reason, manufacturers recommend that the meters be installed with minimum distances of straight, undisturbed pipe lengths upstream and downstream of the meter. These distances are typically expressed in pipe diameters. For instance, for a flow meter installed on a six-inch inside diameter pipeline, the upstream, undisturbed pipe length may be five diameters or 30 inches (= 5 diameters x 6 inches = 30 inches). It is common for owners to install flow meters in non-standard configurations, meaning that they do not install them with the manufacturer's recommended lengths of straight, undisturbed pipe up and downstream of the meter. This usually occurs because the meter is installed at an existing pump location that was not originally planned for a flow meter. Examples of non-standard installations are illustrated in Figures 1, 2, and 3.



Figure 1 - Meter installed 2.5 diameters downstream of a 90° bend



Figure 2 - Meter installed less than 2 diameters upstream of 90° bend



Figure 3 - Meter installed 2.5 diameters downstream of a pump discharge

Meter Testing

As was previously stated, five flow meters were tested in non-standard configurations. The five selected meters had the lowest annualized cost compared to errors in measured discharge in a standard configuration. The five selected meters, in alphabetical order are:

- Bermad Euromag 2300 magnetic meter
- Krohne WF magnetic meter
- McCrometer Duramag magnetic meter
- Seametrics AG 3000 magnetic meter
- Technoflo PS32-06 saddle propeller meter

The manufacturer's recommended installations for each of these meters are listed in Table 1 below.

Table 1 - Flow Meter Manufacturer's Recommended Installation Requirements

Flow Meter	Tested Size inches	Upstream straight, undisturbed pipe length pipe diameters	Downstream straight, undisturbed pipe length pipe diameters
Bermad Euromag 2300	6	5	3
Krohne WF	8	0	0
McCrometer Duramag	8	2	1
Seametrics AG 3000	8	2-5	1
Technoflo PS32-06	6	10	2

Testing

Each of the flow meters was tested in the Water, Energy, and Technology Laboratory of the Center for Irrigation Technology in these five different configurations:

- Check valve one diameter downstream of the flow meter
- Check valve one diameter upstream of the flow meter
- 90° Bend one diameter downstream of the flow meter
- 90° Bend one diameter upstream of the flow meter
- Simulated pump discharge upstream of the flow meter which are illustrated in the Figures 4 through 8.



Figure 4 - Krohne WF flow meter 1 diameter downstream of a check valve



Figure 5 - Seametrics AG3000 1-diameter upstream of 90 bend



Figure 6 - McCrometer flow meter 1-diameter downstream of 90 bend



**Figure 7 - Bermad Euromag flow meter
1-diameter upstream of a check valve**



**Figure 8 - Technoflos PS 36 flow meter
1-diameter downstream of a simulated pump
discharge**

Each meter was tested at discharge rates that produced 2 feet per second, 8 feet per second, and 14 feet per second average velocity in the pipe system, as determined by the continuity equation. This resulted in a total of three tests for each flow meter in each configuration and a total of 75 test runs altogether. The discharge rate was measured both by the flow meter and a calibrated Venturi flow meter (BIF Universal Venturi Tube, Model 20181). The configuration was set up in the lab, checked for water tightness, and then flow was initiated using the laboratory's pump system with water drawn from the wet well. The discharge rate was adjusted until the Venturi meter read the desired discharge rate. Each discharge rate was observed for a minimum of five minutes to ensure that the flow rate was stable. A total of 30 discharge rates were taken at the flow meter and the Venturi meter at 30-second intervals. Discharge rates were recorded for both meters in a data spreadsheet. Examples of tabs from the data collection spreadsheet are contained in the appendix A to this report. The spreadsheet was saved to a local drive and a network drive at the conclusion of each test.

The check valves used in the testing were inserted into the pipe system based on the meter size. They were:

- 6-inch, single, inline wafer check valve, polyvinyl-chloride body with flange by flange connections, Mfr. Model # WCV1600ES
- 8-inch single, inline wafer check valve, cast Iron body with flanged by flanged connections, Mfr. Model # DD1F-CI-34136-800

The 90° bends were installed in the pipe system with the same diameter as the meter to which they were associated. They were:

- 6-inch carbon steel elbow, flange by flange connections with a 6-inch bend radius
- 8-inch carbon steel elbow, flange by flange connections with an 8-inch bend radius

The simulated pump was an 8-inch diameter pump column, discharge elbow, and shaft fabricated from an existing 8-inch diameter pump. The bowels were removed and a flanged connection was welded to the bottom of the pump column to provide a connection to the pipe system. A reducer was used to connect the simulated pump discharge elbow to the 6-inch diameter flow meters.

Digital images of each installation were taken, cataloged, and uploaded to network drive.

Results

Each flow meter was tested in five configurations:

- Check Valve downstream and within one diameter of the flow meter
- Check Valve upstream and within one diameter of the flow meter
- 90° bend downstream and within one diameter of the flow meter
- 90° bend upstream and within one diameter of the flow meter
- Simulated pump upstream and within one diameter of the flow meter

Each meter was also tested at three average velocities, 2 feet per second, 8 feet per second, and 14 feet per second in each configuration.

Thirty consecutive flow meter readings were taken for each configuration and velocity to develop a population of measurements. Each population of measurements was analyzed for average error, standard deviation of the errors, coefficient of variance of the errors, and the skew of the errors. A histogram of the ranked errors was also created to visually inspect the tendency of the errors. The error results are presented for each configuration and velocity in the following tables. Error ranges plots were created for each flow meter in each configuration and for the three velocities. The average error for each configuration was plotted against the velocity for each flow meter. These graphs are presented below. The histograms and error ranges plots are included in the appendix B to this report.

Table 2 - Discharge errors from check valve downstream and within one diameter of the flow meter

Flow Meter	Average Error gpm	Average Error Percent	Maximum Error gpm	Minimum Error gpm
2 feet per second				
Bermad Euromag 2300	-5.34	-3.02	-8.32	-1.75
Krohne WF	14.20	4.52	26.7	8.46
McCometer Duramag	37.79	12.04	39.7	35.5
Seametric AG 3000	-3.64	-2.05	-6.8	-0.80
Technoflo PS32	20.71	11.80	25.8	14.4
8 feet per second				
Bermad Euromag 2300	57.87	8.19	74.82	30.55
Krohne WF	33.30	2.65	76.99	5.91
McCometer Duramag	88.06	7.02	122.5	71.3

Seametric AG 3000	36.71	5.19	55.90	23.70
Technoflo PS32	80.45	11.40	98.1	69.3
14 feet per second				
Bermad Euomag 2300	95.38	7.72	123.77	58.24
Krohne WF	396.08	18.04	452.16	349.90
McCometer Duramag	324.46	14.77	357.60	297.70
Seametric AG 3000	79.76	6.46	105.00	30.00
Technoflo PS32	136.50	11.29	152.00	129.00

Table 3 - Discharge errors from check valve upstream and within one diameter of the flow meter

Flow Meter	Average Error gpm	Average Error Percent	Maximum Error gpm	Minimum Error gpm
2 feet per second				
Bermad Euomag 2300	-0.99	-0.56	-3.02	0.46
Krohne WF	44.31	14.13	57.15	28.83
McCometer Duramag	30.15	9.66	32.4	27.70
Seametric AG 3000	-2.27	-1.29	-3.9	-1.2
Technoflo PS32	-3.26	-2.85	-7.7	1.00
8 feet per second				
Bermad Euomag 2300	75.95	10.74	81.24	71.65
Krohne WF	37.10	2.96	62.05	18.51
McCometer Duramag	50.38	4.01	56.5	46.4
Seametric AG 3000	54.40	7.71	56.30	52.40
Technoflo PS32	57.03	8.08	65.20	43.80
14 feet per second				
Bermad Euomag 2300	140.99	11.41	153.89	313.79
Krohne WF	433.91	19.76	488.40	364.79
McCometer Duramag	327.56	14.91	333.10	322.70
Seametric AG 3000	100.23	8.11	105.00	97.00
Technoflo PS32	93.37	7.56	107.00	83.00

Table 4 - Discharge errors from 90° bend downstream and within one diameter of the flow meter

Flow Meter	Average Error gpm	Average Error Percent	Maximum Error gpm	Minimum Error gpm
2 feet per second				
Bermad Euomag 2300	0.15	0.08	2.58	-1.74
Krohne WF	6.47	2.05	9.11	2.68
McCometer Duramag	4.36	1.39	6.60	2.00
Seametric AG 3000	-0.92	-0.53	-2.6	0.50

Flow Meter	Average Error	Average Error	Maximum Error	Minimum Error
	gpm	Percent	gpm	gpm
Technoflo PS32	21.93	12.45	24.60	18.30
8 feet per second				
Bermad Euromag 2300	55.91	7.92	61.98	45.17
Krohne WF	136.17	10.84	167.47	71.04
McCometer Duramag	125.88	10.02	132.50	30.50
Seametric AG 3000	52.03	7.37	55.00	48.40
Technoflo PS32	124.71	17.66	130.50	119.20
14 feet per second				
Bermad Euromag 2300	103.90	8.41	122.91	90.88
Krohne WF	325.78	14.84	402.43	271.59
McCometer Duramag	234.24	10.66	246.40	216.68
Seametric AG 3000	87.03	7.05	104.00	78.00
Technoflo PS32	216.13	17.50	223.00	207.00

Table 5 - Discharge errors from 90° bend upstream and within one diameter of the flow meter

Flow Meter	Average Error	Average Error	Maximum Error	Minimum Error
	gpm	Percent	gpm	gpm
2 feet per second				
Bermad Euromag 2300	1.05	0.59	9.61	-2.37
Krohne WF	-1.43	-0.46	12.46	8.08
McCometer Duramag	-8.24	-2.62	-10.60	-6.60
Seametric AG 3000	-1.49	-0.84	-2.77	0.16
Technoflo PS32	13.5	7.65	18.8	9.2
8 feet per second				
Bermad Euromag 2300	57.64	8.16	61.61	53.47
Krohne WF	207.29	16.50	224.02	188.08
McCometer Duramag	112.75	8.97	117.40	109.40
Seametric AG 3000	24.93	3.53	26.4	23.5
Technoflo PS32	66.38	9.39	77.8	49.3
14 feet per second				
Bermad Euromag 2300	104.66	8.47	118.36	95.01
Krohne WF	398.11	18.13	648.09	150.55
McCometer Duramag	192.02	8.74	196.90	186.80
Seametric AG 3000	59.33	4.80	62.00	56.00
Technoflo PS32	105.77	8.59	136.00	88.00

Table 6 - Discharge errors from simulated pump upstream and within one diameter of the flow meter

Flow Meter	Average Error	Average Error	Maximum Error	Minimum Error
	gpm	Percent	gpm	gpm
2 feet per second				
Bermad Euromag 2300	-0.32	-0.18	-2.01	1.20
Krohne WF	-13.36	-4.24	-59.36	12.4
McCometer Duramag	11.17	3.55	12.80	8.70
Seametric AG 3000	-1.79	-1.01	-3.3	0.50
Technoflo PS32	6.07	3.42	10.70	1.10
8 feet per second				
Bermad Euromag 2300	86.50	12.21	92.93	81.38
Krohne WF	154.84	12.33	191.52	57.55
McCometer Duramag	152.02	12.10	164.60	141.50
Seametric AG 3000	68.28	9.53	70.20	64.50
Technoflo PS32	84.29	11.94	100.60	62.40
14 feet per second				
Bermad Euromag 2300	143.46	11.61	153.54	133.64
Krohne WF	331.76	15.11	390.69	265.91
McCometer Duramag	302.49	13.76	328.30	280.50
Seametric AG 3000	98.47	7.97	104.00	95.00
Technoflo PS32	144.00	11.66	165.00	124.00

The following figures illustrate the average errors, in percent of the Venturi meter measured flow, versus velocity for each flow meter plotted by configuration. The legend for the figures are:

- CV Dnstrm is a check valve within one diameter downstream of the flow meter
- CV Upstrm is a check valve within one diameter upstream of the flow meter
- 90 Bend Dnstrm is a 90° bend within one diameter downstream of the flow meter
- 90 Bend Upstrm is a 90° bend within one diameter downstream of the flow meter
- Pump Upstrm is a simulated pump within one diameter upstream of the flow meter
-

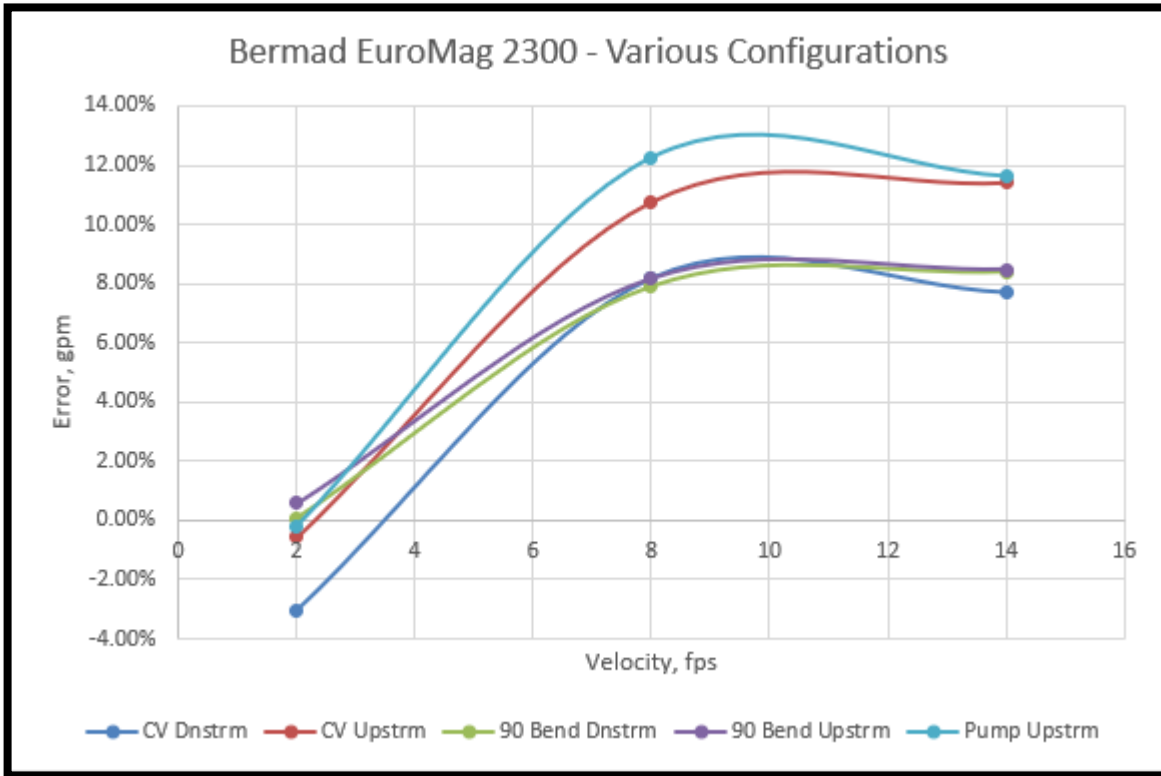


Figure 9 - Bermad Euromag 2300 Flow Meter: Errors in Discharge Rate vs. Velocity through the flow meter installed in various configurations

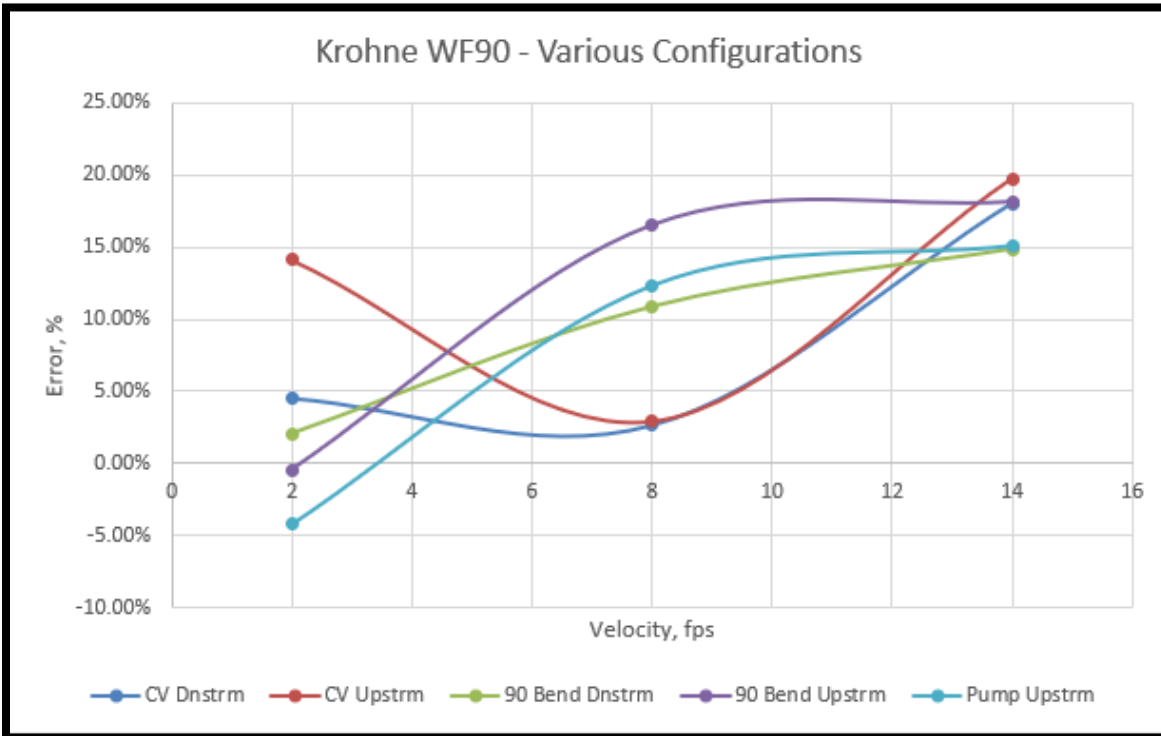


Figure 10 - Krohne WF Flow Meter: Errors in Discharge Rate vs. Velocity through the flow meter installed in various configurations

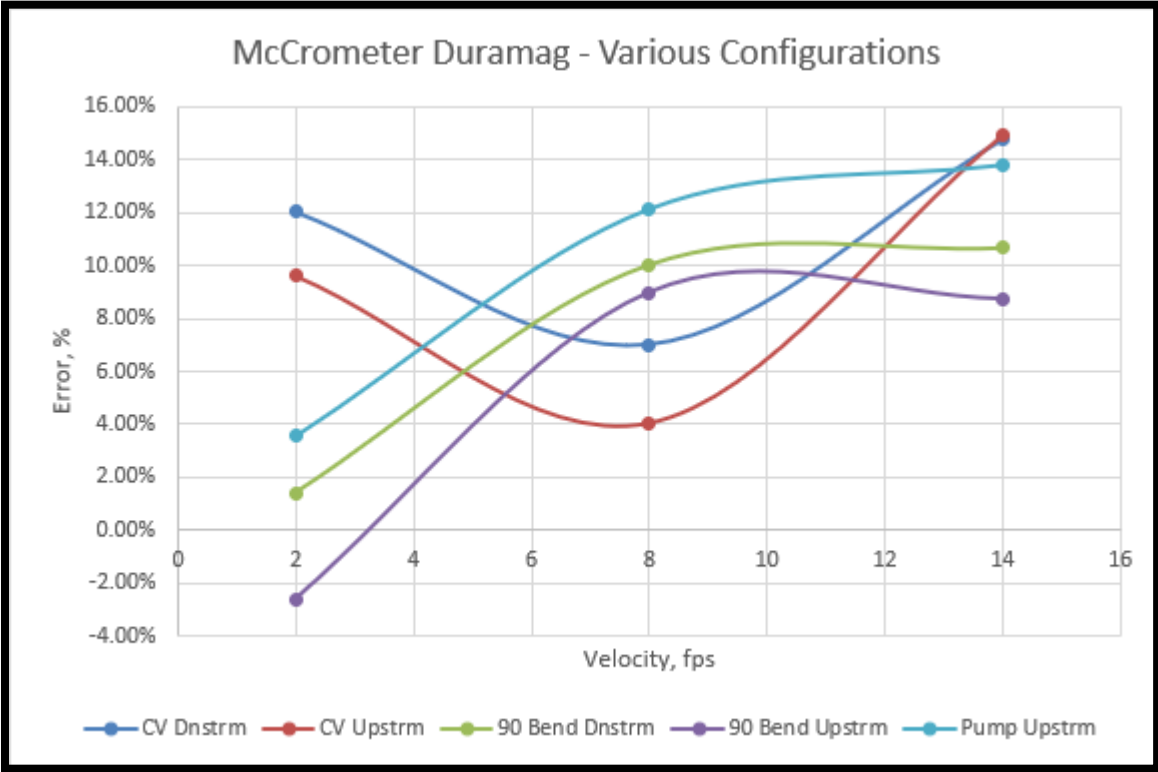


Figure 11 - Mcrometer Duramag Flow Meter: Errors in Discharge Rate vs. Velocity through the meter installed in various configurations

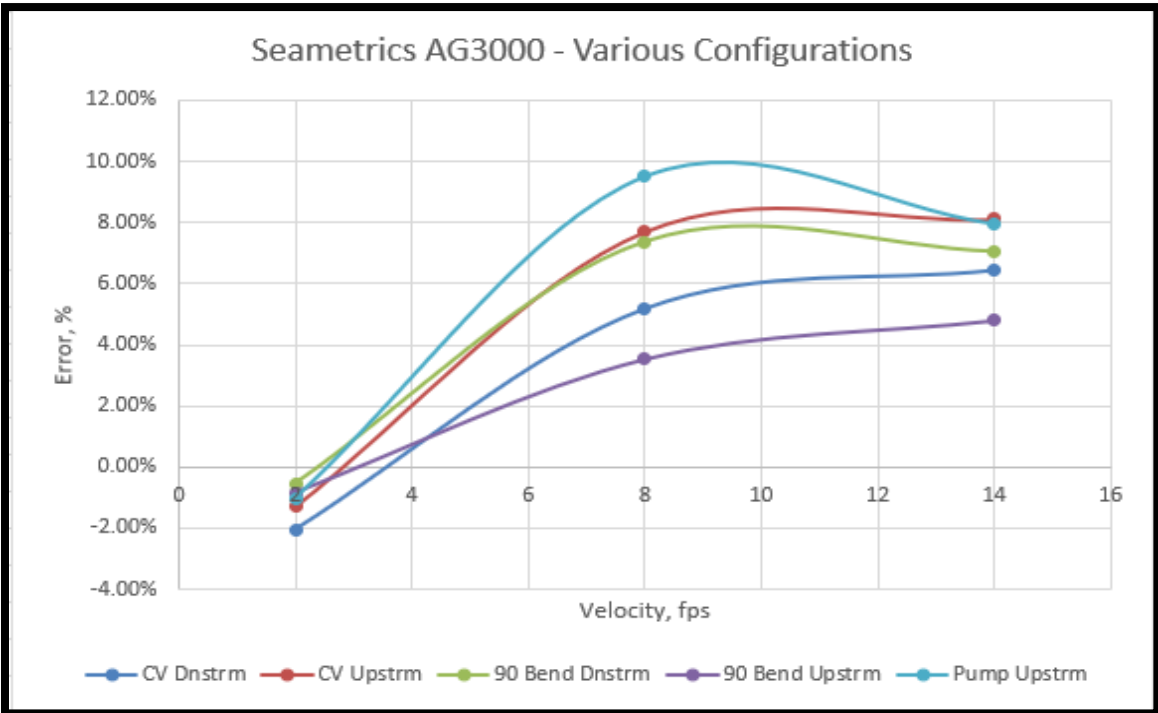


Figure 12 - Seametrics AG3000 Flow Meter: Errors in Discharge Rate vs. Velocity through the meter installed in various configurations

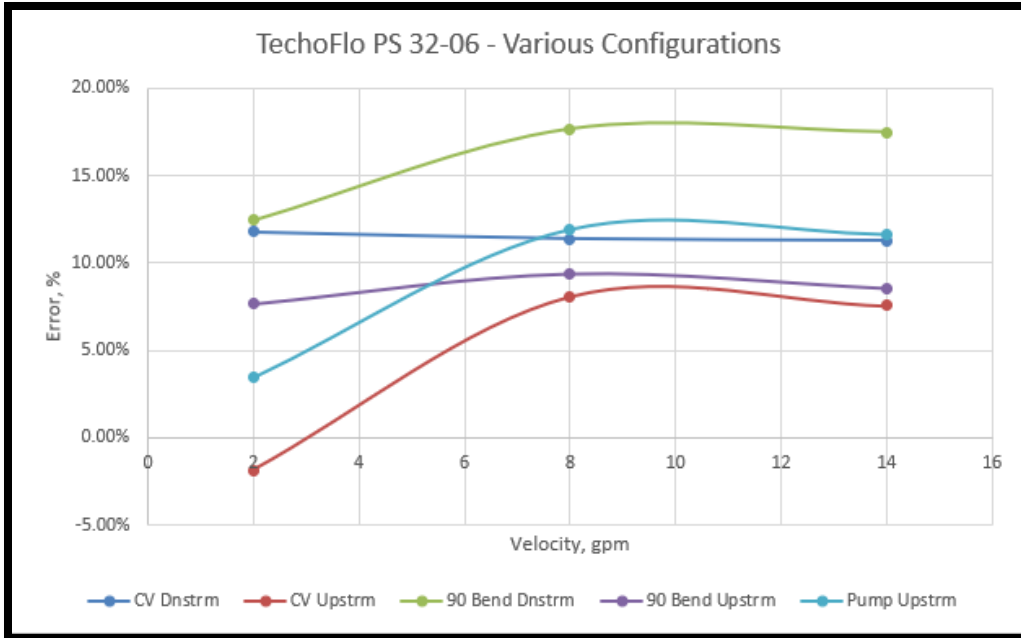


Figure 13 - Technoflow PS 32-06: Errors in Discharge Rate vs. Velocity through the meter installed in various configurations

Figures were created for each flow meter in each configuration and at each of the three velocities that illustrate the average, the high and the low errors in the meter in gallons per minute. There are a total of 75 figures, only five of which are presented here, which are the eight feet per second results. These and the other 10 figures are included in the appendix C of this report. The horizontal axis represents the flow meters. The legend for the horizontal axis is:

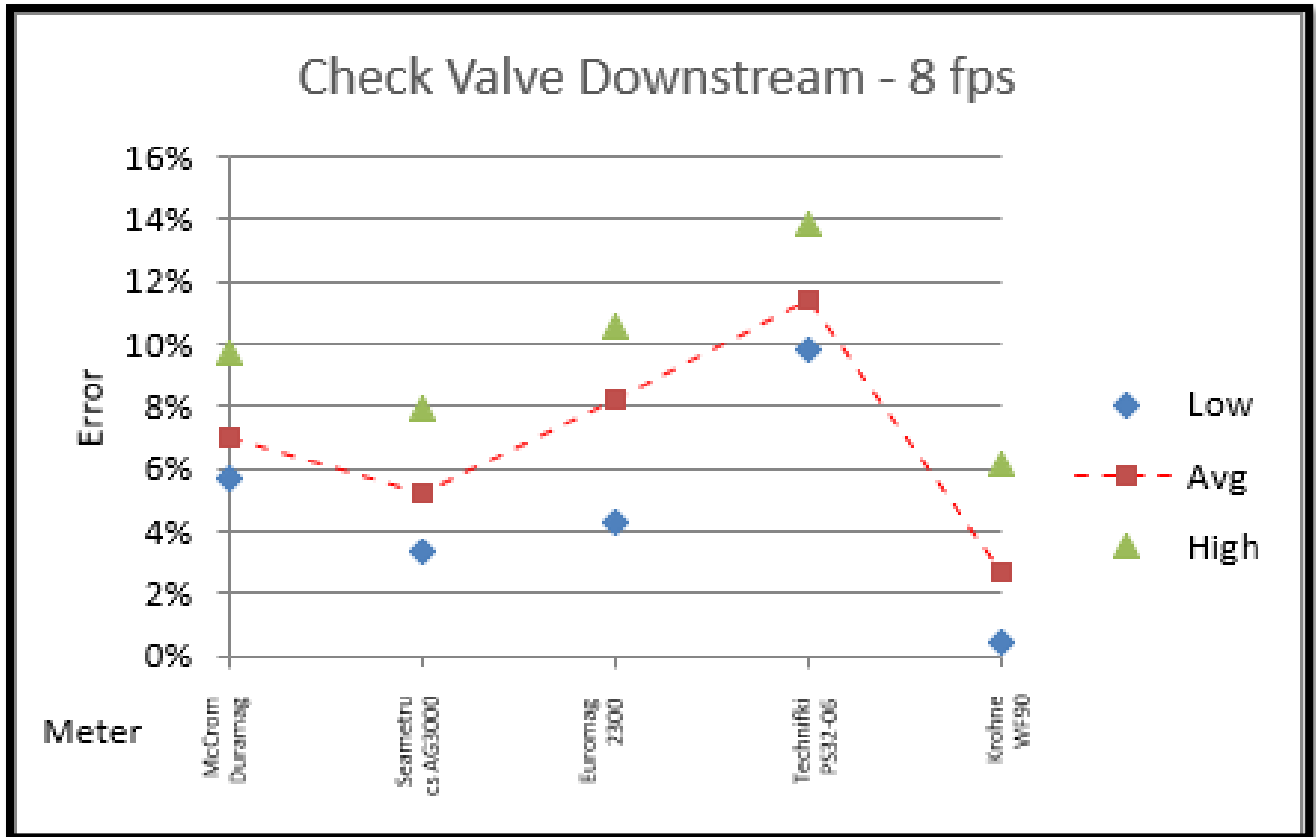


Figure 14 - Graph of the high, average, and low errors as a percent of the average Venturi meter flow rate at 8 fps for the five flow meters

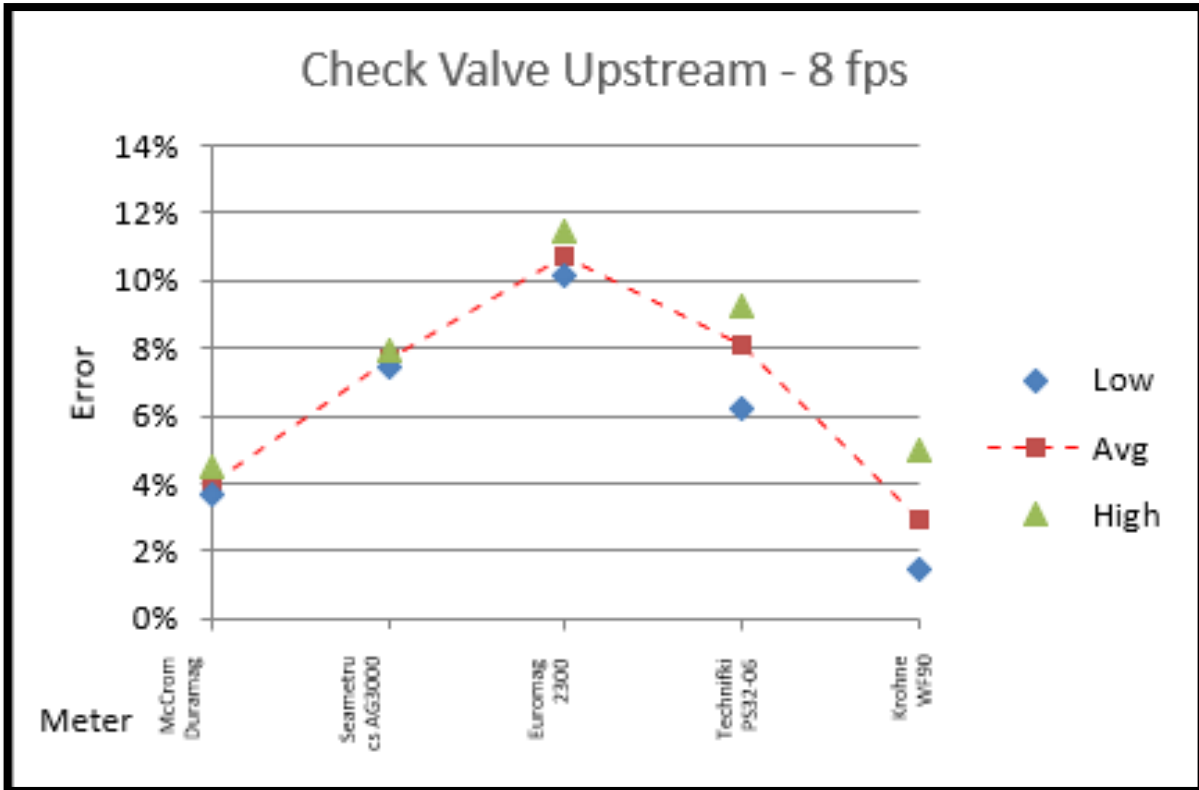


Figure 15 - Graph of the high, average, and low errors as a percent of the average Venturi meter flow rate at 8 fps for the five flow meters

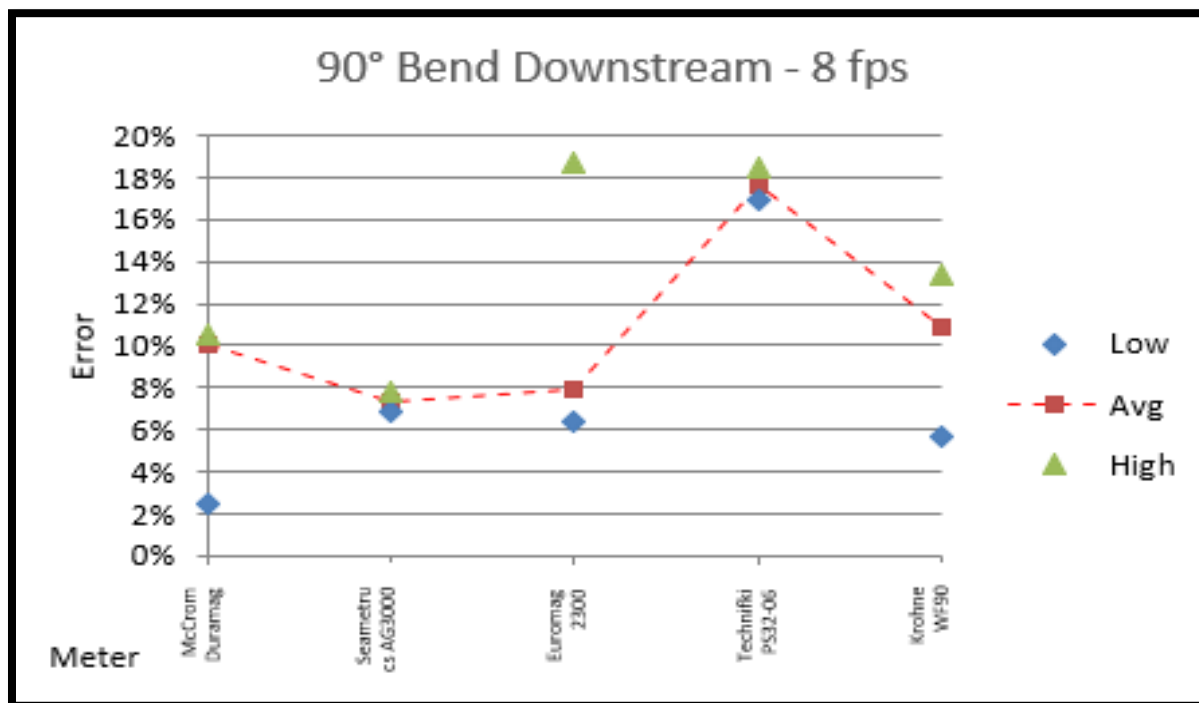


Figure 16 - Graph of the high, average, and low errors as a percent of the average Venturi meter flow rate at 8 fps for the five flow meters

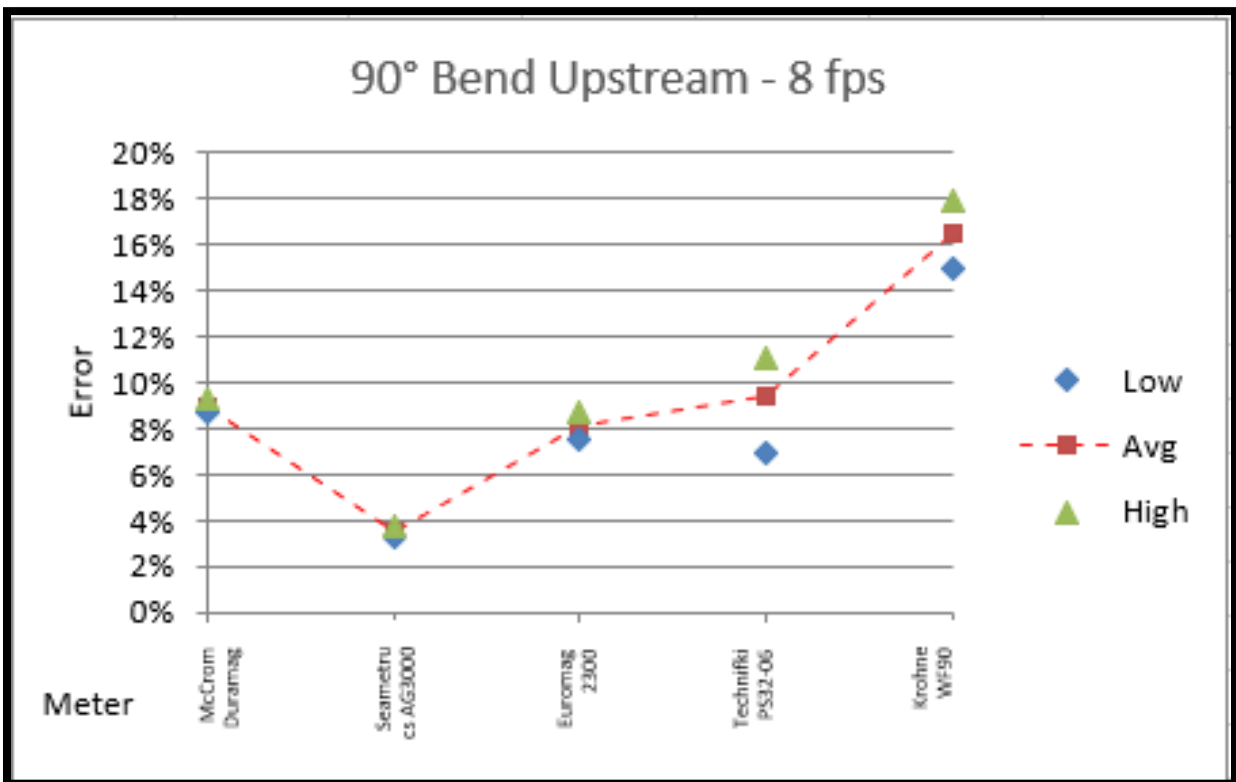


Figure 17 - Graph of the high, average, and low errors as a percent of the average Venturi meter flow rate at 8 fps for the five flow meters

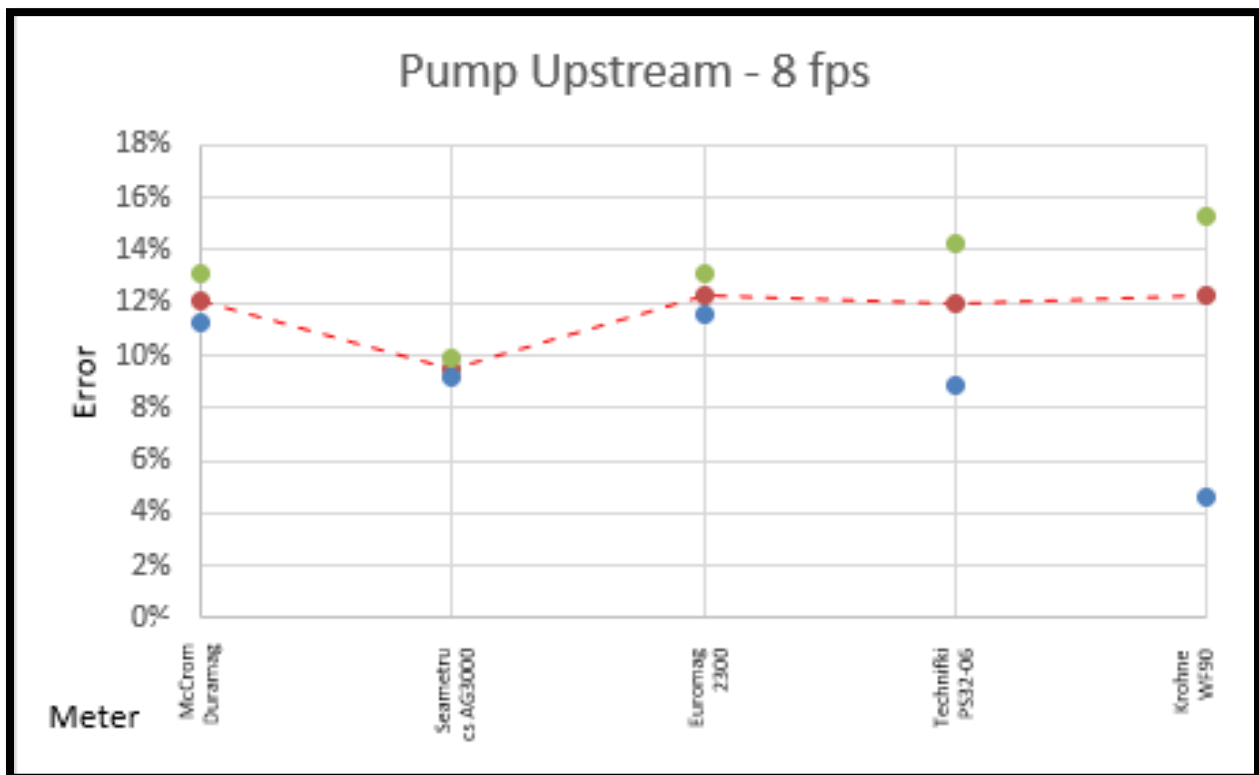


Figure 18 - Graph of the high, average, and low errors as a percent of the average Venturi meter flow rate at 8 fps for the five flow meters

Histograms show the distribution of the occurrence of a specific amount of error in the flow meter reading when compared to the Venturi meter. The error amounts were rounded to the nearest one gallon per minute and those amounts were ranked from highest to lowest. Error amounts having the same value were counted. For instance, if an error amount occurred once, it was counted as one. If an error amount occurred two times, it was counted as two, etc. Multiple occurrences of the same error within a sample population shows the tendency of the flow meter to produce that error amount. Error amounts that occur across the entire range of error amounts show that the flow meter has no tendency towards a specific error amount. A total of 75 histograms were created. Only three typical histograms are illustrated by the following figures. All of the histograms are provided in the appendix C to this report. In these histograms, the larger amount of error between the flow meter and the Venturi meter are represented by the interval from 1 to 15. Likewise, the smaller error amounts are represented by the interval from 16 to 30.

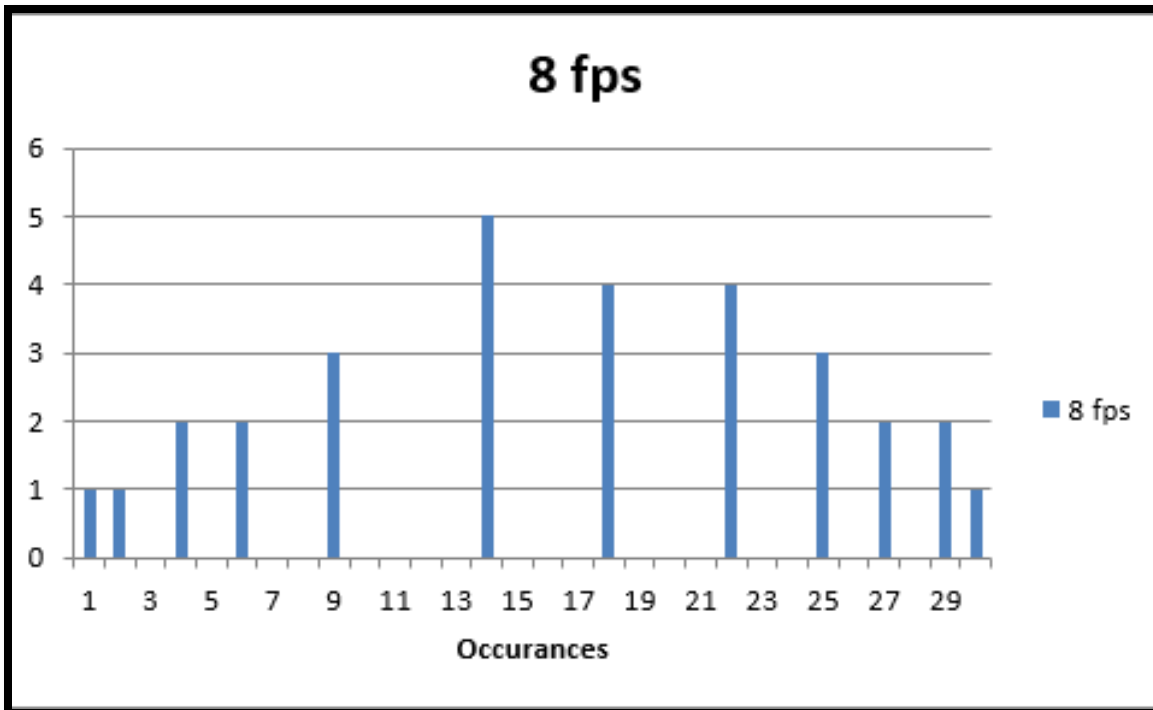


Figure 19 - Histogram of Bermad Euromag 2300 with Pump Upstream illustrating a near bell curve distribution of errors

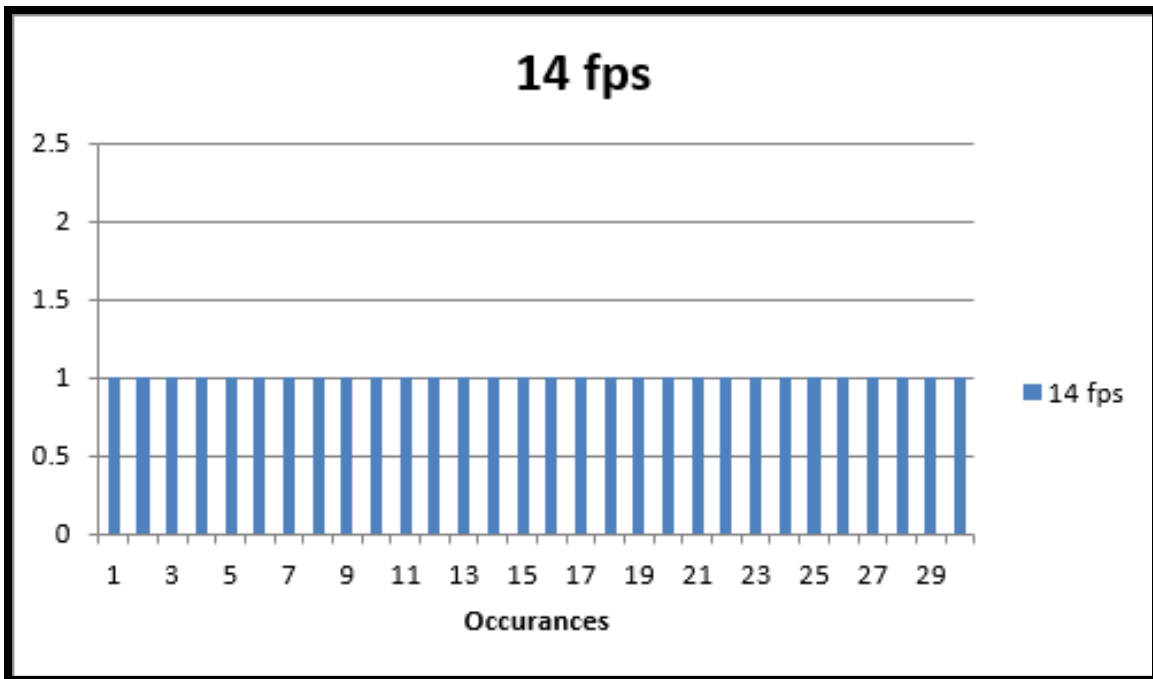


Figure 20 - Histogram of Krohne WF with Pump Upstream illustrating a uniform distribution of errors

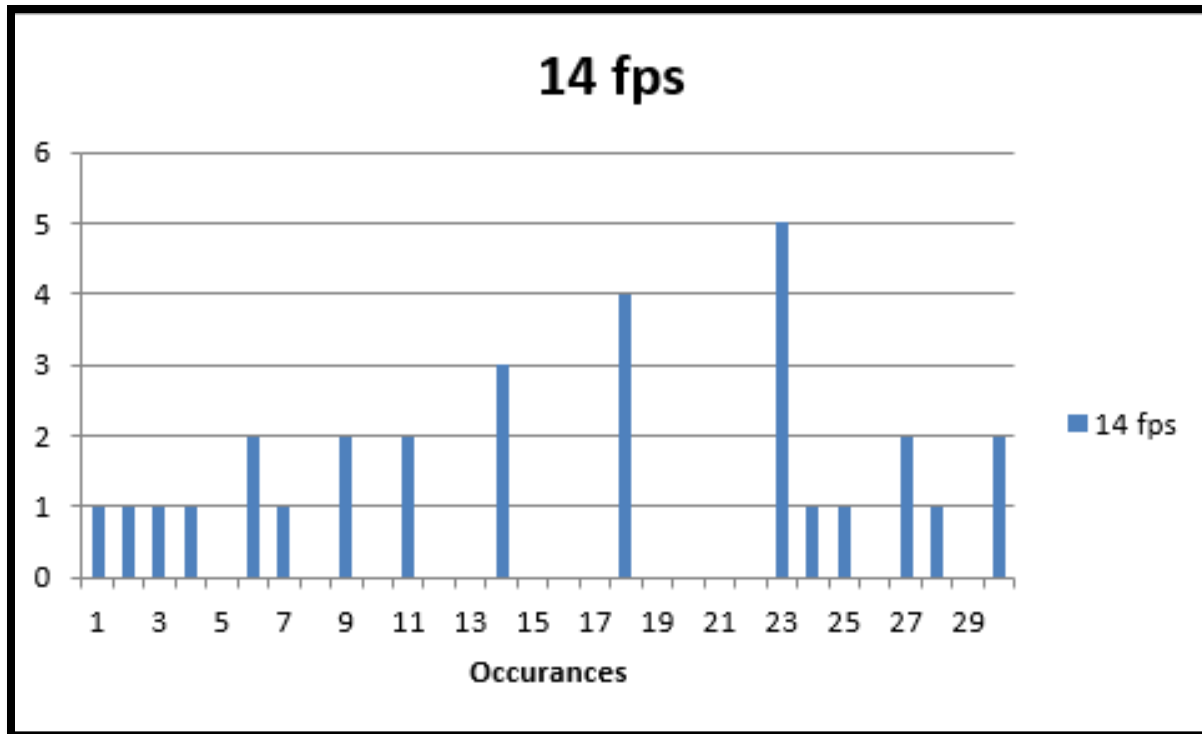


Figure 21 - Histogram of Technoflow PS32 with 90 Bend Upstream illustrating left skew (high number of lower error amounts) of the distribution of errors

Conclusions

Conclusions derived from this testing of the five flow meters will be discussed in three sections: 1) Comparison of Error Amounts by Configuration and Velocity, 2) Error Amounts for a Configuration by Meter and Velocity, and 3) Tendency of the Error Amounts.

Configuration and Velocity

All of the flow meters displayed errors in readings when compared to the Venturi meter at all velocities and in each configuration. The percent of error, based on the Venturi meter flow rate, for each configuration, tended to be less at the slower velocities and increase with increasing velocity. The percent error tended to increase significantly from the two feet per second to the eight feet per second trials and then leveled off between eight feet per second to 14 feet per second. The notable exceptions were the McCrometer Duramag and the Krohne WP flow meters experienced a decrease in the percent error between the two and eight feet per second for the check valves installed in both the upstream and downstream conditions. The percent errors exceeded the desired plus or minus five-percent error for the eight and 14 feet per second velocities in all installations with the exception of the McCrometer Duramag and the Krohne WP flow meters, which demonstrated large percent errors at two feet per second for the check valve installations and smaller percent errors at eight feet per second. The percent errors increased rapidly at 14 feet per second for both of these meters.

This analysis concludes that the flow meters investigated with this work, and potentially all flow meters, should not be installed within one diameter of a flow disturbance. A safe extrapolation of this analysis is that flow meters should not be installed closer to a flow disturbance than recommended by the manufacturer. If they happen to be installed in this configuration the velocities through the valve should be in the two feet per second range.

Configuration by Flow Meter and Velocity

The range of the percent error as compared to the Venturi meter measured for each meter were compared for each configuration and each velocity. The errors were expressed as low (meaning the lowest percent error), average, and high (meaning the highest percent error). The results of that comparison were displayed in the plots. This analysis confirmed that each flow meter tended to perform within the plus or minus five percent error at two feet per second and tended to exceed the standard at the eight and 14 feet per second conditions. This side-by-side comparison did show that the Seametrics AG3000 had lower percent errors than the other meters tested except in the check valve upstream installation at eight feet per second.

Tendency of Errors

A visual representation of the distribution of the errors is displayed by the plot of the histograms. Generally speaking, all of the flow meters displayed some central tendency for the distribution of the errors, meaning that there tended to be a near equal number of larger errors when compared to the Venturi meter as there were smaller errors. However, this is not true in specific instances and the displayed tendency of all of the meters is not a classical bell curve shape. Some distributions were uniform across the entire error range, and some showed a noticeable left skew. Left skew means that there were more instances of smaller errors than there were of the larger errors. A uniform distribution means that there were an equal number of errors across the entire spectrum of errors.

This analysis concludes that the errors do not have a predictable probability of occurrence due to the general lack of a bell curve shape for most of the histograms. That and the presence of both skew and uniform distribution, the average error is not a reliable measurement of the error that can be expected from these flow meters when installed in a non-standard configuration.

Appendix A – Lab Report Sheets



Meter is connected within one pipe diameter downstream of a 90° bend								
EuroMag 2300		Date:	9/16/2021	Time:				7:42 AM
		2 ft/s 30 Secods Values GPM						
ft/s	Gpm	Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count	
2	176.4	1	175.7	174.36	1.34	2.6	1	
8	705.6	2	175	174.41	0.59	2.4	1	
14	1234.8	3	176.6	174.02	2.58	1.7	1	
		4	175.7	174.77	0.93	1.5	1	
		5	176.8	174.41	2.39	1.3	1	
		6	175.9	174.4	1.5	1.2	1	
		7	176.6	175.42	1.18	1.0	1	
		8	176.1	175.12	0.98	0.9		
		9	176.3	175.5	0.8	0.9		
		10	176.2	175.34	0.86	0.9	3	
		11	176.7	175.98	0.72	0.8	1	
		12	175.6	175.34	0.26	0.7	1	
		13	176	176.14	-0.14	0.6		
		14	176.5	176.56	-0.06	0.6	2	
		15	176	176.99	-0.99	0.3	1	
		16	176.3	177.59	-1.29	-0.1		
		17	176.9	177.22	-0.32	-0.1	2	
		18	176.8	177.34	-0.54	-0.3	1	
		19	176.4	178.06	-1.66	-0.4		
		20	176.5	178	-1.5	-0.4	2	
		21	175.9	177.53	-1.63	-0.5		
		22	176.5	177.26	-0.76	-0.5	2	
		23	176.9	175.23	1.67	-0.8	1	
		24	176.6	178.34	-1.74	-0.9	1	
		25	176.9	176.03	0.87	-1.0	1	
		26	176.3	176.77	-0.47	-1.3	1	
		27	176.9	176.31	0.59	-1.5	1	
		28	176.5	176.87	-0.37	-1.6	1	
		29	176.3	176.68	-0.38	-1.7		
		30	176.1	177.02	-0.92	-1.7	2	
		Average	176.32	176.17				
		Difference	0.15					
		Percentage	0.08%					
		Avg Error			0.149667			
		STDV			1.166835			
		CV			1.361503			779.6%
		Skew			0.144453			
		Maximum Error			2.58			
		Minimum Error			-1.74			

Date:	44461	Time:	0.333333333					
8 ft/s 30 Secods Values GPM								
Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count			
1	706.9	650.62	56.28	62	1			
2	705.6	649.44	56.16	61				
3	706.1	651.43	54.67	61				
4	706.5	650.11	56.39	61	3			
5	706.5	649.78	56.72	60	1			
6	705.5	648.71	56.79	59	1			
7	705.9	648.36	57.54	58				
8	706.4	645.86	60.54	58				
9	706.7	649.03	57.67	58				
10	706.9	650.08	56.82	58				
11	706.2	646.58	59.62	58				
12	706.4	647.92	58.48	58	6			
13	706.5	653.07	53.43	57				
14	705.6	660.43	45.17	57				
15	706.6	655.34	51.26	57				
16	705.5	657.15	48.35	57	4			
17	706.2	651.85	54.35	56				
18	706.4	651.1	55.3	56				
19	706.9	653.23	53.67	56	3			
20	705.9	654.75	51.15	55				
21	705.5	656.88	48.62	55				
22	705.1	647.19	57.91	55	3			
23	706.4	644.42	61.98	54				
24	706.5	645.5	61	54	2			
25	706.4	647.72	58.68	53	1			
26	705.9	644.9	61	51				
27	705.7	648.01	57.69	51	2			
28	706.5	649.36	57.14	49	1			
29	706.9	648.8	58.1	48	1			
30	705.8	650.99	54.81	45	1			
		Average	706.20	650.29				
		Difference	55.91					
		Percentage	7.92%					
		Avg Error			55.90967			
		STDV			3.858786			
		CV			14.89023		6.9%	
		Skew			-0.96934			
		Maximum Error			61.98			
		Minimum Error			45.17			

Date:	9/22/2021	Time:	10:00 AM				
14 ft/s 30 Secods Values GPM							
Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count		
1	1234	1130.28	103.72	123	1		
2	1235	1125.31	109.69	118	1		
3	1234	1125.73	108.27	112	1		
4	1235	1127.33	107.67	110			
5	1236	1129.29	106.71	110	2		
6	1234	1133.3	100.7	108			
7	1236	1132.13	103.87	108	2		
8	1234	1135	99	107			
9	1235	1133.64	101.36	107			
10	1236	1130.62	105.38	107	3		
11	1235	1127.81	107.19	105			
12	1234	1121.67	112.33	105	2		
13	1235	1124.75	110.25	104			
14	1236	1133.22	102.78	104			
15	1236	1134.2	101.8	104			
16	1234	1132.53	101.47	104	4		
17	1234	1134.2	99.8	103	1		
18	1235	1134.41	100.59	102			
19	1235	1135.12	99.88	102	2		
20	1236	1142.31	93.69	101			
21	1235	1131.34	103.66	101			
22	1234	1130.08	103.92	101			
23	1235	1130.26	104.74	101	4		
24	1234	1137.96	96.04	100			
25	1234	1142.4	91.6	100	2		
26	1235	1144.12	90.88	99	1		
27	1234	1132.3	101.7	96	1		
28	1234	1126.72	107.28	94	1		
29	1235	1112.09	122.91	92	1		
30	1234	1115.9	118.1	91	1		
		Average	1,234.77	1,130.87			
		Difference	103.90				
		Percentage	8.41%				
		Avg Error			103.8993		
		STDV			6.738558		
		CV			45.40816		6.5%
		Skew			0.577433		
		Maximum Error			122.91		
		Minimum Error			90.88		

Meter is connected within one pipe diameter upstream of a 90° bend

EuroMag 2300						8 ft/s 30 Secods Values GPM						14 ft/s 30 Secods Values GPM											
Date:		9/9/2021		Time:		7:00		Date:		9/8/2021		Time:		2:30PM		Date:		9/8/2021		Time:		1:46 PM	
ft/s	Gpm	Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count	Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count	Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count				
2	176.4	1	175.8	167.91	7.89	9.3	1	1	706	652.23	53.77	62	1	1	1235	1116.64	118.36	118	118				
8	705.6	2	177.3	167.99	9.31	7.9	1	2	707.3	653.83	53.47	61	1	2	1237	1118.74	118.26	118	118				
14	1234.8	3	175.9	176.97	-1.07	7.4	1	3	706.2	651.66	54.54	61	1	3	1238	1120.81	117.19	117	117				
		4	177.5	177.78	-0.28	6.3	1	4	706.7	650.48	56.22	61	1	4	1236	1122.38	113.62	115	115				
		5	176.5	177.52	-1.02	3.1	1	5	705.5	650.23	55.27	61	1	5	1236	1121.2	114.8	115	115				
Notes:		6	176.8	175.99	0.81	1.7	1	6	707.3	646.3	61	61	5	6	1237	1121.64	115.36	114	114				
6 inch OD		7	176.2	176.39	-0.19	1.7	2	7	706.6	646.94	59.66	60	2	7	1237	1123.55	113.45	113	113				
5 minutes to stabilize		8	177.2	176.2	1	1.5	1	8	706.4	646.94	59.46	60	2	8	1235	1130.38	104.62	110	110				
		9	175.4	176.24	-0.84	1.4	1	9	707.5	646.92	60.58	59	1	9	1234	1132.94	101.06	106	106				
		10	176.4	177.45	-1.05	1.4	2	10	707.6	645.99	61.61	59	1	10	1235	1132.86	102.14	106	2				
		11	175	177.37	-2.37	1.3	1	11	707.9	650.35	57.55	59	1	11	1236	1134.99	101.01	105	1				
		12	176.8	177.84	-1.04	1.3	2	12	706.8	652.21	54.59	59	1	12	1236	1135.71	100.29	104	1				
		13	176.8	178.19	-1.39	1.0	1	13	706.4	651.05	55.35	59	1	13	1236	1132.19	103.81	103	1				
		14	175.82	177.98	-2.16	0.8	1	14	706.2	650.37	55.83	59	6	14	1237	1127.14	109.86	103	2				
		15	175.9	177.02	-1.12	0.7	1	15	705.8	651.58	54.22	58	1	15	1236	1130.23	105.77	102	1				
		16	175.5	176.81	-1.31	0.2	1	16	707.8	650.73	57.07	57	1	16	1235	1131.61	103.39	101	1				
		17	175.3	167.89	7.41	-0.2	1	17	706.9	650.34	56.56	57	1	17	1237	1131.18	105.82	101	1				
		18	176	175.78	0.22	-0.3	1	18	705.4	648.42	56.98	57	1	18	1236	1135.15	100.85	101	1				
		19	177.7	176.15	1.55	-0.6	1	19	706.9	646.61	60.29	57	4	19	1235	1131.7	103.3	101	1				
		20	177.4	176.15	1.25	-0.8	1	20	706.8	645.81	60.99	56	1	20	1236	1134.57	101.43	101	1				
		21	177.1	175.36	1.74	-1.0	1	21	706	647.38	58.62	56	1	21	1236	1139.04	96.96	101	6				
		22	175.1	168.78	6.32	-1.0	1	22	706.4	647.31	59.09	56	3	22	1236	1140.35	95.65	100	1				
		23	176.4	175.12	1.28	-1.0	3	23	707.9	647.39	60.51	55	1	23	1238	1138.16	99.84	100	1				
		24	176.5	175.82	0.68	-1.1	1	24	708.4	647.18	61.22	55	1	24	1234	1138.99	95.01	100	3				
		25	177.8	176.07	1.73	-1.1	2	25	705.4	646.74	58.66	55	1	25	1238	1139.05	98.95	99	1				
		26	175.6	176.24	-0.64	-1.2	1	26	705.5	646.33	59.17	55	1	26	1235	1135.92	99.08	99	2				
		27	177.9	176.48	1.42	-1.3	1	27	707.7	648.48	59.22	55	5	27	1235	1137.3	97.7	98	1				
		28	175.3	176.48	-1.18	-1.4	1	28	706.1	649.58	56.52	54	1	28	1237	1135.68	101.32	97	1				
		29	176.4	173.34	3.06	-2.2	1	29	706.6	650.32	56.28	54	2	29	1236	1135.05	100.95	96	1				
		30	176.46	175.05	1.41	-2.4	1	30	704.8	649.97	54.83	53	1	30	1235	1135.04	99.96	95	1				

Average		176.39	175.35		
Difference	1.05				
Percentage	0.59%				
Avg Error			1.047333	281.2%	
STDV			2.945092		
CV			8.673566		
Skew			1.543654		
Maximum Error			9.31		
Minimum Error			-2.37		

Average		706.63	648.99		
Difference	57.64				
Percentage	8.16%				
Avg Error			57.63767	4.3%	
STDV			2.472441		
CV			6.112965		
Skew			-0.02513		
Maximum Error			61.61		
Minimum Error			53.47		

Average		1,236.00	1,131.34		
Difference	104.66				
Percentage	8.47%				
Avg Error			104.6603	6.6%	
STDV			6.906533		
CV			47.7002		
Skew			0.797853		
Maximum Error			118.36		
Minimum Error			95.01		

Meter connected within one pipe diameter downstream of a check valve									
		Date:	8/25/2021	Time:	10:30 AM				
EuroMag 2300		2 ft/s 30 Secods Values GPM							
ft/s	Gpm	Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count		
2	176.4	1	177.8	182.13	-4.33	-1.8	1		
8	705.6	2	176.2	181.74	-5.54	-2.8	1		
14	1234.8	3	175.9	184.22	-8.32	-3.2	2		
		4	177.3	181.71	-4.41	-3.2	2		
Notes:		5	177.7	183.13	-5.43	-4.1	1		
6 inch OD		6	177.5	184.24	-6.74	-4.2	1		
5 minutes to stabilize		7	176.3	181.7	-5.4	-4.3	2		
		8	177.4	182.05	-4.65	-4.3	2		
		9	176.6	180.91	-4.31	-4.4	1		
		10	176.9	182.21	-5.31	-4.7	2		
		11	175.9	183.43	-7.53	-4.7	2		
		12	177.2	184.75	-7.55	-5.0	1		
		13	177.8	184.05	-6.25	-5.1	1		
		14	177.6	183.87	-6.27	-5.3	2		
		15	176.4	183.23	-6.83	-5.3	2		
		16	176.6	183.34	-6.74	-5.4	2		
		17	176.9	182.21	-5.31	-5.4	2		
		18	177	181.73	-4.73	-5.5	1		
		19	176.9	183.45	-6.55	-5.9	2		
		20	176.4	183.7	-7.3	-5.9	2		
		21	176.9	181.96	-5.06	-6.3	2		
		22	176.5	181.48	-4.98	-6.3	2		
		23	177.2	180.36	-3.16	-6.5	1		
		24	177.1	181.16	-4.06	-6.7	2		
		25	177.1	180.26	-3.16	-6.7	2		
		26	177.7	180.51	-2.81	-6.8	1		
		27	176.5	178.25	-1.75	-7.3	1		
		28	176.5	180.66	-4.16	-7.5	1		
		29	176.9	182.81	-5.91	-7.6	1		
		30	176.6	182.51	-5.91	-8.3	1		
			176.91	182.26					
			-5.35						
			-3.02%						
Average Error					-5.34867				
Std Deviation					1.508058			-28.2%	
Variance					2.274238				
Skew					0.250361				
Maximum Error					-1.75				
Minimum Error					-8.32				

		Date:	8/25/2021	Time:	2:20 PM				
EuroMag 2300		8 ft/s 30 Secods Values GPM							
ft/s	Gpm	Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count		
1	705.5	1	705.5	640.78	64.72	75	1		
2	706.8	2	706.8	641.48	65.32	75	1		
3	705.4	3	705.4	637.99	67.41	75	3		
4	708.2	4	708.2	633.38	74.82	74	2		
5	705	5	705	633.99	71.01	74	2		
6	706.4	6	706.4	631.84	74.56	73	1		
7	706.1	7	706.1	632.29	73.81	71	2		
8	705	8	705	631.35	73.65	71	2		
9	706.9	9	706.9	632.27	74.63	67	1		
10	705.5	10	705.5	634.77	70.73	65	1		
11	707.6	11	707.6	634.67	72.93	65	1		
12	707.1	12	707.1	642.07	65.03	65	3		
13	706.6	13	706.6	644.84	61.76	62	1		
14	706.8	14	706.8	647.13	59.67	60	1		
15	705	15	705	653.93	51.07	57	1		
16	707.4	16	707.4	650.26	57.14	56	1		
17	706.1	17	706.1	653.27	52.83	54	1		
18	706.3	18	706.3	654.66	51.64	53	1		
19	706.5	19	706.5	650.42	56.08	52	2		
20	704.8	20	704.8	653.78	51.02	52	3		
21	706.5	21	706.5	654.59	51.91	52	3		
22	707	22	707	660.87	46.13	51	1		
23	705.6	23	705.6	669.84	35.76	51	2		
24	706.2	24	706.2	675.65	30.55	47	1		
25	706.4	25	706.4	669.37	37.03	46	1		
26	705.9	26	705.9	660.09	45.81	46	3		
27	705.4	27	705.4	658.84	46.56	46	3		
28	705.8	28	705.8	653.35	52.45	37	1		
29	706.4	29	706.4	652.05	54.35	36	1		
30	705.3	30	705.3	659.53	45.77	31	1		
Average			706.18	648.31					
Difference			57.87						
Percentage			8.19%						
Average Error					57.87167				
Std Deviation					12.44093			21.5%	
Variance					154.7768				
Skew					-0.29612				
Maximum Error					74.82				
Minimum Error					30.55				

		Date:	8/25/2021	Time:	2:50 PM				
EuroMag 2300		14 ft/s 30 Secods Values GPM							
ft/s	Gpm	Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count		
1	1235	1	1235	1122.38	112.62	124	1		
2	1236	2	1236	1113.91	122.09	122	1		
3	1234	3	1234	1110.23	123.77	113	2		
4	1235	4	1235	1121.84	113.16	113	2		
5	1237	5	1237	1129.89	107.11	107	2		
6	1236	6	1236	1130.9	105.1	107	2		
7	1237	7	1237	1147.12	89.88	106	1		
8	1235	8	1235	1159.05	75.95	105	2		
9	1237	9	1237	1154.25	82.75	105	2		
10	1236	10	1236	1167.64	68.36	103	1		
11	1236	11	1236	1177.76	58.24	102	1		
12	1237	12	1237	1164.55	72.45	100	1		
13	1236	13	1236	1146.33	89.67	98	1		
14	1236	14	1236	1133.61	102.39	96	2		
15	1235	15	1235	1128.09	106.91	96	2		
16	1237	16	1237	1134.08	102.92	95	1		
17	1237	17	1237	1140.62	96.38	93	2		
18	1235	18	1235	1136.9	98.1	93	2		
19	1236	19	1236	1135.86	100.14	90	4		
20	1236	20	1236	1131.08	104.92	90	1		
21	1238	21	1238	1132.38	105.62	90	1		
22	1236	22	1236	1140.93	95.07	90	1		
23	1236	23	1236	1140.42	95.58	89	2		
24	1235	24	1235	1142.27	92.73	89	1		
25	1236	25	1236	1145.87	90.13	88	1		
26	1236	26	1236	1147.39	88.61	83	1		
27	1238	27	1238	1144.99	93.01	76	1		
28	1236	28	1236	1145.56	90.44	72	1		
29	1234	29	1234	1144.86	89.14	68	1		
30	1236	30	1236	1147.99	88.01	58	1		
Average			1,236.00	1,140.63					
Difference			95.38						
Percentage			7.72%						
Average Error					95.375				
Std Deviation					14.45644			15.2%	
Variance					208.9887				
Skew					-0.39843				
Maximum Error					123.77				
Minimum Error					58.24				

Meter connected within one pipe diameter upstream of a check valve

EuroMag 2300		Date:	9/7/2021	Time:	11:35 AM					
		2 ft/s 30 Secods Values GPM								
ft/s	Gpm	Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count			
2	176.4	1	176.1	176.87	-0.77	0.46	1			
8	705.6	2	177.6	177.14	0.46	0.07	1			
14	1234.8	3	176.2	178.1	-1.9	0.01	1			
		4	176.7	177.45	-0.75	-0.06	1			
		5	175.7	177.26	-1.56	-0.10	1			
		6	176.8	177.12	-0.32	-0.19	1			
		7	176.4	177.03	-0.63	-0.32	1			
		8	176.5	176.6	-0.1	-0.39	1			
		9	177	177.06	-0.06	-0.42	1			
		10	175.5	176.94	-1.44	-0.63	1			
		11	176.5	176.43	0.07	-0.65	1			
		12	175.7	176.75	-1.05	-0.75	1			
		13	176.1	177.26	-1.16	-0.77	1			
		14	175.8	177.36	-1.56	-1.00	1			
		15	176.1	176.49	-0.39	-1.05	1			
		16	176.6	177.02	-0.42	-1.12	1			
		17	176.4	176.59	-0.19	-1.12	2			
		18	176.6	176.59	0.01	-1.13	1			
		19	176.1	177.1	-1	-1.16	1			
		20	175.8	177.62	-1.82	-1.42	1			
		21	176	177.46	-1.46	-1.44	1			
		22	175.3	178.32	-3.02	-1.46	1			
		23	176.7	178.25	-1.55	-1.53	1			
		24	176.9	178.02	-1.12	-1.55	1			
		25	177.5	178.92	-1.42	-1.56	1			
		26	176.9	178.03	-1.13	-1.56	2			
		27	175.4	177.39	-1.99	-1.82	1			
		28	176.4	177.05	-0.65	-1.90	1			
		29	175.7	177.23	-1.53	-1.99	1			
		30	175.8	176.92	-1.12	-3.02	1			
		Average	176.29	177.28						
		Difference	-0.99							
		Percentage	-0.56%							
		Avg Error			-0.98567					
		STDV			0.743746		-75.5%			
		CV			0.553158					
		Skew			-0.32633					
		Maximum Error			0.46					
		Minimum Error			-3.02					

		Date:	9/7/2021	Time:	1:06 PM					
		8 ft/s 30 Secods Values GPM								
		Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count			
		1	706.5	628.6	77.9	81	1			
		2	707.6	631.95	75.65	80	1			
		3	708.8	631.74	77.06	79	1			
		4	706.6	629.35	77.25	78				
		5	706.3	627.44	78.86	78				
		6	707.1	625.86	81.24	78	3			
		7	707.8	627.54	80.26	77				
		8	706.7	629.18	77.52	77				
		9	706.7	629.75	76.95	77				
		10	707.4	629.22	78.18	77				
		11	706.5	629.76	76.74	77				
		12	706.8	630.17	76.63	77	6			
		13	707.6	631.26	76.34	76				
		14	707.2	630.31	76.89	76				
		15	706.4	631.46	74.94	76				
		16	707.1	631.73	75.37	76				
		17	706.7	631.07	75.63	76				
		18	707.3	631.4	75.9	76				
		19	705.8	632.8	73	76	7			
		20	707	631.37	75.63	75				
		21	707.4	631.8	75.6	75				
		22	708.7	632.57	76.13	75				
		23	705.7	631.78	73.92	75	4			
		24	706.4	631.01	75.39	74				
		25	706.4	632.94	73.46	74	2			
		26	706	633.79	72.21	73				
		27	707.6	633.12	74.48	73				
		28	706.1	634.45	71.65	73	3			
		29	706.2	631.45	74.75	72				
		30	707.2	634.25	72.95	72	2			
		Average	706.92	630.97						
		Difference	75.95							
		Percentage	10.74%							
		Avg Error			75.94933					
		STDV			2.148931		2.8%			
		CV			4.617906					
		Skew			0.236802					
		Maximum Error			81.24					
		Minimum Error			71.65					

		Date:	9/7/2021	Time:	2:00 PM					
		14 ft/s 30 Secods Values GPM								
		Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count			
		1	1236	1083.13	152.87	154	1			
		2	1237	1083.11	153.89	153	1			
		3	1237	1086.74	150.26	150	1			
		4	1235	1087.11	147.89	148				
		5	1236	1088.59	147.41	148	2			
		6	1235	1088.69	146.31	147				
		7	1236	1088.45	147.55	147				
		8	1235	1089.56	145.44	147	3			
		9	1237	1090.23	146.77	146	1			
		10	1235	1093.28	141.72	145	1			
		11	1237	1096.31	140.69	142	1			
		12	1237	1099.05	137.95	141				
		13	1236	1089	147	141	2			
		14	1237	1098.87	138.13	140				
		15	1236	1098.98	137.02	140				
		16	1236	1097.7	138.3	140	3			
		17	1237	1096.45	140.55	139	1			
		18	1236	1097.42	138.58	138				
		19	1236	1097.88	138.12	138				
		20	1236	1101.83	134.17	138				
		21	1235	1095.4	139.6	138	4			
		22	1236	1101.48	134.52	137				
		23	1237	1096.85	140.15	137	2			
		24	1235	1098.77	136.23	136	1			
		25	1236	1096.2	139.8	135				
		26	1235	1102.41	132.59	135	2			
		27	1236	1103.6	132.4	134				
		28	1235	1103.21	131.79	133				
		29	1236	1100.68	135.32	132				
		30	1237	1100.25	136.75	132	2			
		Average	1,236.03	1,095.04						
		Difference	140.99							
		Percentage	11.41%							
		Avg Error			140.9923					
		STDV			6.034483		4.3%			
		CV			36.41498					
		Skew			0.47956					
		Maximum Error			153.89					
		Minimum Error			131.79					

Meter connected immediately downstream of a simulated pump discharge

EuroMag 2300		Date:	11/17/2021	Time:	9:00 AM		
		2 ft/s 30 Secods Values GPM					
ft/s	Gpm	Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count
2	176.4	1	177.1	176.39	0.71	1.2	
8	705.6	2	177.7	176.62	1.08	1.2	2
14	1234.8	3	176.4	176.78	-0.38	1.1	
		4	176.5	177.5	-1	1.1	2
		5	177.4	176.66	0.74	0.8	1
		6	176.5	176.48	0.02	0.7	
		7	176.1	177.19	-1.09	0.7	
		8	175.7	177.51	-1.81	0.7	3
		9	177.3	178.23	-0.93	0.5	1
		10	177.4	178.67	-1.27	0.3	1
		11	177.2	177.47	-0.27	0.0	
		12	178.5	178.01	0.49	0.0	
		13	177	178.33	-1.33	0.0	3
		14	176.8	178.43	-1.63	-0.2	1
		15	177.4	178.8	-1.4	-0.3	2
		16	177.8	178.6	-0.8	-0.3	2
		17	176.7	178.01	-1.31	-0.4	1
		18	176.7	178.71	-2.01	-0.8	1
		19	176.8	177.9	-1.1	-0.9	1
		20	175.9	176.89	-0.99	-1.0	
		21	177.5	176.7	0.8	-1.0	2
		22	177.2	176.01	1.19	-1.1	
		23	176.9	175.82	1.08	-1.1	2
		24	176.8	176.84	-0.04	-1.3	
		25	177.3	177.56	-0.26	-1.3	
		26	177.7	177.36	0.34	-1.3	3
		27	177.3	176.58	0.72	-1.4	1
		28	177.7	176.5	1.2	-1.6	1
		29	176.5	176.5	0	-1.8	1
		30	176.8	177.03	-0.23	-2.0	1
		Average	177.02	177.34			
		Difference	-0.32				
		Percentage	-0.18%				
		Avg Error			-0.316		
		STDV			0.966315		-305.8%
		CV			0.933764		
		Skew			0.056411		
		Maximum Error			1.2		
		Minimum Error			-2.01		

		Date:	11/17/2021	Time:	10:30 AM		
		8 ft/s 30 Secods Values GPM					
Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count		
1	706.9	623.32	83.58	93	1		
2	706.1	621.05	85.05	92	1		
3	707.5	620.08	87.42	91			
4	706.6	621.24	85.36	91	2		
5	706.3	620.14	86.16	90			
6	705.7	617.38	88.32	90	2		
7	706	615.12	90.88	88			
8	707.1	616.81	90.29	88			
9	707.7	620.71	86.99	88	3		
10	705.9	621.06	84.84	87			
11	707.2	625.82	81.38	87			
12	707.7	623.6	84.1	87			
13	706.6	623.88	82.72	87			
14	706.5	619.07	87.43	87	5		
15	707.3	614.89	92.41	86			
16	706.4	615.09	91.31	86			
17	706.8	620.87	85.93	86			
18	707.2	620.99	86.21	86	4		
19	706.6	618.35	88.25	85			
20	706.9	617.01	89.89	85			
21	706.4	613.47	92.93	85			
22	706.8	619.17	87.63	85	4		
23	707.7	620.31	87.39	84			
24	706.7	621.75	84.95	84			
25	707.6	620.93	86.67	84	3		
26	706.3	620.44	85.86	83			
27	705.5	622.85	82.65	83	2		
28	706.6	622.75	83.85	82			
29	706.8	624.48	82.32	82	2		
30	706.7	624.48	82.22	81	1		
		Average	706.74	620.24			
		Difference	86.50				
		Percentage	12.24%				
		Avg Error			86.49967		
		STDV			3.037506		3.5%
		CV			9.226443		
		Skew			0.387282		
		Maximum Error			92.93		
		Minimum Error			81.38		

		Date:	11/17/2021	Time:	12:00 PM		
		14 ft/s 30 Secods Values GPM					
Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count		
1	1235	1097.1	137.9	154	1		
2	1237	1087.92	149.08	153	1		
3	1236	1088.49	147.51	152			
4	1234	1086	148	152			
5	1236	1084.31	151.69	152	3		
6	1235	1087.05	147.95	150	1		
7	1235	1090.23	144.77	149	1		
8	1235	1093.26	141.74	148			
9	1236	1093.4	142.6	148			
10	1235	1097.27	137.73	148	3		
11	1235	1099.45	135.55	147	1		
12	1234	1097.42	136.58	145			
13	1236	1099.06	136.94	145	2		
14	1236	1097.35	138.65	144			
15	1236	1098.59	137.41	144	2		
16	1235	1100.38	134.62	143			
17	1235	1101.35	133.65	143	2		
18	1236	1098.18	137.82	142			
19	1236	1095.75	140.25	142	2		
20	1235	1091.91	143.09	140	1		
21	1235	1091.34	143.66	139	1		
22	1236	1092.17	143.83	138			
23	1236	1091.31	144.69	138			
24	1235	1088.24	146.76	138	3		
25	1235	1083.12	151.88	137			
26	1236	1094.45	141.55	137			
27	1235	1082.14	152.86	137	3		
28	1235	1085.17	149.83	136	1		
29	1235	1083.46	151.54	135	1		
30	1236	1082.46	153.54	134	1		
		Average	1,235.40	1,091.94			
		Difference	143.46				
		Percentage	11.61%				
		Avg Error			143.4557		
		STDV			5.880446		4.1%
		CV			34.57964		
		Skew			0.108131		
		Maximum Error			153.54		
		Minimum Error			133.65		

Meter is connected within one pipe diameter downstream of a 90° bend							
Date: 10/5/2021		Time: 9:30 AM					
Krohne WaterFlux - 3070							
2 ft/s 30 Secods Values GPM							
ft/s	Gpm	Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count
2	313.6	1	315.2	311.65	3.55	9.1	1
8	1254.4	2	315.7	309.36	6.34	8.7	
14	2195.2	3	316.4	310.02	6.38	8.7	2
		4	315.5	310.11	5.39	8.6	1
		5	315.8	310.85	4.95	8.5	1
		6	316.7	310.2	6.5	7.9	1
		7	315.2	310.41	4.79	7.8	1
		8	317.3	308.58	8.72	7.7	1
		9	316.4	308.7	7.7	7.2	1
		10	316.6	311.27	5.33	7.1	1
		11	316	313.32	2.68	6.9	
		12	316.3	310.46	5.84	6.9	
		13	317.1	311.75	5.35	6.9	3
		14	315.4	307.48	7.92	6.5	
		15	315.9	307.39	8.51	6.5	2
		16	316.5	307.39	9.11	6.4	1
		17	315.6	308.52	7.08	6.3	1
		18	316.6	310.75	5.85	5.9	1
		19	317.2	311.82	5.38	5.8	
		20	316.5	309.55	6.95	5.8	2
		21	316.4	310.65	5.75	5.7	1
		22	316.9	311.19	5.71	5.5	1
		23	315.3	309.79	5.51	5.4	
		24	316.4	309.47	6.93	5.4	
		25	315.8	309.26	6.54	5.4	3
		26	316.3	308.53	7.77	5.3	1
		27	316.8	309.86	6.94	4.9	1
		28	316.5	309.27	7.23	4.8	1
		29	315.9	307.2	8.7	3.6	1
		30	315.8	307.2	8.6	2.7	1
Average	316.20	309.73					
Difference	6.47						
Percentage	2.05%						
Avg Error			6.466667				
STDV			1.509776			23.3%	
CV			2.279422				
Skew			-0.27976				
Maximum Error				9.11			
Minimum Error				2.68			

Date: 10/4/2021		Time: 1:00 PM					
Krohne WaterFlux - 3070							
8 ft/s 30 Secods Values GPM							
ft/s	Gpm	Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count
		1	1257	1126.06	130.94	167	1
		2	1258	1111.27	146.73	150	1
		3	1255	1116.48	138.52	147	1
		4	1257	1115.83	141.17	146	
		5	1255	1116.77	138.23	146	2
		6	1255	1141.36	113.64	145	
		7	1258	1121.17	136.83	145	2
		8	1256	1113.54	142.46	144	
		9	1257	1134.13	122.87	144	2
		10	1256	1120.35	135.65	143	1
		11	1257	1118.53	138.47	142	
		12	1255	1117.17	137.83	142	
		13	1256	1131.69	124.31	142	3
		14	1258	1112.35	145.65	141	1
		15	1254	1112.11	141.89	139	1
		16	1258	1112.69	145.31	138	
		17	1255	1121.6	133.4	138	
		18	1256	1113.58	142.42	138	3
		19	1258	1121.75	136.25	137	1
		20	1255	1105.36	149.64	136	
		21	1260	1124.38	135.62	136	
		22	1255	1111.71	143.29	136	3
		23	1257	1112.62	144.38	133	1
		24	1255	1111.37	143.63	131	1
		25	1258	1134.64	123.36	124	1
		26	1254	1108.6	145.4	123	
		27	1256	1110.02	145.98	123	
		28	1256	1184.96	71.04	123	3
		29	1257	1134.07	122.93	114	1
		30	1258	1090.53	167.47	71	1
Average		1,256.40	1,120.22				
Difference		136.18					
Percentage		10.84%					
Avg Error			136.177				
STDV			15.70339			11.5%	
CV			246.5964				
Skew			-2.32743				
Maximum Error			167.47				
Minimum Error			71.04				

Date: 10/4/2021		Time: 2:00 PM					
Krohne WaterFlux - 3070							
14 ft/s 30 Secods Values GPM							
ft/s	Gpm	Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count
		1	2196	1923.62	272.38	402	1
		2	2197	1864.58	332.42	377	1
		3	2194	1866.15	327.85	374	1
		4	2197	1850.5	346.5	371	1
		5	2197	1901.92	295.08	358	1
		6	2195	1840.26	354.74	355	1
		7	2195	1887.68	307.32	347	1
		8	2196	1874.53	321.47	342	1
		9	2198	1858.35	339.65	340	1
		10	2194	1888.34	305.66	332	1
		11	2196	1824.64	371.36	331	1
		12	2196	1868.74	327.26	328	
		13	2195	1867.41	327.59	328	2
		14	2198	1902.16	295.84	327	
		15	2196	1874.55	321.45	327	2
		16	2197	1854.59	342.41	322	1
		17	2196	1873.88	322.12	321	
		18	2195	1894.18	300.82	321	2
		19	2195	1877.65	317.35	317	1
		20	2195	1792.57	402.43	315	1
		21	2194	1879.24	314.76	313	1
		22	2194	1900.97	293.03	307	1
		23	2196	1883.33	312.67	306	1
		24	2198	1867	331	301	1
		25	2195	1818.05	376.95	296	1
		26	2197	1870.08	326.92	295	1
		27	2194	1911.92	282.08	293	1
		28	2195	1836.53	358.47	282	1
		29	2195	1923.41	271.59	272	
		30	2196	1821.7	374.3	272	2
Average		2,195.73	1,869.95				
Difference		325.78					
Percentage		14.84%					
Avg Error			325.7823				
STDV			30.6628			9.4%	
CV			940.2075				
Skew			0.424756				
Maximum Error			402.43				
Minimum Error			271.59				

Meter is connected within one pipe diameter upstream of a 90° bend

Krohne WaterFlux		Date:	10/13/2021	Time:	11:30 AM					
ft/s	Gpm	Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count			
2	313.6	1	314.1	319.73	-5.63	12.5	1			
8	1254.4	2	313.7	315.97	-2.27	3.0	1			
14	2195.2	3	313.4	316.15	-2.75	2.9				
		4	314.7	318.06	-3.36	2.9	2			
		5	314	318.08	-4.08	2.7	1			
		6	315.1	317.57	-2.47	2.4	1			
		7	314.5	314.42	0.08	2.0	1			
		8	313.8	316.08	-2.28	0.2	1			
		9	314.5	311.61	2.89	0.1	1			
		10	315.4	318.96	-3.56	-1.1	1			
		11	314.1	311.2	2.9	-1.8	1			
		12	313.8	311.39	2.41	-2.0	1			
		13	313.5	315.3	-1.8	-2.1	1			
		14	314.3	311.27	3.03	-2.3				
		15	314.1	312.14	1.96	-2.3	2			
		16	314.5	315.56	-1.06	-2.5	1			
		17	314.4	316.49	-2.09	-2.6	1			
		18	314	313.78	0.22	-2.7	1			
		19	313.4	318.31	-4.91	-2.8	1			
		20	313.6	310.89	2.71	-2.9	1			
		21	313.8	316.41	-2.61	-3.0	1			
		22	313.9	321.98	-8.08	-3.4	1			
		23	313.6	316.51	-2.91	-3.6	1			
		24	314	315.98	-1.98	-4.0	1			
		25	313.9	316.56	-2.66	-4.1	1			
		26	314.1	318.11	-4.01	-4.9	1			
		27	314.3	301.84	12.46	-5.0	1			
		28	313.7	316.66	-2.96	-5.1	1			
		29	314	319.02	-5.02	-5.6	1			
		30	314.8	319.89	-5.09	-8.1	1			
		Average	314.10	315.53						
		Difference	-1.43							
		Percentage	-0.46%							
		Avg Error			-1.43067					
		STDV			3.801372		265.7%			
		CV			14.45043					
		Skew			1.618559					
		Maximum Error			12.46					
		Minimum Error			-8.08					

Krohne WaterFlux		Date:	9/29/2021	Time:	10:00 AM					
ft/s	Gpm	Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count			
		1	1256	1053.41	202.59	224	1			
		2	1257	1046.86	210.14	220	1			
		3	1255	1050.23	204.77	217	1			
		4	1259	1054.68	204.32	215				
		5	1256	1056.45	199.55	215	2			
		6	1255	1056	199	214				
		7	1258	1043.26	214.74	214				
		8	1256	1050.21	205.79	214	3			
		9	1258	1044.63	213.37	213				
		10	1255	1040.11	214.89	213	2			
		11	1258	1053.3	204.7	212	1			
		12	1255	1044.12	210.88	211	1			
		13	1256	1041.65	214.35	210	1			
		14	1257	1058.87	198.13	207	1			
		15	1254	1048.12	205.88	206				
		16	1256	1049.38	206.62	206				
		17	1258	1052.16	205.84	206	3			
		18	1255	1052.69	202.31	205	2			
		19	1257	1036.51	220.49	205				
		20	1257	1032.98	224.02	205	3			
		21	1255	1041.45	213.55	204				
		22	1254	1058.6	195.4	204	2			
		23	1257	1043.34	213.66	203	1			
		24	1255	1060.36	194.64	202	1			
		25	1256	1067.92	188.08	200	1			
		26	1255	1051.45	203.55	199	1			
		27	1257	1051.99	205.01	198	1			
		28	1255	1042.51	212.49	195				
		29	1257	1043.8	213.2	195	2			
		30	1256	1039.21	216.79	188	1			
		Average	1,256.17	1,048.88						
		Difference	207.29							
		Percentage	16.50%							
		Avg Error			207.2917					
		STDV			7.926537		3.8%			
		CV			62.82999					
		Skew			-0.19579					
		Maximum Error			224.02					
		Minimum Error			188.08					

Krohne WaterFlux		Date:	9/29/2021	Time:	3:00 PM					
ft/s	Gpm	Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count			
		1	2196	1560	636	648	1			
		2	2194	1568	626	636	1			
		3	2199	1751	448	633	1			
		4	2197	1783.6	413.4	626	1			
		5	2196	1838.39	357.61	622	1			
		6	2195	1821.9	373.1	598	1			
		7	2197	1811.1	385.9	521	1			
		8	2195	1860.08	334.92	510	1			
		9	2199	1844.16	354.84	448	1			
		10	2195	1881.13	313.87	440				
		11	2195	1561.73	633.27	440	2			
		12	2197	1548.91	648.09	413	1			
		13	2195	1981.19	213.81	386	1			
		14	2197	2046.45	150.55	383				
		15	2195	1684.64	510.36	383	2			
		16	2196	1755.66	440.34	373				
		17	2198	1825.24	372.76	373	2			
		18	2197	1981.74	215.26	358	1			
		19	2195	1812.25	382.75	355	1			
		20	2199	1876.15	322.85	335	1			
		21	2196	1938.12	257.88	333	1			
		22	2197	2013.32	183.68	323	1			
		23	2195	1596.64	598.36	314	1			
		24	2195	1962.33	232.67	258	1			
		25	2195	1956.47	238.53	239	1			
		26	2195	1572.8	622.2	233	1			
		27	2196	1812.54	383.46	215	1			
		28	2198	1677.37	520.63	214	1			
		29	2196	1863.39	332.61	184	1			
		30	2195	1755.47	439.53	151	1			
		Average	2,196.17	1,798.06						
		Difference	398.11							
		Percentage	18.13%							
		Avg Error			398.1077					
		STDV			144.2286		36.2%			
		CV			20801.88					
		Skew			0.307091					
		Maximum Error			648.09					
		Minimum Error			150.55					

Meter connected within one pipe diameter downstream of a check valve																			
Krohne WaterFlux 3070		Date:	8/19/2021	Time:	8:43 AM		Date:	8/19/2021	Time:	10:28 AM		Date:	44428	Time:	0.293056				
2 ft/s 30 Secods Values GPM							8 ft/s 30 Secods Values GPM					14 ft/s 30 Secods Values GPM							
ft/s	Gpm	Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count	Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count	Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count
2	313.6	1	314.6	300.05	14.55	27	1	1	1255	1217.09	37.91	77	1	1	2198	1844.9	353.1	452	1
8	1254.4	2	314.5	303.98	10.52	24	1	2	1254	1226.06	27.94	61	1	2	2196	1743.84	452.16	428	1
14	2195.2	3	313.7	301.67	12.03	21	1	3	1253	1176.01	76.99	59	1	3	2194	1772.38	421.62	423	1
		4	313.6	303.67	9.93	20		4	1253	1231.88	21.12	54		4	2195	1766.93	428.07	422	1
Notes:		5	313.9	300.87	13.03	20		5	1255	1207.64	47.36	54	2	5	2200	1805.14	394.86	421	1
8 inch OD		6	314.2	296.64	17.56	20	3	6	1255	1221.24	33.76	47	1	6	2193	1769.55	423.45	420	1
5 minutes to stabilize		7	314.5	302.89	11.61	19	1	7	1254	1227.68	26.32	43		7	2195	1791.6	403.4	409	
		8	314.6	294.38	20.22	18	1	8	1254	1227.15	26.85	43	2	8	2195	1817.97	377.03	409	2
		9	313.5	300.36	13.14	15		9	1253	1233.9	19.1	39	1	9	2193	1797.06	395.94	407	
		10	314.2	304.28	9.92	15	2	10	1254	1193.2	60.8	38		10	2192	1784.84	407.16	407	2
		11	313.8	292.4	21.4	14		11	1256	1217.4	38.6	38	2	11	2195	1773.96	421.04	403	
		12	314.1	304.9	9.2	14	2	12	1255	1226.98	28.02	36	1	12	2195	1795.62	399.38	403	2
		13	313.8	301.79	12.01	13		13	1253	1216.62	36.38	35	1	13	2197	1803.96	393.04	402	1
		14	313.4	298.27	15.13	13	2	14	1255	1230.86	24.14	34	1	14	2197	1788	409	399	1
		15	314.3	303.22	11.08	12		15	1254	1226.79	27.21	31	1	15	2194	1817.59	376.41	396	1
		16	313.5	301.03	12.47	12		16	1254	1236.02	17.98	29	1	16	2196	1809.03	386.97	395	
		17	314.8	295.38	19.42	12		17	1256	1218.44	37.56	28		17	2190	1810.06	379.94	395	
		18	313.7	300.08	13.62	12		18	1254	1195.44	58.56	28	2	18	2194	1774.36	419.64	395	
		19	314.5	302.07	12.43	12		19	1254	1210.79	43.21	27		19	2196	1792.89	403.11	395	4
		20	314.9	288.2	26.7	12		20	1254	1240.61	13.39	27	2	20	2197	1808.42	388.58	393	1
		21	314.3	305.03	9.27	12	7	21	1256	1202.37	53.63	26	1	21	2196	1789.38	406.62	389	1
		22	313.9	305.44	8.46	11		22	1256	1224.73	31.27	24	1	22	2195	1799.69	395.31	387	1
		23	314.1	294.19	19.91	11		23	1255	1211.99	43.01	21	1	23	2198	1833.72	364.28	380	1
		24	314.9	290.5	24.4	11		24	1253	1223.53	29.47	19	1	24	2197	1795.28	401.72	377	1
		25	313.9	300.3	13.6	11	4	25	1257	1246.74	10.26	18	1	25	2195	1800.1	394.9	376	1
		26	313.7	303.09	10.61	10		26	1254	1236.65	17.35	17	1	26	2195	1827.77	367.23	367	1
		27	314.2	294.55	19.65	10	2	27	1255	1201.12	53.88	16	1	27	2194	1785.48	408.52	365	1
		28	313.8	301.9	11.9	9		28	1255	1220.19	34.81	13	1	28	2196	1800.87	395.13	364	1
		29	314.1	303.52	10.58	9	2	29	1253	1247.09	5.91	10	1	29	2199	1834.2	364.8	353	1
		30	313.3	301.63	11.67	8	1	30	1253	1236.85	16.15	6	1	30	2195	1845.1	349.9	350	1
Average		314.08	299.88					Average	1,254.40	1,221.10				Average	2,195.40	1,799.32			
Difference GPM		14.20						Difference GPM	33.30					Difference GPM	396.08				
Percentage		4.52%						Percentage	2.65%					Percentage	18.04%				
Avg Error				14.20067				Avg Error		33.298				Avg Error		396.077			
STDV				4.674378		32.9%		STDV		16.02812		48.1%		STDV		22.66724		5.7%	
CV				21.84981				CV		256.9006				CV		513.8038			
Skew				1.130768				Skew		0.703478				Skew		-0.006			
Maximum Error				26.7				Maximum Error		76.99				Maximum Error		452.16			
Minimum Error				8.46				Minimum Error		5.91				Minimum Error		349.9			

Meter connected within one pipe diameter upstream of a check valve								
		Date:	44431			Time:		
Krohne WaterFlux 3070		2 ft/s 30 Secods Values GPM						
ft/s	Gpm	Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count	
2	313.6	1	313.1	261.44	51.66	57	1	
8	1254.4	2	313.1	258.88	54.22	56	1	
14	2195.2	3	314.1	263.8	50.3	55	1	
		4	313.3	263.59	49.71	54		
		5	314.2	261.55	52.65	54	2	
		6	313.3	275.11	38.19	53		
		7	314	270.18	43.82	53	2	
		8	315.3	260.33	54.97	52	1	
		9	314.9	258.96	55.94	50		
		10	313.5	269.69	43.81	50	2	
		11	313.9	275.35	38.55	49		
		12	313.4	268.73	44.67	49	2	
		13	313	282.89	30.11	48	1	
		14	313.7	278.08	35.62	46		
		15	313.5	269.69	43.81	46	2	
		16	313.1	278.25	34.85	45	1	
		17	313.7	259.37	54.33	44		
		18	312	258.83	53.17	44		
		19	314.9	265.88	49.02	44	3	
		20	312.6	255.45	57.15	39	1	
		21	313.3	284.47	28.83	38	1	
		22	312.4	263.98	48.42	37	1	
		23	313.9	277.34	36.56	36		
		24	313.2	267.45	45.75	36		
		25	313.5	277.13	36.37	36	3	
		26	314	267.94	46.06	35	1	
		27	313.4	279.78	33.62	34	1	
		28	314.1	278.45	35.65	33	1	
		29	314.7	281.81	32.89	30	1	
		30	313.9	265.2	48.7	29	1	
Average			313.63	269.32				
Difference			44.31					
Percentage			14.13%					
Avg Error					44.31333			
STDV					8.293657		18.7%	
CV					68.78475			
Skew					-0.22472			
Maximum Error					57.15			
Minimum Error					28.83			

0.270833						
		Date:	44431			Time:
8 ft/s 30 Secods Values GPM						
Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count	
1	1255	1197.74	57.26	62	1	
2	1254	1210.6	43.4	57	1	
3	1254	1215.11	38.89	52	1	
4	1253	1202.67	50.33	51	1	
5	1253	1221.39	31.61	50		
6	1254	1191.95	62.05	50	2	
7	1254	1209.54	44.46	46	1	
8	1256	1221.45	34.55	44	1	
9	1254	1233.2	20.8	43		
10	1254	1207.72	46.28	43		
11	1254	1233.25	20.75	43	3	
12	1256	1220.08	35.92	39	1	
13	1256	1229.48	26.52	38	1	
14	1254	1211.11	42.89	36		
15	1256	1221.92	34.08	36		
16	1255	1222.14	32.86	36	3	
17	1257	1213.73	43.27	35		
18	1256	1220.37	35.63	35	2	
19	1256	1204.79	51.21	34		
20	1254	1234.24	19.76	34	2	
21	1255	1218.84	36.16	33	1	
22	1255	1231.93	23.07	32	1	
23	1256	1229.14	26.86	27		
24	1256	1217.71	38.29	27		
25	1256	1229.14	26.86	27	3	
26	1256	1205.71	50.29	23	1	
27	1257	1222.1	34.9	21		
28	1255	1221.33	33.67	21	2	
29	1254	1235.49	18.51	20	1	
30	1254	1202.05	51.95	19	1	
Average		1,254.97	1,217.86			
Difference		37.10				
Percentage		2.96%				
Avg Error				37.10267		
STDV				11.30553		30.5%
CV				127.8149		
Skew				0.230167		
Maximum Error				62.05		
Minimum Error				18.51		

0.336806							
		Date:	44428			Time:	0.55
14 ft/s 30 Secods Values GPM							
Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count		
1	2196	1757.65	438.35	488	1		
2	2193	1741.75	451.25	485	1		
3	2196	1756.81	439.19	484	1		
4	2194	1769.09	424.91	467	1		
5	2193	1775.91	417.09	462	1		
6	2195	1733.43	461.57	459	1		
7	2197	1832.21	364.79	457	1		
8	2197	1816.06	380.94	451	1		
9	2194	1757.52	436.48	445	1		
10	2199	1732.4	466.6	439	1		
11	2195	1788.62	406.38	438	1		
12	2194	1781.87	412.13	437	1		
13	2200	1804.86	395.14	436			
14	2196	1779.23	416.77	436	2		
15	2194	1786.2	407.8	434	1		
16	2199	1713.68	485.32	432			
17	2197	1708.9	488.1	432			
18	2192	1732.99	459.01	432	3		
19	2195	1760.69	434.31	429	1		
20	2194	1774.94	419.06	428	1		
21	2195	1762.76	432.24	425	1		
22	2196	1712.03	483.97	419	1		
23	2197	1760.89	436.11	417			
24	2194	1762.03	431.97	417	2		
25	2196	1758.74	437.26	412	1		
26	2196	1764.34	431.66	408	1		
27	2198	1769.69	428.31	406	1		
28	2194	1748.86	445.14	395	1		
29	2199	1742.32	456.68	381	1		
30	2196	1767.2	428.8	365	1		
Average		2,195.70	1,761.79				
Difference		433.91					
Percentage		19.76%					
Avg Error				433.911		6.5%	
STDV				27.99569			
CV				783.7587			
Skew				-0.14278			
Maximum Error				488.1			
Minimum Error				364.79			

Meter connected immediately downstream of a simulated pump discharge

Date: 10/26/2021 Time: 6:10 AM

Krohne WaterFlux		2 ft/s 30 Secods Values GPM					
ft/s	Gpm	Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count
2	313.6	1	317	312.7	4.3	12.4	1
8	1254.4	2	314.6	366.5	-51.9	12.2	1
14	2195.2	3	314.2	309.8	4.4	7.1	1
		4	315.9	310.5	5.4	5.7	1
		5	314.6	302.4	12.2	5.4	1
		6	315.7	333.24	-17.54	4.4	1
		7	314.6	364.5	-49.9	4.3	1
		8	315.8	373.94	-58.14	1.9	1
		9	313.7	312.6	1.1	1.8	1
		10	315.2	321.4	-6.2	1.1	1
		11	314.8	302.4	12.4	0.3	1
		12	315.1	324.7	-9.6	-3.4	1
		13	315.5	323.55	-8.05	-5.0	1
		14	313.2	312.9	0.3	-6.2	1
		15	315.3	337.87	-22.57	-8.1	1
		16	314.8	336.12	-21.32	-8.1	2
		17	313.8	312.02	1.78	-9.6	1
		18	316.8	321.8	-5	-10.2	1
		19	315.3	323.45	-8.15	-10.9	1
		20	315.2	326.11	-10.91	-17.5	1
		21	313.4	337.56	-24.16	-17.7	1
		22	315.1	307.99	7.11	-20.5	1
		23	315.2	309.5	5.7	-21.3	1
		24	314.8	312.89	1.91	-22.6	1
		25	313.3	323.54	-10.24	-24.2	1
		26	316.5	334.15	-17.65	-49.9	1
		27	315.2	374.56	-59.36	-51.9	1
		28	314.6	367.31	-52.71	-52.7	1
		29	316.7	337.22	-20.52	-58.1	1
		30	313.4	316.8	-3.4	-59.4	1

Notes:
8 inch OD
5 minutes to stabilize

Average	314.98	328.33	
Difference	-13.36		
Percentage	-4.24%		
Avg Error			-13.3573
STDV			20.88398
CV			436.1406
Skew			-1.06141
Maximum Error			12.4
Minimum Error			-59.36

-156.3%

Date: 10/26/2021 Time: 9:07 AM

Krohne WaterFlux		8 ft/s 30 Secods Values GPM					
ft/s	Gpm	Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count
		1	1260	1097.03	162.97	192	1
		2	1254	1102.07	151.93	190	1
		3	1259	1123.86	135.14	185	1
		4	1251	1080.95	170.05	185	2
		5	1257	1090.4	166.6	179	1
		6	1255	1107.7	147.3	175	1
		7	1258	1115.57	142.43	172	1
		8	1259	1079.96	179.04	171	1
		9	1255	1083.32	171.68	170	1
		10	1256	1097.89	158.11	167	1
		11	1253	1087.92	165.08	165	1
		12	1255	1101.9	153.1	164	1
		13	1253	1104.32	148.68	163	1
		14	1255	1070.49	184.51	159	1
		15	1256	1106.38	149.62	158	1
		16	1254	1062.48	191.52	157	1
		17	1257	1085.76	171.24	153	1
		18	1260	1135.56	124.44	152	1
		19	1252	1061.59	190.41	150	1
		20	1257	1098.3	158.7	149	1
		21	1256	1112.77	143.23	148	1
		22	1254	1105.93	148.07	147	1
		23	1256	1092.19	163.81	143	1
		24	1255	1069.77	185.23	142	1
		25	1254	1097.03	156.97	139	1
		26	1256	1198.45	57.55	135	1
		27	1257	1134.87	122.13	131	1
		28	1256	1081.04	174.96	124	1
		29	1255	1115.54	139.46	122	1
		30	1258	1126.78	131.22	58	1

Average	1,255.77	1,100.93	
Difference	154.84		
Percentage	12.33%		
Avg Error			154.8393
STDV			25.63777
CV			657.2952
Skew			-1.71989
Maximum Error			191.52
Minimum Error			57.55

16.6%

Date: 10/26/2021 Time: 11:00 AM

Krohne WaterFlux		14 ft/s 30 Secods Values GPM					
ft/s	Gpm	Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count
		1	2199	1830.67	368.33	391	1
		2	2196	1805.31	390.69	384	1
		3	2197	1892.55	304.45	368	1
		4	2195	1856.6	338.4	361	1
		5	2198	1889.21	308.79	358	1
		6	2198	1886.03	311.97	357	1
		7	2193	1892.56	300.44	354	1
		8	2194	1928.09	265.91	353	1
		9	2198	1888.34	309.66	347	1
		10	2197	1866.39	330.61	343	1
		11	2196	1915.08	280.92	342	1
		12	2199	1858.15	340.85	341	1
		13	2195	1834.11	360.89	340	1
		14	2199	1844.99	354.01	338	1
		15	2198	1865.73	332.27	335	1
		16	2194	1867.97	326.03	333	1
		17	2197	1875.3	321.7	332	1
		18	2194	1854.44	339.56	331	1
		19	2198	1869.34	328.66	329	1
		20	2195	1836.79	358.21	326	1
		21	2194	1860.59	333.41	322	1
		22	2196	1902.04	293.96	312	1
		23	2197	1862.04	334.96	310	1
		24	2196	1854.43	341.57	309	1
		25	2194	1851.35	342.65	304	1
		26	2196	1843.14	352.86	300	1
		27	2196	1848.92	347.08	294	1
		28	2198	1904.64	293.36	293	1
		29	2195	1811.03	383.97	281	1
		30	2196	1838.91	357.09	266	1

Average	2,196.27	1,864.49	
Difference	331.78		
Percentage	15.11%		
Avg Error			331.7753
STDV			28.53074
CV			814.003
Skew			-0.19436
Maximum Error			390.69
Minimum Error			265.91

8.6%

Meter is connected within one pipe diameter downstream of a 90° bend							
McCrometer Duramag		Date:	10/11/2021	Time:		9:00 AM	
2 ft/s 30 Seconds Values GPM							
ft/s	Gpm	Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count
2	313.6	1	313.8	308	5.8	6.6	1
8	1254.4	2	314.2	308.9	5.3	5.8	1
14	2195.2	3	314.6	309	5.6	5.6	
		4	314.5	309.7	4.8	5.6	2
		5	313.1	309.9	3.2	5.4	1
		6	313.1	311	2.1	5.3	
		7	313.1	311.1	2	5.3	
		8	313.7	309.3	4.4	5.3	
		9	314.8	309.5	5.3	5.3	4
		10	313.9	309.5	4.4	5.1	
		11	313.6	309.4	4.2	5.1	2
		12	313.5	309.1	4.4	4.9	1
		13	314.6	309.8	4.8	4.8	
		14	315.8	310.7	5.1	4.8	2
		15	315.8	310.5	5.3	4.4	
		16	313.8	310.8	3	4.4	
		17	314.9	309.3	5.6	4.4	3
		18	313.6	310.3	3.3	4.3	1
		19	313	309.9	3.1	4.2	1
		20	314.8	312.2	2.6	3.9	1
		21	313.6	309.8	3.8	3.8	1
		22	314.2	309.3	4.9	3.6	
		23	313.4	306.8	6.6	3.6	2
		24	313.6	308.3	5.3	3.3	1
		25	314.8	309.4	5.4	3.2	1
		26	314.6	309.5	5.1	3.1	1
		27	314.2	310.6	3.6	3	1
		28	314.8	311.2	3.6	2.6	1
		29	315.2	311.3	3.9	2.1	1
		30	314.8	310.5	4.3	2	1
Average		314.18	309.82				
Difference		4.36					
Percentage		1.39%					
Avg Error					4.36		
STDV					1.124752	25.8%	
CV					1.265067		
Skew					-0.36864		
Maximum Error					6.6		
Minimum Error					2		

Date:						9/30/2021	Time:		0.291667
8 ft/s 30 Secods Values GPM									
Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count				
1	1256	1125.8	130.2	133	1				
2	1258	1131.6	126.4	132					
3	1256	1130.2	125.8	132					
4	1254	1128.6	125.4	132	3				
5	1256	1125	131	131					
6	1259	1126.7	132.3	131					
7	1257	1128.4	128.6	131					
8	1256	1127.4	128.6	131					
9	1257	1124.5	132.5	131					
10	1255	1128.6	126.4	131	6				
11	1258	1127.1	130.9	130					
12	1259	1228.5	30.5	130					
13	1255	1128.4	126.6	130	3				
14	1257	1128.7	128.3	129					
15	1256	1125.4	130.6	129					
16	1258	1128.5	129.5	129					
17	1257	1131.6	125.4	129					
18	1256	1128.5	127.5	129					
19	1254	1124.6	129.4	129	6				
20	1257	1125.6	131.4	128					
21	1257	1124.8	132.2	128					
22	1254	1121.9	132.1	128					
23	1257	1126.7	130.3	128	4				
24	1255	1125.6	129.4	127	1				
25	1257	1128	129	126					
26	1258	1127.4	130.6	126					
27	1255	1126.7	128.3	126	3				
28	1254	1125.2	128.8	125					
29	1257	1126.3	130.7	125	2				
30	1258	1130.2	127.8	31	1				
Average		1,256.43	1,130.55						
Difference		125.88							
Percentage		10.02%							
Avg Error			125.8833						
STDV			17.83198	14.2%					
CV			317.9794						
Skew			-5.3602						
Maximum Error			132.5						
Minimum Error			30.5						

Date:						9/30/2021	Time:	1:00 PM
14 ft/s 30 Secods Values GPM								
Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count			
1	2195	1972.3	222.7	246	1			
2	2196	1979.32	216.68	244	1			
3	2198	1965.21	232.79	243				
4	2198	1962.6	235.4	243	2			
5	2197	1971.8	225.2	241	1			
6	2198	1954.4	243.6	239	1			
7	2196	1963.7	232.3	238				
8	2197	1965.7	231.3	238	2			
9	2195	1964.2	230.8	237				
10	2197	1966.6	230.4	237	2			
11	2196	1957.9	238.1	236				
12	2195	1961.2	233.8	236	2			
13	2194	1958.6	235.4	235				
14	2197	1959	238	235				
15	2199	1956.2	242.8	235				
16	2198	1962.7	235.3	235	4			
17	2196	1959.3	236.7	234				
18	2197	1960.8	236.2	234	2			
19	2198	1968.5	229.5	233	1			
20	2194	1964.3	229.7	232	1			
21	2198	1957.4	240.6	231				
22	2195	1960.3	234.7	231				
23	2196	1958.7	237.3	231	2			
24	2197	1957.6	239.4	230				
25	2195	1952.3	242.7	230				
26	2198	1951.6	246.4	230	3			
27	2199	1963.1	235.9	229	1			
28	2195	1964.5	230.5	225	1			
29	2194	1960.1	233.9	223	1			
30	2195	1965.8	229.2	217	1			
Average		2,196.43	1,962.19					
Difference		234.24						
Percentage		10.66%						
Avg Error			234.2423					
STDV			6.190274	2.6%				
CV			38.31949					
Skew			-0.56189					
Maximum Error			246.4					
Minimum Error			216.68					

Meter is connected within one pipe diameter upstream of a 90° bend

McCrometer Duramag							8 ft/s 30 Secods Values GPM					14 ft/s 30 Secods Values GPM							
ft/s	Gpm	Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count	Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count	Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count
2	313.6	1	314.5	325.1	-10.6	-6.6	1	1	1254	1144.6	109.4	117	1	1	2199	2009.1	189.9	197	
8	1254.4	2	315.1	324	-8.9	-6.7	1	2	1256	1143.2	112.8	115		2	2199	2008.3	190.7	197	2
14	2195.2	3	313.5	323.8	-10.3	-7.0	1	3	1254	1143.5	110.5	115		3	2201	2007.1	193.9	196	
		4	313.9	322.8	-8.9	-7.2	1	4	1256	1143.9	112.1	115		4	2200	2003.2	196.8	196	
		5	313.3	322.3	-9	-7.3		5	1257	1141.8	115.2	115	4	5	2195	2001.1	193.9	196	3
Notes:		6	314.3	322.8	-8.5	-7.3	2	6	1259	1142.1	116.9	114		6	2201	2005.3	195.7	195	
8 inch OD		7	313.5	322.5	-9	-7.5	1	7	1257	1142.3	114.7	114		7	2196	2004.3	191.7	195	2
5 minutes to stabilize		8	314.6	323	-8.4	-7.6		8	1256	1143.1	112.9	114		8	2198	2006.7	191.3	194	
		9	314.4	322.6	-8.2	-7.6	2	9	1255	1145	110	114		9	2196	2005.4	190.6	194	
		10	313.8	322.2	-8.4	-7.7	1	10	1258	1144.5	113.5	114		10	2196	2008.5	187.5	194	
		11	314.6	321.9	-7.3	-7.8		11	1254	1144.2	109.8	114	6	11	2199	2003.4	195.6	194	
		12	314.4	322.3	-7.9	-7.8	2	12	1256	1146.2	109.8	113		12	2198	2008.1	189.9	194	5
		13	315.5	322.1	-6.6	-7.9	1	13	1255	1145.3	109.7	113		13	2199	2007.6	191.4	193	
		14	315.1	322.6	-7.5	-8.1	1	14	1256	1145.5	110.5	113		14	2197	2009.2	187.8	193	2
		15	314.4	322.8	-8.4	-8.2	1	15	1258	1145.2	112.8	113		15	2196	2009.1	186.9	192	
		16	313.7	322.9	-9.2	-8.4		16	1257	1144.8	112.2	113	5	16	2199	2004.3	194.7	192	2
		17	315.9	323.1	-7.2	-8.4		17	1258	1143.6	114.4	112		17	2197	2003.1	193.9	191	
		18	314.4	323.4	-9	-8.4	3	18	1257	1143.3	113.7	112		18	2199	2002.1	196.9	191	
		19	315.3	323.1	-7.8	-8.5	1	19	1258	1142.7	115.3	112		19	2195	2001.2	193.8	191	
		20	314.4	323	-8.6	-8.6	1	20	1257	1143.4	113.6	112		20	2198	2002.1	195.9	191	
		21	314.6	322.2	-7.6	-8.7	1	21	1255	1142.1	112.9	112	5	21	2197	2004.5	192.5	191	5
		22	314.7	322.5	-7.8	-8.9		22	1257	1144.4	112.6	111		22	2195	2002.1	192.9	190	
		23	315.7	322.4	-6.7	-8.9	2	23	1259	1144.4	114.6	111		23	2198	2003.2	194.8	190	
		24	314.5	322.2	-7.7	-9.0		24	1257	1145.6	111.4	111	3	24	2198	2011.2	186.8	190	
		25	313.6	322.7	-9.1	-9.0		25	1259	1141.6	117.4	110		25	2199	2007.6	191.4	190	4
		26	314.7	322.8	-8.1	-9.0	3	26	1257	1143.2	113.8	110		26	2198	2004.5	193.5	188	
		27	314.3	323	-8.7	-9.1	1	27	1254	1142.3	111.7	110		27	2197	2006.9	190.1	188	
		28	315.2	322.8	-7.6	-9.2	1	28	1259	1144.9	114.1	110	4	28	2195	2007.4	187.6	188	3
		29	315.5	322.5	-7	-10.3	1	29	1257	1144.6	112.4	109	1	29	2196	2005.7	190.3	187	
		30	314.8	322.1	-7.3	-10.6	1	30	1256	1144.1	111.9	117	1	30	2195	2003.2	191.8	187	2
		Average		314.54	322.78			Average	1,256.60	1,143.85				Average	2,197.53	2,005.52			
		Difference		-8.24				Difference	112.75					Difference	192.02				
		Percentage		-2.62%				Percentage	8.97%					Percentage	8.74%				
		Avg Error				-8.24333		Avg Error			112.7533			Avg Error			192.0167		
		STDV				0.93441	-11.3%	STDV			2.054221	1.8%		STDV			2.8984		1.5%
		CV				0.873122		CV			4.219822			CV			8.400722		
		Skew				-0.48012		Skew			0.243802			Skew			-0.16608		
		Maximum Error				-6.6		Maximum Error			117.4			Maximum Error			196.9		
		Minimum Error				-10.6		Minimum Error			109.4			Minimum Error			186.8		

Meter connected within one pipe diameter downstream of a check valve

McCrometer Duramag		Date:	8/18/2021	Time:	11:00 AM						
		2 ft/s 30 Secods Values GPM									
ft/s	Gpm	Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count				
2	313.6	1	313.3	273.8	39.5	39.7	1				
8	1254.4	2	313.7	274	39.7	39.5	1				
14	2195.2	3	314.3	275	39.3	39.4	1				
		4	313.9	275.9	38	39.3	2				
		5	313.5	276.9	36.6	39.3					
		6	314	277.1	36.9	38.8	1				
		7	313.8	277.2	36.6	38.6	1				
		8	314.3	277.9	36.4	38.4	1				
		9	313.5	276.1	37.4	38.3	1				
		10	313.6	275.5	38.1	38.2	1				
		11	313.9	275.9	38	38.1	2				
		12	313	276.2	36.8	38.1					
		13	314	276.5	37.5	38	2				
		14	313.6	275.7	37.9	38					
		15	314.1	275.9	38.2	37.9	3				
		16	313.3	276.4	36.9	37.9					
		17	313.8	275	38.8	37.9					
		18	313.5	274.2	39.3	37.5	2				
		19	313.4	275.9	37.5	37.5					
		20	314.2	276.8	37.4	37.4	2				
		21	313.3	277.8	35.5	37.4					
		22	313.3	273.9	39.4	37.3	1				
		23	314.7	276.3	38.4	36.9	2				
		24	314.2	275.9	38.3	36.9					
		25	313.4	276.1	37.3	36.8	1				
		26	313.6	278.1	35.5	36.6	2				
		27	314.7	276.8	37.9	36.6					
		28	313.7	275.6	38.1	36.4	1				
		29	313.2	274.6	38.6	35.5	2				
		30	313.8	275.9	37.9	35.5					
Average		313.75	275.96								
Difference		37.79									
Percentage		12.04%									
Avg Error				37.79							
STDV				1.080848432				2.9%			
CV				1.168233333							
Skew				-0.212448806							
Maximum Error				39.7							
Minimum Error				35.5							

McCrometer Duramag		Date:	8/18/2021	Time:	1:00 PM						
		8 ft/s 30 Secods Values GPM									
ft/s	Gpm	Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count				
		1	1255	1132.6	122.4	122	1				
		2	1256	1165.3	90.7	105	1				
		3	1255	1160.4	94.6	101	1				
		4	1256	1170.1	85.9	96	1				
		5	1254	1182.7	71.3	95					
		6	1253	1175.7	77.3	95	2				
		7	1254	1170	84	93	1				
		8	1254	1161.9	92.1	92					
		9	1254	1158.1	95.9	92					
		10	1255	1165.2	89.8	92	3				
		11	1253	1164.2	88.8	91					
		12	1254	1163.9	90.1	91	2				
		13	1255	1160.3	94.7	90					
		14	1254	1161.6	92.4	90	2				
		15	1255	1164.5	90.5	89					
		16	1253	1176	77	89	2				
		17	1254	1169.6	84.4	88	1				
		18	1256	1163.7	92.3	87	1				
		19	1254	1174.4	79.6	86					
		20	1254	1160.7	93.3	86	2				
		21	1254	1165	89	84					
		22	1253	1177.1	75.9	84	2				
		23	1253	1180.7	72.3	80	1				
		24	1254	1167.3	86.7	77					
		25	1254	1153.1	100.9	77					
		26	1256	1151	105	77	3				
		27	1255	1180.6	74.4	76	1				
		28	1254	1177.2	76.8	74	1				
		29	1254	1166.3	87.7	72	1				
		30	1254	1168.1	85.9	71	1				
Average		1,254.30	1,166.24								
Difference		88.06									
Percentage		7.02%									
Avg Error				88.05667							
STDV				10.36487				11.8%			
CV				107.4305							
Skew				0.985007							
Maximum Error				122.4							
Minimum Error				71.3							

McCrometer Duramag		Date:	8/20/2021	Time:							
		14 ft/s 30 Secods Values GPM									
ft/s	Gpm	Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count				
		1	2195	1881.5	313.5	358	1				
		2	2196	1872.2	323.8	347	1				
		3	2200	1852.8	347.2	343					
		4	2196	1878	318	343					
		5	2194	1889.8	304.2	343	3				
		6	2195	1864.9	330.1	342	1				
		7	2198	1856	342	339	1				
		8	2196	1853.3	342.7	337	1				
		9	2196	1857	339	333					
		10	2198	1882.7	315.3	333	2				
		11	2199	1899.4	299.6	330	1				
		12	2197	1875.1	321.9	326	1				
		13	2195	1881.7	313.3	325	1				
		14	2198	1872.9	325.1	324	1				
		15	2194	1867.8	326.2	323					
		16	2200	1866.9	333.1	323					
		17	2199	1862	337	323	3				
		18	2195	1871.6	323.4	322	1				
		19	2197	1896.9	300.1	320	1				
		20	2200	1882.1	317.9	318					
		21	2197	1853.7	343.3	318					
		22	2194	1836.4	357.6	318	3				
		23	2196	1852.8	343.2	315	1				
		24	2196	1876.1	319.9	314	1				
		25	2194	1875.9	318.1	313	1				
		26	2196	1863.2	332.8	304	1				
		27	2202	1878.8	323.2	301	1				
		28	2197	1899.3	297.7	300					
		29	2193	1891.7	301.3	300	2				
		30	2197	1873.6	323.4	298	1				
Average		2,196.67	1,872.20								
Difference		324.46									
Percentage		14.77%									
Avg Error				324.4633							
STDV				15.13247				4.7%			
CV				228.9917							
Skew				0.052229							
Maximum Error				357.6							
Minimum Error				297.7							

Meter connected within one pipe diameter upstream of a check valve							
Date:		8/23/2021		Time:		10:06 AM	
McCrometer Duramag							
2 ft/s 30 Secods Values GPM							
ft/s	Gpm	Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count
2	313.6	1	315.9	286.7	29.2	32.4	1
8	1254.4	2	313.5	284.6	28.9	32.0	1
14	2195.2	3	314.5	285.2	29.3	31.7	1
		4	314.2	284.5	29.7	31.6	1
		5	314	284.4	29.6	31.5	1
		6	313.5	285.3	28.2	31.3	
		7	313.3	284.3	29	31.3	2
		8	315.6	283.2	32.4	31.2	
		9	314.3	284.3	30	31.2	2
		10	313.9	284	29.9	30.9	1
		11	313.8	284.2	29.6	30.8	1
		12	314.2	285.1	29.1	30.6	
		13	313.4	285.7	27.7	30.6	2
		14	313.5	285.4	28.1	30.4	1
		15	314	284.1	29.9	30.0	1
		16	313	283.8	29.2	29.9	
		17	314.5	283.2	31.3	29.9	2
		18	314	282.7	31.3	29.7	1
		19	313.8	283.2	30.6	29.6	
		20	314.3	282.7	31.6	29.6	
		21	313.9	283.5	30.4	29.6	3
		22	314.2	282.2	32	29.3	1
		23	313.6	282.7	30.9	29.2	
		24	314.7	283.2	31.5	29.2	2
		25	315.6	283.9	31.7	29.1	1
		26	313.9	283.3	30.6	29.0	1
		27	313.5	282.3	31.2	28.9	1
		28	313.5	282.7	30.8	28.2	1
		29	314.9	283.7	31.2	28.1	1
		30	313.7	284.1	29.6	27.7	1
Average		314.09	283.94				
Difference		30.15					
Percentage		9.60%					
Avg Error					30.15		
STDV				1.195756	4.0%		
CV				1.429833			
Skew				-0.10505			
Maximum Error				32.4			
Minimum Error				27.7			

Date:		8/23/2021		Time:		11:00 AM
McCrometer Duramag						
8 ft/s 30 Secods Values GPM						
Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count	
1	1255	1198.5	56.5	57	1	
2	1256	1199.8	56.2	56	1	
3	1255	1204.1	50.9	54	1	
4	1254	1204.1	49.9	52		
5	1256	1206	50	52		
6	1256	1203.6	52.4	52		
7	1254	1203.8	50.2	52		
8	1256	1204.6	51.4	52	5	
9	1257	1204.6	52.4	51		
10	1254	1204.2	49.8	51		
11	1257	1204.8	52.2	51		
12	1253	1205.7	47.3	51	4	
13	1256	1206.8	49.2	50		
14	1255	1204.5	50.5	50		
15	1256	1203.9	52.1	50		
16	1258	1203.6	54.4	50		
17	1256	1203.8	52.2	50		
18	1254	1205.9	48.1	50		
19	1254	1207.6	46.4	50		
20	1255	1207	48	50		
21	1255	1205.1	49.9	50	9	
22	1256	1205.6	50.4	49	1	
23	1255	1207.2	47.8	48		
24	1254	1207.2	46.8	48		
25	1255	1205.3	49.7	48		
26	1255	1206.7	48.3	48		
27	1257	1207.3	49.7	48	5	
28	1255	1205.3	49.7	47		
29	1255	1206.7	48.3	47	2	
30	1256	1205.3	50.7	46	1	
Average	1,255.33	1,204.95				
Difference	50.38					
Percentage	4.01%					
Avg Error			50.38			
STDV			2.413352	4.8%		
CV			5.824267			
Skew			0.810589			
Maximum Error			56.5			
Minimum Error			46.4			

Date:		8/20/2021		Time:		11:07 AM
McCrometer Duramag						
14 ft/s 30 Secods Values GPM						
Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count	
1	2196	1868.8	327.2	333	1	
2	2198	1871.5	326.5	331		
3	2195	1869.3	325.7	331		
4	2199	1868.2	330.8	331		
5	2196	1872	324	331	4	
6	2197	1871.3	325.7	330		
7	2197	1873	324	330		
8	2195	1872.3	322.7	330	3	
9	2198	1870.2	327.8	329		
10	2199	1871.5	327.5	329		
11	2199	1873.4	325.6	329	3	
12	2196	1871.4	324.6	328		
13	2197	1870	327	328		
14	2198	1870.6	327.4	328	3	
15	2199	1871.2	327.8	327		
16	2196	1870.2	325.8	327		
17	2194	1869.5	324.5	327		
18	2197	1868	329	327		
19	2196	1868.6	327.4	327		
20	2197	1870.2	326.8	327		
21	2200	1870.5	329.5	327	7	
22	2196	1869.3	326.7	326		
23	2197	1866.9	330.1	326		
24	2198	1869.3	328.7	326		
25	2199	1869.3	329.7	326	4	
26	2196	1867.3	328.7	325		
27	2199	1867.9	331.1	325	2	
28	2199	1865.9	333.1	324		
29	2198	1867.5	330.5	324	2	
30	2198	1867.2	330.8	323	1	
Average	2,197.30	1,869.74				
Difference	327.56					
Percentage	14.91%					
Avg Error			327.5667			
STDV			2.424415	0.7%		
CV			5.877789			
Skew			0.150549			
Maximum Error			333.1			
Minimum Error			322.7			

Meter connected immediately downstream of a simulated pump discharge

Date: 10/28/2021 Time: 6:00 AM
McCrometer Duramag 2 ft/s 30 Secods Values GPM

ft/s	Gpm	Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count
2	313.6	1	315.2	305.2	10	12.8	1
8	1254.4	2	315.5	304.1	11.4	12.6	1
14	2195.2	3	316.2	304.5	11.7	12.5	1
		4	316.4	306.1	10.3	12.4	1
Notes:		5	314.5	305.5	9	12.2	1
8 inch OD		6	314	305.3	8.7	12.1	1
5 minutes to stabilize		7	315.9	303.1	12.8	12.0	
		8	314.7	302.9	11.8	12.0	2
		9	314.5	302.3	12.2	11.9	
		10	315.6	303	12.6	11.9	2
		11	314.9	303.1	11.8	11.8	
		12	315	303	12	11.8	
		13	313.8	303.4	10.4	11.8	3
		14	315.1	303.7	11.4	11.7	1
		15	314.1	303.2	10.9	11.4	
		16	316.5	304.1	12.4	11.4	2
		17	314.9	305.3	9.6	11.1	1
		18	315.2	304.3	10.9	10.9	
		19	315.2	303.3	11.9	10.9	
		20	314.1	303.2	10.9	10.9	3
		21	315.6	303.7	11.9	10.8	1
		22	313.8	303.9	9.9	10.4	
		23	315.6	303.8	11.8	10.4	2
		24	315.7	303.6	12.1	10.3	1
		25	314.2	303.1	11.1	10.0	1
		26	314.6	303.8	10.8	9.9	
		27	314.2	304.3	9.9	9.9	2
		28	316.1	303.6	12.5	9.6	1
		29	314.3	303.9	10.4	9.0	1
		30	315.9	303.9	12	8.7	1

Average	315.04	303.87		
Difference	11.17			
Percentage	3.55%			
Avg Error			11.17	
STDV			1.066193	
CV			1.136767	9.5%
Skew			-0.5889	
Maximum Error			12.8	
Minimum Error			8.7	

Date: 10/28/2021 Time: 12:00 PM
8 ft/s 30 Secods Values GPM

Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count
1	1256	1091.4	164.6	165	1
2	1257	1096.3	160.7	161	1
3	1255	1105.7	149.3	159	1
4	1256	1107.4	148.6	158	1
5	1257	1100.2	156.8	157	
6	1256	1103.1	152.9	157	
7	1255	1101.6	153.4	157	
8	1257	1099.6	157.4	157	4
9	1256	1104.5	151.5	154	
10	1258	1100.9	157.1	154	
11	1256	1102.3	153.7	154	3
12	1258	1099.5	158.5	153	
13	1258	1104.4	153.6	153	
14	1256	1110.9	145.1	153	
15	1257	1107.4	149.6	153	4
16	1256	1108.3	147.7	152	1
17	1258	1109.4	148.6	150	
18	1258	1109.1	148.9	150	
19	1254	1109.2	144.8	150	3
20	1254	1109.3	144.7	149	
21	1256	1114.5	141.5	149	
22	1255	1104.6	150.4	149	
23	1257	1108.1	148.9	149	
24	1259	1101.3	157.7	149	5
25	1258	1108.3	149.7	148	1
26	1258	1104.6	153.4	147	1
27	1255	1108.3	146.7	145	
28	1256	1103	153	145	
29	1257	1102.6	154.4	145	3
30	1256	1098.7	157.3	142	1

Average	1,256.50	1,104.48		
Difference	152.02			
Percentage	12.10%			
Avg Error			152.0167	
STDV			5.18164	
CV			26.84939	3.4%
Skew			0.250675	
Maximum Error			164.6	
Minimum Error			141.5	

Date: 11/1/2021 Time: 8:00 AM
14 ft/s 30 Secods Values GPM

Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count
1	2197	1905.7	291.3	328	1
2	2198	1899.5	298.5	322	1
3	2198	1903.1	294.9	315	1
4	2196	1895.8	300.2	314	1
5	2198	1883.6	314.4	313	
6	2199	1888.3	310.7	313	2
7	2199	1900.2	298.8	312	1
8	2196	1915.5	280.5	311	1
9	2196	1892.1	303.9	307	1
10	2199	1897.2	301.8	304	1
11	2197	1906.3	290.7	303	
12	2198	1894.7	303.3	303	
13	2197	1897	300	303	3
14	2196	1896.6	299.4	302	
15	2197	1906.6	290.4	302	2
16	2198	1903.5	294.5	301	1
17	2199	1898.3	300.7	300	
18	2198	1895.1	302.9	300	2
19	2197	1894.5	302.5	299	
20	2198	1891	307	299	
21	2197	1903	294	299	3
22	2199	1902.3	296.7	297	1
23	2198	1885.5	312.5	295	
24	2196	1893.7	302.3	295	2
25	2198	1904.4	293.6	294	
26	2198	1885.2	312.8	294	2
27	2197	1875.3	321.7	291	
28	2198	1883.4	314.6	291	2
29	2198	1886.1	311.9	290	1
30	2197	1868.7	328.3	281	1

Average	2,197.57	1,895.07		
Difference	302.49			
Percentage	13.76%			
Avg Error			302.4933	
STDV			9.939079	
CV			98.78529	3.3%
Skew			0.472988	
Maximum Error			328.3	
Minimum Error			280.5	

Meter is connected within one pipe diameter downstream of a 90° bend								
Seametrics AG3000		Date:	9/15/2021	Time:				7:00 AM
2 ft/s 30 Secods Values GPM								
ft/s	Gpm	Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count	
2	176.4	1	174.5	176	-1.5	0.5	1	
8	705.6	2	175.8	176	-0.2	0.1	1	
14	1234.8	3	174.9	176	-1.1	-0.1	1	
		4	176.6	177	-0.4	-0.2		
		5	175.7	178	-2.3	-0.2	2	
		6	176.7	178	-1.3	-0.3	1	
		7	175.7	178	-2.3	-0.4		
		8	176.2	177	-0.8	-0.4		
		9	175.9	178	-2.1	-0.4		
		10	176.6	178	-1.4	-0.4	4	
		11	176.6	177	-0.4	-0.6	1	
		12	175.4	178	-2.6	-0.7		
		13	176	177	-1	-0.7		
		14	176.4	177	-0.6	-0.7		
		15	175.3	177	-1.7	-0.7	4	
		16	176.3	177	-0.7	-0.8		
		17	175.5	177	-1.5	-0.8	2	
		18	176.3	177	-0.7	-0.9	1	
		19	175.1	176	-0.9	-1	1	
		20	175.7	177	-1.3	-1.1	1	
		21	176.2	177	-0.8	-1.3		
		22	175.3	176	-0.7	-1.3	2	
		23	176.1	176	0.1	-1.4	1	
		24	176.6	177	-0.4	-1.5		
		25	175.6	176	-0.4	-1.5	2	
		26	175.9	176	-0.1	-1.7	1	
		27	175.3	176	-0.7	-2.1	1	
		28	175.8	176	-0.2	-2.3		
		29	176.5	176	0.5	-2.3	2	
		30	175.7	176	-0.3	-2.6	1	
Average			175.87	176.80				
Difference			-0.93					
Percentage			-0.53%					
Avg Error					-0.92667			
STDV					0.73979			-79.8%
CV					0.547289			
Skew					-0.54655			
Maximum Error					0.5			
Minimum Error					-2.6			

Date:	44453	Time:	0.5625					
8 ft/s 30 Secods Values GPM								
Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count			
1	705.6	654	51.6	55	1			
2	705.8	652	53.8	54				
3	706.9	653	53.9	54				
4	706.7	655	51.7	54				
5	707.4	654	53.4	54	4			
6	706.4	655	51.4	53				
7	706.3	653	53.3	53				
8	706.8	653	53.8	53				
9	705.1	654	51.1	53				
10	706.1	655	51.1	53	5			
11	706.5	655	51.5	52				
12	705.6	654	51.6	52				
13	706.3	653	53.3	52				
14	705.2	655	50.2	52				
15	706.4	658	48.4	52				
16	706	653	53	52				
17	706.7	655	51.7	52				
18	705.4	654	51.4	52				
19	705.5	654	51.5	52				
20	705.9	654	51.9	52	10			
21	706.1	655	51.1	51				
22	706	651	55	51				
23	706.9	653	53.9	51				
24	705.4	653	52.4	51				
25	706.4	655	51.4	51				
26	705.8	655	50.8	51				
27	706	654	52	51				
28	705.5	655	50.5	51	8			
29	706.7	655	51.7	50	1			
30	705.6	653	52.6	48	1			
Average		706.10	654.07					
Difference		52.03						
Percentage		7.37%						
Avg Error				52.03333				2.6%
STDV				1.341972				
CV				1.800889				
Skew				-0.07976				
Maximum Error				55				
Minimum Error				48.4				

Date:	9/14/2021	Time:	12:21 PM					
14 ft/s 30 Secods Values GPM								
Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count			
1	1234	1153	81	104	1			
2	1236	1157	79	95	1			
3	1234	1148	86	92				
4	1235	1151	84	92				
5	1234	1151	83	92	3			
6	1237	1152	85	91				
7	1236	1148	88	91	2			
8	1234	1143	91	90				
9	1235	1146	89	90	2			
10	1235	1144	91	89	1			
11	1234	1147	87	88	1			
12	1234	1147	87	87				
13	1235	1145	90	87				
14	1235	1152	83	87				
15	1236	1144	92	87				
16	1235	1148	87	87				
17	1234	1130	104	87	6			
18	1236	1144	92	86				
19	1235	1148	87	86	2			
20	1235	1149	86	85				
21	1236	1155	81	85	2			
22	1234	1154	80	84				
23	1235	1157	78	84	2			
24	1235	1150	85	83				
25	1237	1142	95	83	2			
26	1235	1145	90	81				
27	1235	1151	84	81	2			
28	1236	1144	92	80	1			
29	1234	1147	87	79	1			
30	1234	1147	87	78	1			
Average		1,235.00	1,147.97					
Difference		87.03						
Percentage		7.05%						
Avg Error				87.03333				6.0%
STDV				5.192837				
CV				26.96556				
Skew				0.92635				
Maximum Error				104				
Minimum Error				78				

Meter is connected within one pipe diameter upstream of a 90° bend

Seametrics AG3000						8 ft/s 30 Secods Values GPM						14 ft/s 30 Secods Values GPM											
Date:		9/9/2021		Time:		1:42		Date:		9/10/2021		Time:		7:58 AM		Date:		9/10/2021		Time:		9:00 AM	
ft/s	Gpm	Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count	Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count	Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count				
2	176.4	1	176.8	178	-1.2	0.2	1	1	707	681	26	26	1	1235	1176	59	62	1					
8	705.6	2	175.3	178	-2.7	-0.1	1	2	706.8	681	25.8	26	2	1237	1176	61	61						
14	1234.8	3	177.9	178	-0.1	-0.4	1	3	706	681	25	26	3	1236	1176	60	61						
		4	176.53	178	-1.47	-0.7		4	706.9	681	25.9	26	4	1236	1177	59	61						
		5	175.12	177	-1.88	-0.7		5	707.7	682	25.7	26	5	1235	1177	58	61						
		6	176.56	177	-0.44	-0.7	3	6	706.8	681	25.8	26	6	1235	1174	61	61						
		7	177.16	177	0.16	-0.8	1	7	705.5	682	23.5	26	7	1236	1178	58	61	6					
		8	176.58	178	-1.42	-0.9		8	706.7	682	24.7	26	8	1237	1179	58	60						
		9	177.34	178	-0.66	-0.9		9	707.8	682	25.8	26	9	1237	1179	58	60						
		10	176.12	177	-0.88	-0.9		10	706.2	682	24.2	26	10	1236	1176	60	60	10					
		11	175.55	178	-2.45	-0.9	4	11	706.1	681	25.1	25	11	1236	1177	59	60						
		12	175.78	177	-1.22	-1.0	1	12	707.4	681	26.4	25	12	1236	1177	59	60						
		13	177.12	178	-0.88	-1.2		13	706.2	682	24.2	25	13	1237	1177	60	60						
		14	176.34	177	-0.66	-1.2	2	14	706.5	682	24.5	25	14	1235	1177	58	60						
		15	175.34	177	-1.66	-1.4	1	15	706.4	682	24.4	25	15	1237	1177	60	60	8					
		16	177.05	178	-0.95	-1.5	1	16	706.3	682	24.3	25	16	1237	1177	60	59						
		17	175.7	178	-2.3	-1.7		17	706.1	682	24.1	25	17	1236	1178	58	59						
		18	175.34	178	-2.66	-1.7	2	18	706.1	681	25.1	25	18	1236	1176	60	59						
		19	176.12	177	-0.88	-1.8		19	706.9	681	25.9	25	19	1237	1176	61	59						
		20	177.01	178	-0.99	-1.8	2	20	705.6	681	24.6	25	20	1236	1176	60	59	5					
		21	175.34	178	-2.66	-1.9		21	706	682	24	24	21	1237	1176	61	58						
		22	176.21	178	-1.79	-1.9	2	22	706.7	682	24.7	24	22	1237	1176	61	58						
		23	175.34	178	-2.66	-2.3	1	23	706.4	682	24.4	24	23	1236	1176	60	58						
		24	176.23	177	-0.77	-2.4	1	24	705.8	682	23.8	24	24	1235	1176	59	58						
		25	175.23	178	-2.77	-2.7		25	706.6	682	24.6	24	25	1235	1177	58	58						
		26	176.34	178	-1.66	-2.7		26	705.5	682	23.5	24	26	1237	1179	58	58						
		27	175.12	177	-1.88	-2.7		27	706.7	682	24.7	24	27	1236	1174	62	58						
		28	175.34	178	-2.66	-2.7		28	707.4	681	26.4	24	28	1236	1175	61	58	8					
		29	176.34	177	-0.66	-2.7	5	29	705.6	681	24.6	24	29	1235	1178	57	57	1					
		30	175.16	177	-1.84	-2.8	1	30	707.3	681	26.3	24	30	1234	1178	56	56	1					

Average		176.11	177.60		
Difference		-1.49			
Percentage		-0.84%			
Avg Error			-1.48633		
STDV			0.834512		-56.1%
CV			0.69641		
Skew			-0.04155		
Maximum Error			0.16		
Minimum Error			-2.77		

Average		706.50	681.57		
Difference		24.93			
Percentage		3.53%			
Avg Error			24.93333		
STDV			0.851795		3.4%
CV			0.725556		
Skew			0.226256		
Maximum Error			26.4		
Minimum Error			23.5		

Average		1,236.03	1,176.70		
Difference		59.33			
Percentage		4.80%			
Avg Error			59.33333		
STDV			1.398412		2.4%
CV			1.955556		
Skew			-0.25395		
Maximum Error			62		
Minimum Error			56		

Meter connected within one pipe diameter downstream of a check valve								
		Date:	8/30/2021	Time:	8:24 AM			
Seametrics AG3000		2 ft/s 30 Secods Values GPM						
ft/s	Gpm	Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count	
2	176.4	1	179.4	182	-2.6	-0.8	1	
8	705.6	2	179.1	182	-2.9	-1	1	
14	1234.8	3	179.1	183	-3.9	-2.1	1	
		4	177.9	180	-2.1	-2.2	1	
		5	177.1	183	-5.9	-2.3	1	
		6	178.1	181	-2.9	-2.4	1	
		7	176.2	183	-6.8	-2.6	1	
		8	177.1	181	-3.9	-2.9		
		9	177.7	181	-3.3	-2.9		
		10	176.5	181	-4.5	-2.9	3	
		11	177.6	182	-4.4	-3.1		
		12	175.4	181	-5.6	-3.1	2	
		13	176.9	181	-4.1	-3.3		
		14	178.2	182	-3.8	-3.3	2	
		15	176.3	182	-5.7	-3.5	1	
		16	179	180	-1	-3.6	1	
		17	177.5	181	-3.5	-3.8	1	
		18	178.6	181	-2.4	-3.9		
		19	177	182	-5	-3.9	2	
		20	177.9	181	-3.1	-4.1	1	
		21	177.5	182	-4.5	-4.4	1	
		22	178.1	181	-2.9	-4.5		
		23	177.4	181	-3.6	-4.5	2	
		24	177.4	182	-4.6	-4.6	1	
		25	178.9	182	-3.1	-4.7	1	
		26	178.8	181	-2.2	-5	1	
		27	178.7	182	-3.3	-5.6	1	
		28	177.7	180	-2.3	-5.7	1	
		29	177.3	182	-4.7	-5.9	1	
		30	179.2	180	-0.8	-6.8	1	
Average			177.79	181.43				
Difference			-3.65					
Percentage			-2.05%					
Avg Error					-3.64667			
STDV					1.36473			-37.4%
CV					1.862489			
Skew					-0.13395			
Maximum Error					-0.8			
Minimum Error					-6.8			

		Date:	8/30/2021	Time:	10:00 AM			
Seametrics AG3000		8 ft/s 30 Secods Values GPM						
ft/s	Gpm	Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count	
		1	707.4	672	35.4	56	1	
		2	706.8	668	38.8	50		
		3	707.1	657	50.1	50	2	
		4	706.5	679	27.5	47	1	
		5	706.3	673	33.3	45	1	
		6	707.9	652	55.9	44	1	
		7	707	670	37	41	1	
		8	705.9	671	34.9	40	1	
		9	706.7	670	36.7	39	1	
		10	706.5	677	29.5	37		
		11	706.2	672	34.2	37		
		12	705.9	677	28.9	37	3	
		13	706	671	35	36		
		14	707.3	666	41.3	36	2	
		15	707.3	670	37.3	35		
		16	708.2	672	36.2	35		
		17	706.5	663	43.5	35		
		18	706.7	683	23.7	35		
		19	707.2	672	35.2	35	5	
		20	706.4	666	40.4	34		
		21	708	674	34	34	2	
		22	706.8	662	44.8	33	1	
		23	707.3	671	36.3	32		
		24	708.3	658	50.3	32	2	
		25	706.6	660	46.6	30		
		26	706.4	671	35.4	30	2	
		27	706.2	674	32.2	29	1	
		28	707.6	676	31.6	28	1	
		29	708.7	679	29.7	26	1	
		30	706.6	681	25.6	24	1	
Average			706.94	670.23				
Difference			36.71					
Percentage			5.19%					
Avg Error					36.71			
STDV					7.313884			19.9%
CV					53.4929			
Skew					0.724623			
Maximum Error					55.9			
Minimum Error					23.7			

		Date:	8/30/2021	Time:	11:07 AM			
Seametrics AG3000		14 ft/s 30 Secods Values GPM						
ft/s	Gpm	Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count	
		1	1235	1179	56	105	1	
		2	1234	1157	77	102	1	
		3	1234	1164	70	101	1	
		4	1233	1146	87	100	1	
		5	1235	1149	86	96	1	
		6	1234	1144	90	95	1	
		7	1234	1148	86	94	1	
		8	1235	1168	67	90	1	
		9	1235	1154	81	87		
		10	1234	1139	95	87	2	
		11	1237	1135	102	86		
		12	1234	1170	64	86	2	
		13	1235	1148	87	84	1	
		14	1234	1204	30	82	1	
		15	1236	1142	94	81		
		16	1236	1136	100	81		
		17	1235	1151	84	81	3	
		18	1235	1172	63	79	1	
		19	1236	1131	105	77	1	
		20	1237	1136	101	76		
		21	1234	1158	76	76	2	
		22	1236	1155	81	71	1	
		23	1235	1154	81	70		
		24	1237	1161	76	70	2	
		25	1236	1157	79	67	1	
		26	1234	1164	70	64	1	
		27	1236	1181	55	63	1	
		28	1235	1164	71	56	1	
		29	1236	1154	82	55	1	
		30	1234	1138	96	30	1	
Average			1,235.03	1,155.30				
Difference			79.73					
Percentage			6.46%					
Avg Error					79.73333			
STDV					15.97484			20.0%
CV					255.1956			
Skew					-0.91708			
Maximum Error					105			
Minimum Error					30			

Meter connected immediately downstream of a simulated pump discharge

Date: 11/16/2021 Time: 1:00 PM
Seametrics AG3000 2 ft/s 30 Secods Values GPM

ft/s	Gpm	Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count
2	176.4	1	177.7	180	-2.3	0.5	1
8	705.6	2	176.9	179	-2.1	-0.2	1
14	1234.8	3	176.8	179	-2.2	-0.6	1
		4	177.8	179	-1.2	-0.7	1
		5	177.4	180	-2.6	-0.9	1
		6	177.3	178	-0.7	-1.0	1
		7	178.8	179	-0.2	-1.2	1
		8	176.3	179	-2.7	-1.2	1
		9	176.7	179	-2.3	-1.2	3
		10	177.2	179	-1.8	-1.3	1
		11	177.3	179	-1.7	-1.6	1
		12	177.7	179	-1.3	-1.7	1
		13	178.5	178	0.5	-1.7	1
		14	177.3	179	-1.7	-1.7	1
		15	175.8	179	-3.2	-1.7	4
		16	177.8	179	-1.2	-1.8	1
		17	177.1	178	-0.9	-2.0	1
		18	177.4	178	-0.6	-2.1	1
		19	176.3	179	-2.7	-2.2	1
		20	176.8	179	-2.2	-2.2	2
		21	175.7	179	-3.3	-2.3	1
		22	176.8	178	-1.2	-2.3	2
		23	175.8	179	-3.2	-2.4	1
		24	177.4	179	-1.6	-2.6	1
		25	177.3	179	-1.7	-2.6	2
		26	176	178	-2	-2.7	1
		27	176.3	178	-1.7	-2.7	2
		28	177.4	180	-2.6	-3.2	1
		29	177	178	-1	-3.2	2
		30	176.6	179	-2.4	-3.3	1

Average	177.04	178.83		
Difference	-1.79			
Percentage	-1.01%			
Avg Error			-1.79333	
STDV			0.889544	
CV			0.791289	
Skew			0.443945	
Maximum Error			0.5	
Minimum Error			-3.3	

Date: 11/16/2021 Time: 10:00 AM
8 ft/s 30 Secods Values GPM

Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count
1	706.5	639	67.5	70	1
2	705.1	640	65.1	69	
3	705.9	638	67.9	69	
4	706.9	640	66.9	69	
5	706.3	640	66.3	69	
6	705.1	637	68.1	69	5
7	705.7	639	66.7	68	
8	705.2	636	69.2	68	
9	706.5	639	67.5	68	
10	705.4	638	67.4	68	
11	705.6	641	64.6	68	
12	707.2	637	70.2	68	
13	705.4	640	65.4	68	
14	705.9	640	65.9	68	
15	706.1	639	67.1	68	
16	705.3	640	65.3	68	10
17	706.2	638	68.2	67	
18	706.4	637	69.4	67	
19	706.9	638	68.9	67	
20	705.8	638	67.8	67	
21	706.7	639	67.7	67	5
22	706.2	637	69.2	66	
23	705.3	636	69.3	66	
24	706.1	638	68.1	66	
25	705.7	639	66.7	66	4
26	705.9	640	65.9	65	
27	705.4	637	68.4	65	
28	705.7	638	67.7	65	
29	705.5	641	64.5	65	
30	705.6	640	65.6	65	5

Average	705.92	638.63		
Difference	67.28			
Percentage	9.53%			
Avg Error			67.28333	
STDV			1.496904	
CV			2.240722	
Skew			-0.13245	
Maximum Error			70.2	
Minimum Error			64.5	

Date: 11/16/2021 Time: 9:00 AM
14 ft/s 30 Secods Values GPM

Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count
1	1235	1139	96	104	1
2	1236	1138	98	102	
3	1237	1137	100	102	2
4	1234	1138	96	101	
5	1236	1135	101	101	
6	1235	1139	96	101	3
7	1234	1139	95	100	
8	1236	1134	102	100	
9	1235	1136	99	100	3
10	1235	1135	100	99	
11	1234	1137	97	99	
12	1236	1132	104	99	
13	1235	1136	99	99	4
14	1235	1139	96	98	
15	1236	1134	102	98	
16	1235	1137	98	98	
17	1236	1138	98	98	
18	1237	1139	98	98	
19	1235	1140	95	98	
20	1234	1136	98	98	7
21	1235	1139	96	97	
22	1234	1136	98	97	
23	1235	1137	98	97	3
24	1234	1133	101	96	
25	1234	1134	100	96	
26	1235	1138	97	96	
27	1235	1134	101	96	
28	1235	1138	97	96	5
29	1236	1137	99	95	
30	1234	1135	99	95	2

Average	1,235.10	1,136.63		
Difference	98.47			
Percentage	7.97%			
Avg Error			98.46667	
STDV			2.202019	
CV			4.848889	
Skew			0.490987	
Maximum Error			104	
Minimum Error			95	

Meter is connected within one pipe diameter downstream of a 90° bend

Techno Flow PS32-06		Date:	9/13/2021	Time:		11:00 AM			
		2 ft/s 30 Secods Values GPM							
ft/s	Gpm	Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count		
2	176.4	1	175.3	156	19.3	24.6	1		
8	705.6	2	176.4	153	23.4	24.3	1		
14	1234.8	3	176.6	157	19.6	24.1	1		
		4	176.3	158	18.3	24.0	1		
		5	175.6	151	24.6	23.9			
		6	175.8	154	21.8	23.9	2		
		7	176.9	153	23.9	23.7	1		
		8	176.4	154	22.4	23.6	1		
		9	175.9	154	21.9	23.4	1		
		10	175.4	156	19.4	23.2	1		
		11	175.5	153	22.5	23.0	1		
		12	176.5	158	18.5	22.6	1		
		13	175.3	151	24.3	22.5	1		
		14	176.3	154	22.3	22.4	1		
		15	175.1	151	24.1	22.3	1		
		16	175.7	155	20.7	22.1	1		
		17	176	152	24	21.9	1		
		18	176.2	153	23.2	21.8	1		
		19	176.1	156	20.1	21.7	1		
		20	176.1	155	21.1	21.5	1		
		21	175.1	153	22.1	21.1			
		22	175	152	23	21.1	2		
		23	176.7	155	21.7	20.7	1		
		24	176.9	153	23.9	20.1	1		
		25	176.1	155	21.1	19.6	1		
		26	176.6	153	23.6	19.4	1		
		27	177.2	158	19.2	19.3	1		
		28	176.5	155	21.5	19.2	1		
		29	176.7	153	23.7	18.5	1		
		30	176.6	154	22.6	18.3	1		
		Average	176.09	154.17					
		Difference	21.93						
		Percentage	12.45%						
		Avg Error			21.92667				
		STDV			1.817862				
		CV			3.304622		8.3%		
		Skew			-0.46633				
		Maximum Error			24.6				
		Minimum Error			18.3				

44452		Date:	9/13/2021	Time:	0.08125	11:00 AM			
		8 ft/s 30 Secods Values GPM							
Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count				
1	705.5	579	126.5	131	1				
2	705.2	586	119.2	129					
3	705.5	581	124.5	129	2				
4	706.4	582	124.4	128	1				
5	705.5	581	124.5	127					
6	706.3	583	123.3	127					
7	705.8	578	127.8	127					
8	707.6	581	126.6	127					
9	706.7	578	128.7	127	5				
10	706.3	583	123.3	126					
11	705.5	583	122.5	126					
12	705.3	581	124.3	126					
13	706.5	580	126.5	126	4				
14	706.7	580	126.7	125					
15	706.5	587	119.5	125					
16	706.5	582	124.5	125					
17	705.3	580	125.3	125	4				
18	706.2	586	120.2	124					
19	706.5	576	130.5	124					
20	705.6	580	125.6	124					
21	706.7	581	125.7	124	4				
22	705.9	577	128.9	123					
23	706.2	585	121.2	123					
24	706.4	584	122.4	123	3				
25	706.7	583	123.7	122	1				
26	707.3	581	126.3	121					
27	706.3	582	124.3	121	2				
28	705.7	585	120.7	120					
29	706.4	579	127.4	120	2				
30	706.4	580	126.4	119	1				
		Average	706.18	581.47					
		Difference	124.71						
		Percentage	17.66%						
		Avg Error			124.7133				
		STDV			2.7523				
		CV			7.575156		2.2%		
		Skew			-0.20784				
		Maximum Error			130.5				
		Minimum Error			119.2				

44452		Date:	9/13/2021	Time:	2:13 PM	11:00 AM			
		14 ft/s 30 Secods Values GPM							
Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count				
1	1236	1019	217	223	1				
2	1235	1018	217	221	1				
3	1237	1020	217	220					
4	1235	1020	215	220					
5	1237	1021	216	220					
6	1235	1018	217	220					
7	1236	1018	218	220	5				
8	1236	1016	220	219					
9	1235	1024	211	219	2				
10	1234	1014	220	218	1				
11	1236	1013	223	217					
12	1234	1014	220	217					
13	1234	1021	213	217					
14	1235	1016	219	217					
15	1234	1027	207	217					
16	1236	1022	214	217	6				
17	1234	1021	213	216					
18	1236	1020	216	216	2				
19	1235	1022	213	215					
20	1235	1021	214	215	2				
21	1235	1015	220	214					
22	1235	1021	214	214					
23	1236	1015	221	214	3				
24	1236	1021	215	213					
25	1235	1015	220	213					
26	1234	1024	210	213	3				
27	1235	1024	211	211					
28	1234	1017	217	211	2				
29	1237	1018	219	210	1				
30	1235	1018	217	207	1				
		Average	1,235.23	1,019.10					
		Difference	216.13						
		Percentage	17.50%						
		Avg Error			216.1333				
		STDV			3.603085				
		CV			12.98222		1.7%		
		Skew			-0.4518				
		Maximum Error			223				
		Minimum Error			207				

Meter is connected within one pipe diameter upstream of a 90° bend

Date: 9/13/2021 Time: 7:45 AM

TechnoFlo PS32-06		2 ft/s 30 Secods Values GPM					
ft/s	Gpm	Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count
2	176.4	1	176.8	162	14.8	18.8	1
8	705.6	2	176.4	163	13.4	18.2	1
14	1234.8	3	177	165	12	16.8	1
		4	176.5	163	13.5	14.9	1
		5	176.7	166	10.7	14.8	
		6	176.5	163	13.5	14.8	
		7	176.6	164	12.6	14.8	3
		8	176.9	166	10.9	14.7	1
		9	175.4	164	11.4	14.6	1
		10	176.9	162	14.9	14.3	
		11	175.3	161	14.3	14.3	2
		12	176.8	165	11.8	14.1	1
		13	175.1	163	12.1	14.0	1
		14	176	162	14	13.7	1
		15	175.8	159	16.8	13.5	
		16	176.2	167	9.2	13.5	2
		17	176.7	165	11.7	13.4	
		18	176.6	164	12.6	13.4	2
		19	176.8	162	14.8	12.6	
		20	177.4	164	13.4	12.6	2
		21	176.8	162	14.8	12.1	1
		22	176.2	158	18.2	12.0	
		23	176.7	163	13.7	12.0	2
		24	176	164	12	11.8	1
		25	176.3	162	14.3	11.7	1
		26	176.1	162	14.1	11.4	
		27	175.7	161	14.7	11.4	2
		28	176.6	162	14.6	10.9	1
		29	176.4	165	11.4	10.7	1
		30	176.8	158	18.8	9.2	1

Average	176.40	162.90		
Difference	13.50			
Percentage	7.65%			
Avg Error			13.5	
STDV			2.072197	15.3%
CV			4.294	
Skew			0.564901	
Maximum Error			18.8	
Minimum Error			9.2	

Date: 9/10/2021 Time: 2:00 PM

		8 ft/s 30 Secods Values GPM				
Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count	
1	707.1	648	59.1	78	1	
2	706.9	642	64.9	77		
3	707.7	650	57.7	77	2	
4	705.3	632	73.3	75		
5	706.8	635	71.8	75	2	
6	706.2	633	73.2	73		
7	704.6	630	74.6	73		
8	707	634	73	73		
9	707.7	631	76.7	73		
10	706.1	636	70.1	73	5	
11	707.8	630	77.8	72		
12	707.7	631	76.7	72	2	
13	706.3	651	55.3	71	1	
14	705.3	630	75.3	70		
15	707.4	634	73.4	70	2	
16	705.4	650	55.4	68	1	
17	705.5	645	60.5	67	1	
18	707.7	654	53.7	65	1	
19	706.8	653	53.8	62		
20	706.3	646	60.3	62		
21	705.6	638	67.6	62	3	
22	705.8	644	61.8	61	1	
23	706.3	657	49.3	60	1	
24	705.6	633	72.6	59	1	
25	706.9	645	61.9	58	1	
26	705.8	639	66.8	55	1	
27	706.4	634	72.4	55	2	
28	707.8	646	61.8	54		
29	707.9	637	70.9	54	2	
30	706.7	637	69.7	49	1	

Average	706.55	640.17		
Difference	66.38			
Percentage	9.39%			
Avg Error			66.38	
STDV			8.057105	12.1%
CV			64.91693	
Skew			-0.43045	
Maximum Error			77.8	
Minimum Error			49.3	

Date: 9/10/2021 Time: 10:20 AM

		14 ft/s 30 Secods Values GPM				
Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count	
1	1236	1133	103	136	1	
2	1235	1132	103	127	1	
3	1235	1124	111	119	1	
4	1237	1149	88	116	1	
5	1235	1141	94	114		
6	1237	1118	119	114	2	
7	1237	1133	104	113	1	
8	1235	1128	107	111		
9	1236	1123	113	111	2	
10	1236	1139	97	109		
11	1237	1128	109	109	2	
12	1236	1125	111	107		
13	1234	1120	114	107		
14	1236	1100	136	107	3	
15	1235	1128	107	104		
16	1236	1144	92	104		
17	1236	1129	107	104		
18	1236	1132	104	104	4	
19	1235	1108	127	103		
20	1237	1133	104	103		
21	1235	1132	103	103		
22	1235	1131	104	103		
23	1236	1122	114	103	5	
24	1237	1146	91	97	1	
25	1236	1133	103	94	1	
26	1237	1145	92	92		
27	1237	1128	109	92	2	
28	1235	1147	88	91	1	
29	1236	1120	116	88		
30	1234	1131	103	88	2	

Average	1,235.83	1,130.07		
Difference	105.77			
Percentage	8.56%			
Avg Error			105.7667	
STDV			10.65734	10.1%
CV			113.5789	
Skew			0.590814	
Maximum Error			136	
Minimum Error			88	

Meter connected within one pipe diameter downstream of a check valve									
		Date:	8/31/2021		Time:	8:47 AM			
TechnoFlo PS32-06		2 ft/s 30 Secods Values GPM							
ft/s	Gpm	Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count		
2	176.4	1	175.2	152	23.2	25.8	1		
8	705.6	2	175.1	156	19.1	25.4	1		
14	1234.8	3	174.3	154	20.3	24.7	1		
		4	175.7	156	19.7	24.3	1		
Notes:		5	175.4	154	21.4	23.9	1		
6 Inch OD		6	175.4	154	21.4	23.7	1		
5 minutes to stabilize		7	174.5	154	20.5	23.3	1		
		8	174.9	156	18.9	23.2	1		
		9	175.7	151	24.7	23	1		
		10	176.4	162	14.4	22.9	1		
		11	176.5	161	15.5	22.6	1		
		12	175.9	152	23.9	21.4	2		
		13	175.4	157	18.4	21.4	1		
		14	175.8	156	19.8	20.5	1		
		15	176.4	157	19.4	20.3	1		
		16	175.5	156	19.5	19.9	1		
		17	176.4	157	19.4	19.8	1		
		18	175.9	156	19.9	19.7	1		
		19	175	152	23	19.5	1		
		20	175.3	151	24.3	19.4	3		
		21	174.6	152	22.6	19.4	1		
		22	175.8	150	25.8	19.4	1		
		23	175.4	156	19.4	19.1	1		
		24	175.4	150	25.4	18.9	1		
		25	176.3	153	23.3	18.5	1		
		26	174.6	158	16.6	18.4	1		
		27	176.5	160	16.5	16.6	1		
		28	175.9	153	22.9	16.5	1		
		29	175.7	152	23.7	15.5	1		
		30	176.5	158	18.5	14.4	1		
Average			175.58	154.87					
Difference			20.71						
Percentage			11.80%						
Avg Error					20.71333				
STDV					2.888452				
CV					8.343156	13.9%			
Skew					-0.16988				
Maximum Error					25.8				
Minimum Error					14.4				

Date: 8/30/2021 Time: 2:48 PM						
8 ft/s 30 Secods Values GPM						
Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count	
1	706.4	623	83.4	98	1	
2	706	617	89	89	1	
3	707.1	628	79.1	87	1	
4	705.8	627	78.8	86	1	
5	704.3	635	69.3	86	2	
6	706.8	631	75.8	85	1	
7	705.5	632	73.5	85	2	
8	706.1	608	98.1	84	1	
9	704.6	628	76.6	84	2	
10	704.9	625	79.9	83	1	
11	706.5	622	84.5	83	1	
12	706.9	623	83.9	83	3	
13	705.4	621	84.4	81	1	
14	705.9	619	86.9	81	1	
15	705.9	625	80.9	81	3	
16	705.6	627	78.6	80	1	
17	705.8	620	85.8	79	1	
18	706.1	627	79.1	79	1	
19	706.3	631	75.3	79	1	
20	705.2	628	77.2	79	4	
21	706	621	85	77	1	
22	707.7	627	80.7	77	1	
23	707.4	630	77.4	77	3	
24	705.5	632	73.5	76	1	
25	706.3	633	73.3	75	1	
26	705.5	625	80.5	74	1	
27	705.3	635	70.3	74	2	
28	704.3	621	83.3	73	1	
29	705.9	620	85.9	70	1	
30	705.4	622	83.4	69	1	
Average		705.88	625.43			
Difference		80.45				
Percentage		11.40%				
Avg Error				80.44667		
STDV				5.896198		
CV				34.76516	7.3%	
Skew				0.550477		
Maximum Error				98.1		
Minimum Error				69.3		

Date: 8/30/2021 Time: 2:07 PM						
14 ft/s 30 Secods Values GPM						
Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count	
1	1235	1099	136	152	2	
2	1235	1089	146	152	1	
3	1238	1086	152	151	1	
4	1236	1092	144	148	1	
5	1237	1102	135	147	1	
6	1235	1101	134	146	2	
7	1238	1093	145	146	1	
8	1236	1095	141	145	2	
9	1238	1087	151	145	1	
10	1234	1100	134	144	1	
11	1236	1089	147	143	1	
12	1237	1089	148	141	1	
13	1236	1091	145	140	1	
14	1235	1105	130	139	3	
15	1237	1085	152	139	1	
16	1237	1099	138	139	1	
17	1235	1102	133	138	2	
18	1239	1099	140	138	1	
19	1238	1109	129	136	1	
20	1235	1092	143	135	2	
21	1236	1090	146	135	1	
22	1236	1098	138	134	2	
23	1235	1102	133	134	1	
24	1235	1104	131	133	2	
25	1234	1095	139	133	1	
26	1235	1096	139	132	1	
27	1236	1104	132	131	1	
28	1237	1107	130	130	2	
29	1236	1101	135	130	1	
30	1237	1098	139	129	1	
Average		1,236.13	1,096.63			
Difference		139.50				
Percentage		11.29%				
Avg Error				139.5		
STDV				6.771263		
CV				45.85	4.9%	
Skew				0.278232		
Maximum Error				152		
Minimum Error				129		

Meter connected immediately downstream of a simulated pump discharge

Date: 11/15/2021 Time: 10:00 AM
 TechnoFlo PS32-06 2 ft/s 30 Secods Values GPM

ft/s	Gpm	Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count
2	176.4	1	175.5	172	3.5	10.7	1
8	705.6	2	177.5	173	4.5	9.7	1
14	1234.8	3	177.7	174	3.7	9.3	1
		4	177.2	170	7.2	8.7	1
		5	177.7	169	8.7	8.6	1
		6	176	173	3	8.5	1
		7	177.9	170	7.9	8.5	2
		8	177.8	173	4.8	7.9	1
		9	177.2	172	5.2	7.9	2
		10	178.6	170	8.6	7.7	1
		11	177.5	169	8.5	7.3	1
		12	177.9	173	4.9	7.2	1
		13	178.1	177	1.1	6.8	1
		14	177.7	170	7.7	6.7	1
		15	177.5	171	6.5	6.5	1
		16	176.6	173	3.6	5.8	1
		17	176.5	172	4.5	5.4	1
		18	177.8	171	6.8	5.2	1
		19	176.5	173	3.5	4.9	1
		20	176.3	169	7.3	4.8	1
		21	177.9	170	7.9	4.5	1
		22	177.7	171	6.7	4.5	2
		23	178.3	169	9.3	3.7	1
		24	177.5	169	8.5	3.6	1
		25	178.2	175	3.2	3.5	1
		26	177.8	172	5.8	3.5	1
		27	176.4	171	5.4	3.5	3
		28	176.7	166	10.7	3.2	1
		29	177.7	168	9.7	3.0	1
		30	177.5	174	3.5	1.1	1

Average	177.37	171.30	
Difference	6.07		
Percentage	3.42%		
Avg Error			6.073333
STDV			2.355976
CV			5.550622
Skew			-0.01128
Maximum Error			10.7
Minimum Error			1.1

38.8%

Date: 11/15/2021 Time: 11:00 AM
 8 ft/s 30 Secods Values GPM

Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count
1	707.6	626	81.6	101	1
2	706.4	644	62.4	96	1
3	705.8	629	76.8	95	1
4	706.7	626	80.7	93	1
5	707	633	74	92	1
6	705.7	619	86.7	91	1
7	706.1	621	85.1	89	1
8	705.5	623	82.5	89	1
9	706.6	606	100.6	89	3
10	705.2	628	77.2	88	1
11	706.4	623	83.4	87	1
12	705.6	614	91.6	87	2
13	706.3	624	82.3	86	1
14	706.7	611	95.7	85	1
15	706.4	615	91.4	85	2
16	705.2	616	89.2	84	1
17	706.3	623	83.3	83	1
18	705.3	634	71.3	83	1
19	705.2	623	82.2	83	3
20	706.7	621	85.7	82	1
21	706.2	617	89.2	82	1
22	705.5	613	92.5	82	3
23	706.7	620	86.7	81	1
24	706.3	621	85.3	80	1
25	705.7	617	88.7	77	1
26	706	626	80	77	2
27	707.6	632	75.6	76	1
28	706.9	623	83.9	74	1
29	705.8	611	94.8	71	1
30	705.4	617	88.4	62	1

Average	706.16	621.87	
Difference	84.29		
Percentage	11.94%		
Avg Error			84.29333
STDV			7.671503
CV			58.85196
Skew			-0.51933
Maximum Error			100.6
Minimum Error			62.4

9.1%

Date: 11/15/2021 Time: 1:30 PM
 14 ft/s 30 Secods Values GPM

Run No.	Venturi gpm	FlowMeter gpm	Delta gpm	Sorted gpm	Count
1	1237	1081	156	165	1
2	1236	1073	163	163	1
3	1235	1109	126	160	1
4	1236	1090	146	159	1
5	1235	1084	151	159	2
6	1236	1102	134	156	1
7	1235	1098	137	154	1
8	1236	1082	154	154	2
9	1234	1092	142	151	1
10	1236	1093	143	148	1
11	1235	1111	124	146	1
12	1236	1097	139	146	1
13	1235	1108	127	146	1
14	1234	1069	165	146	4
15	1235	1089	146	145	1
16	1234	1110	124	143	1
17	1234	1075	159	142	1
18	1235	1081	154	142	2
19	1236	1090	146	140	1
20	1235	1102	133	139	1
21	1236	1076	160	139	2
22	1234	1095	139	138	1
23	1236	1096	140	137	1
24	1235	1093	142	134	1
25	1235	1097	138	134	2
26	1234	1086	148	133	1
27	1235	1101	134	127	1
28	1234	1089	145	126	1
29	1235	1076	159	124	1
30	1234	1088	146	124	2

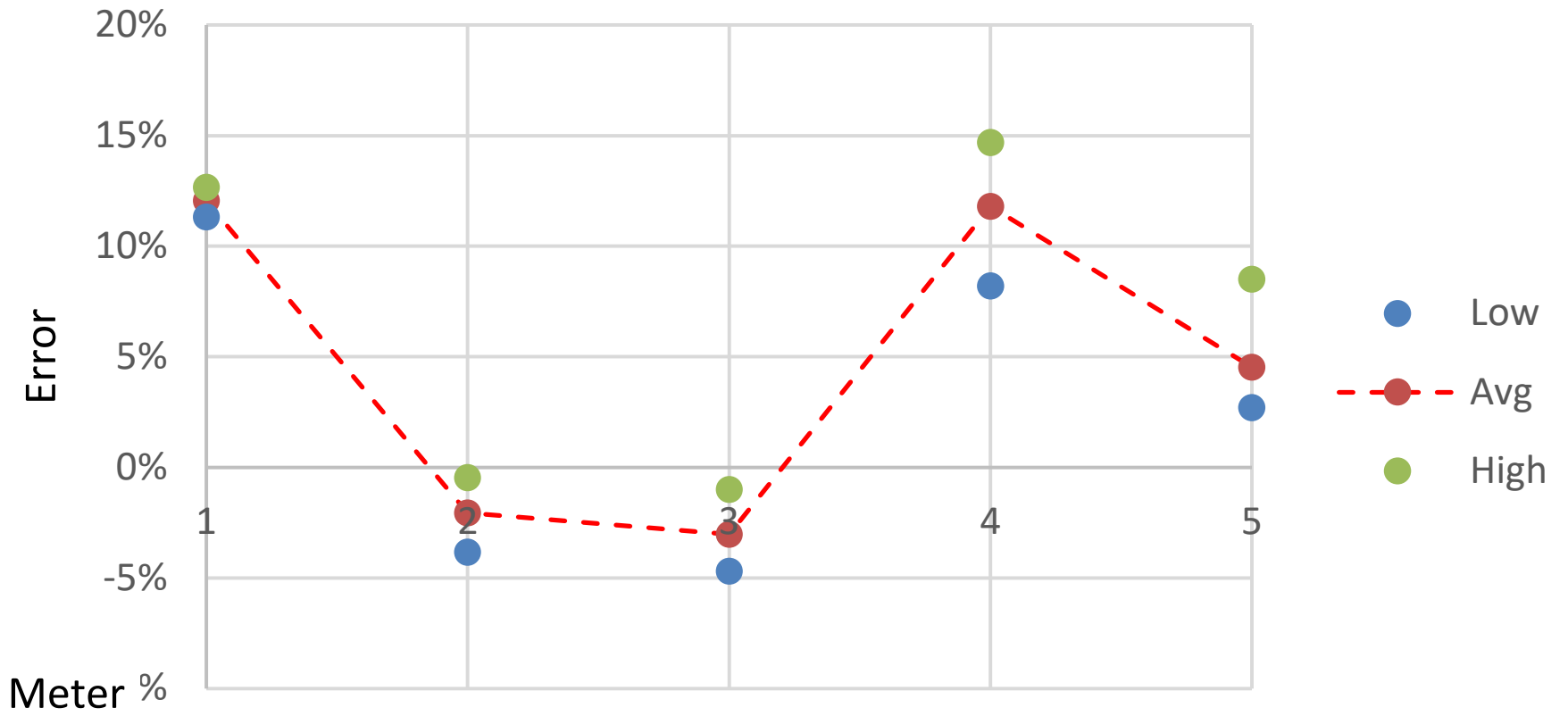
Average	1,235.10	1,091.10	
Difference	144.00		
Percentage	11.66%		
Avg Error			144
STDV			11.29602
CV			127.6
Skew			0.004093
Maximum Error			165
Minimum Error			124

7.8%

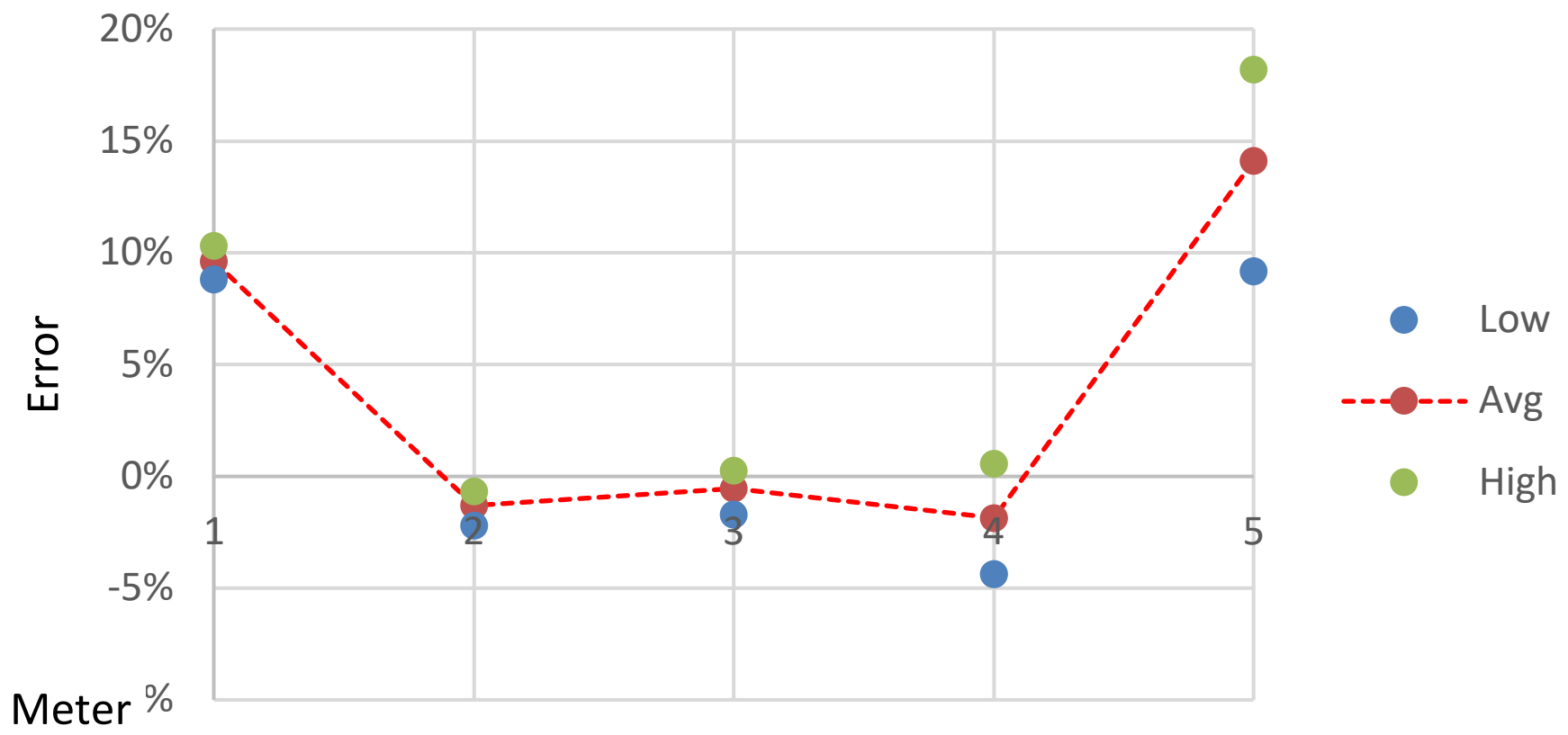
Appendix B - Plots of two, eight, and 14 feet per second percent error plots for all configurations



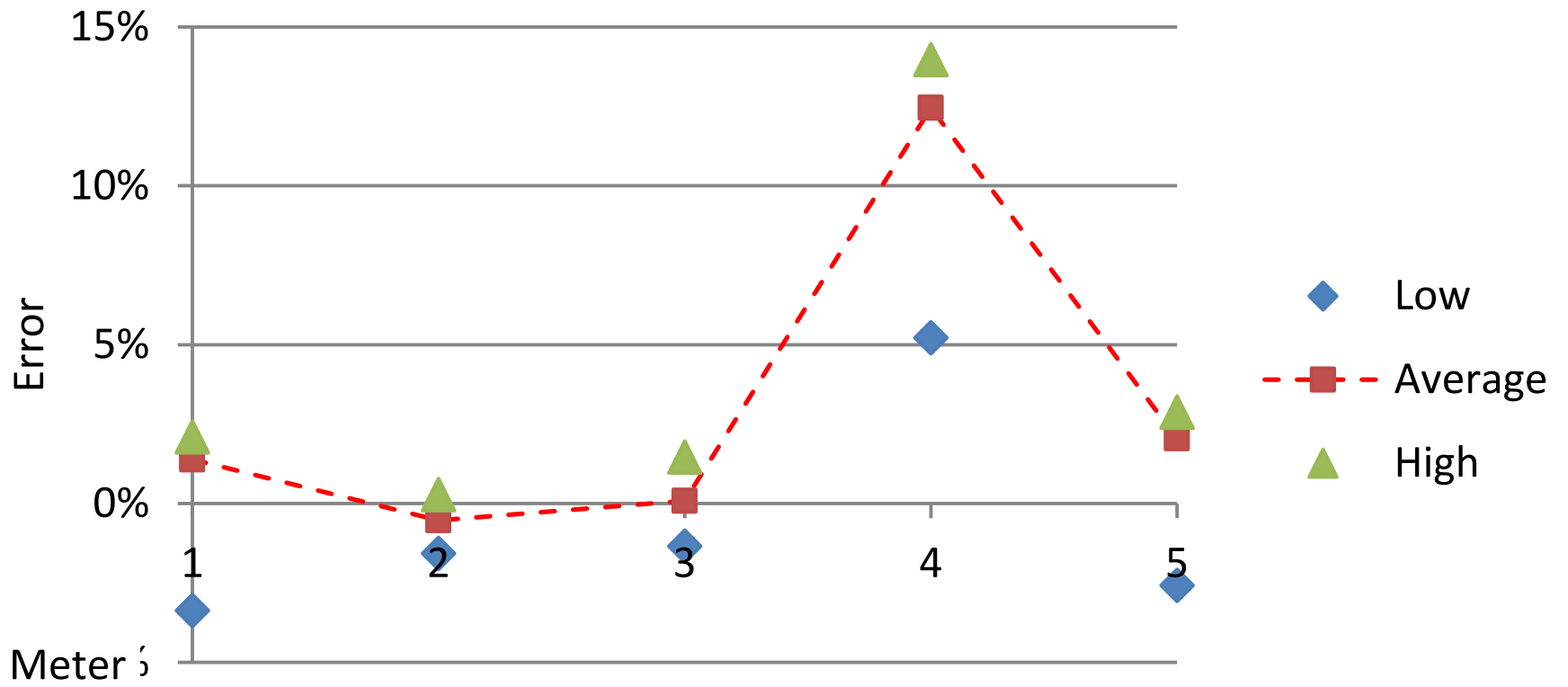
CV Downstream - 2 fps



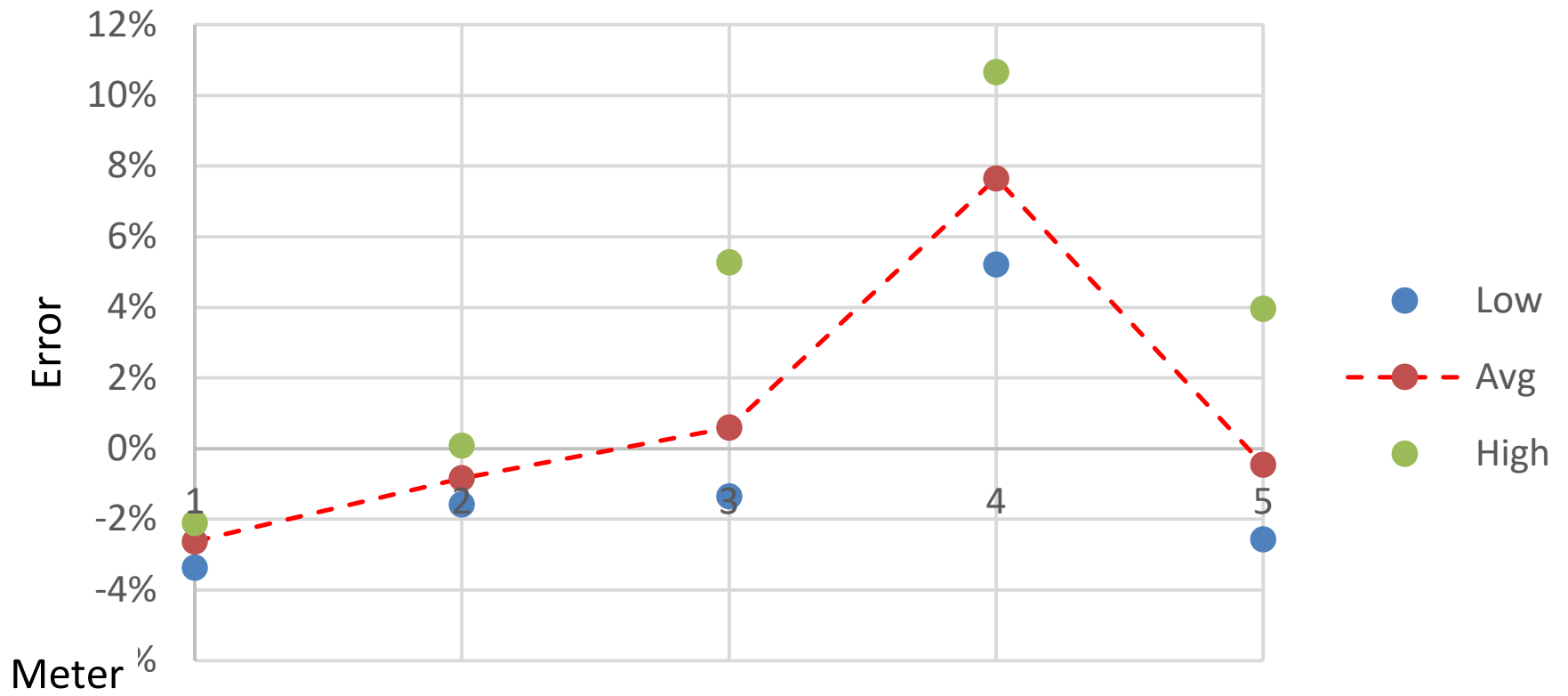
CV Upstream - 2 fps



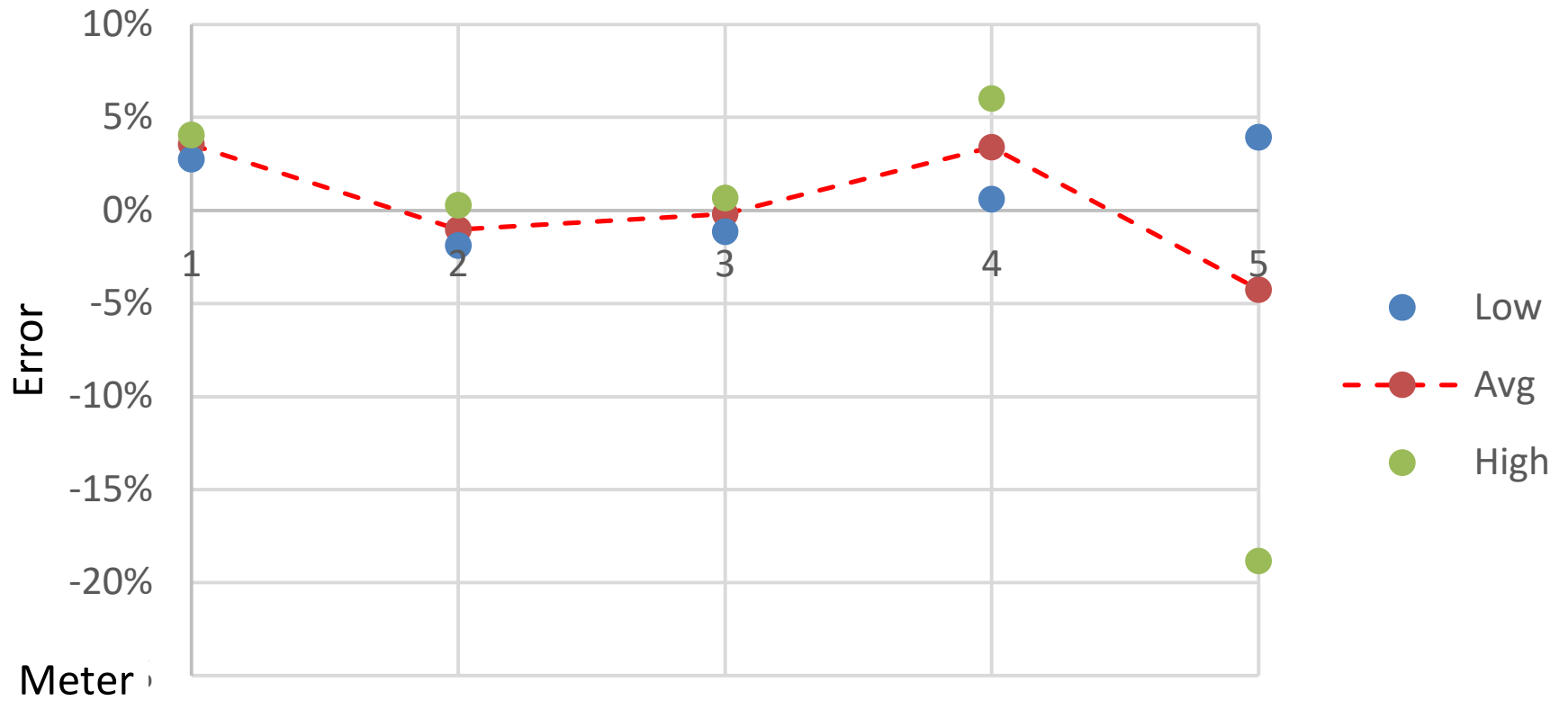
90° Bend Downstream - 2 fps



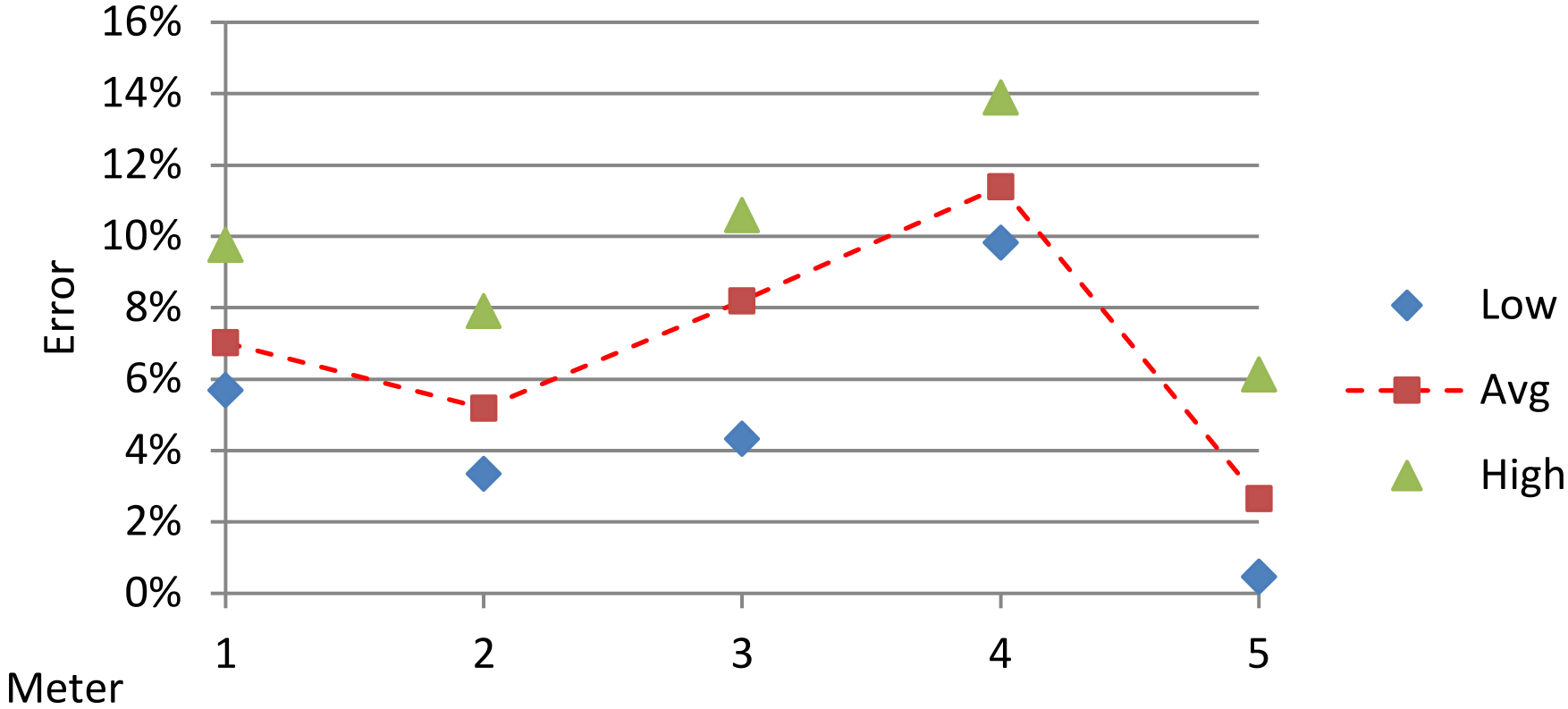
90° Bend Upstream - 2 fps



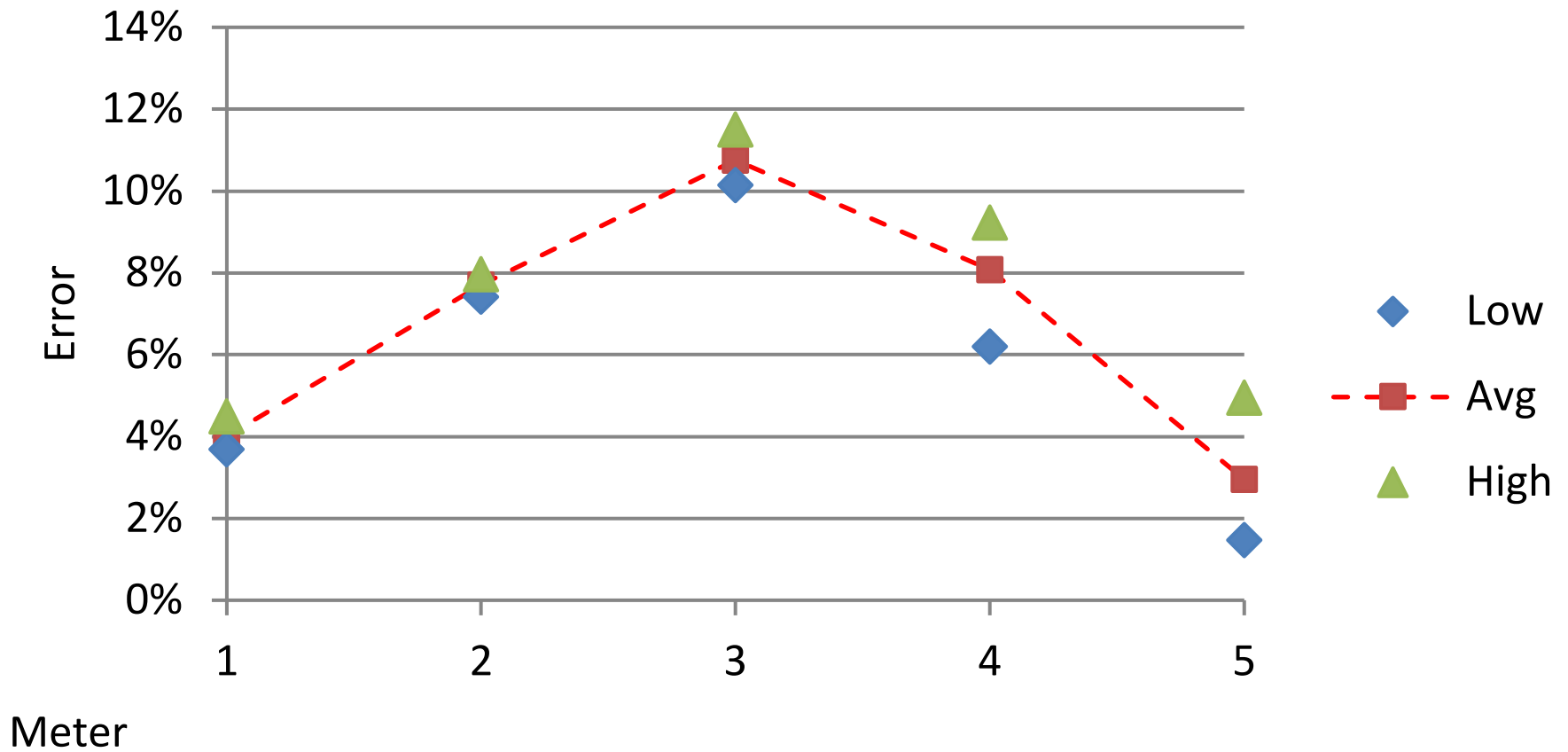
Pump Upstream - 2 fps



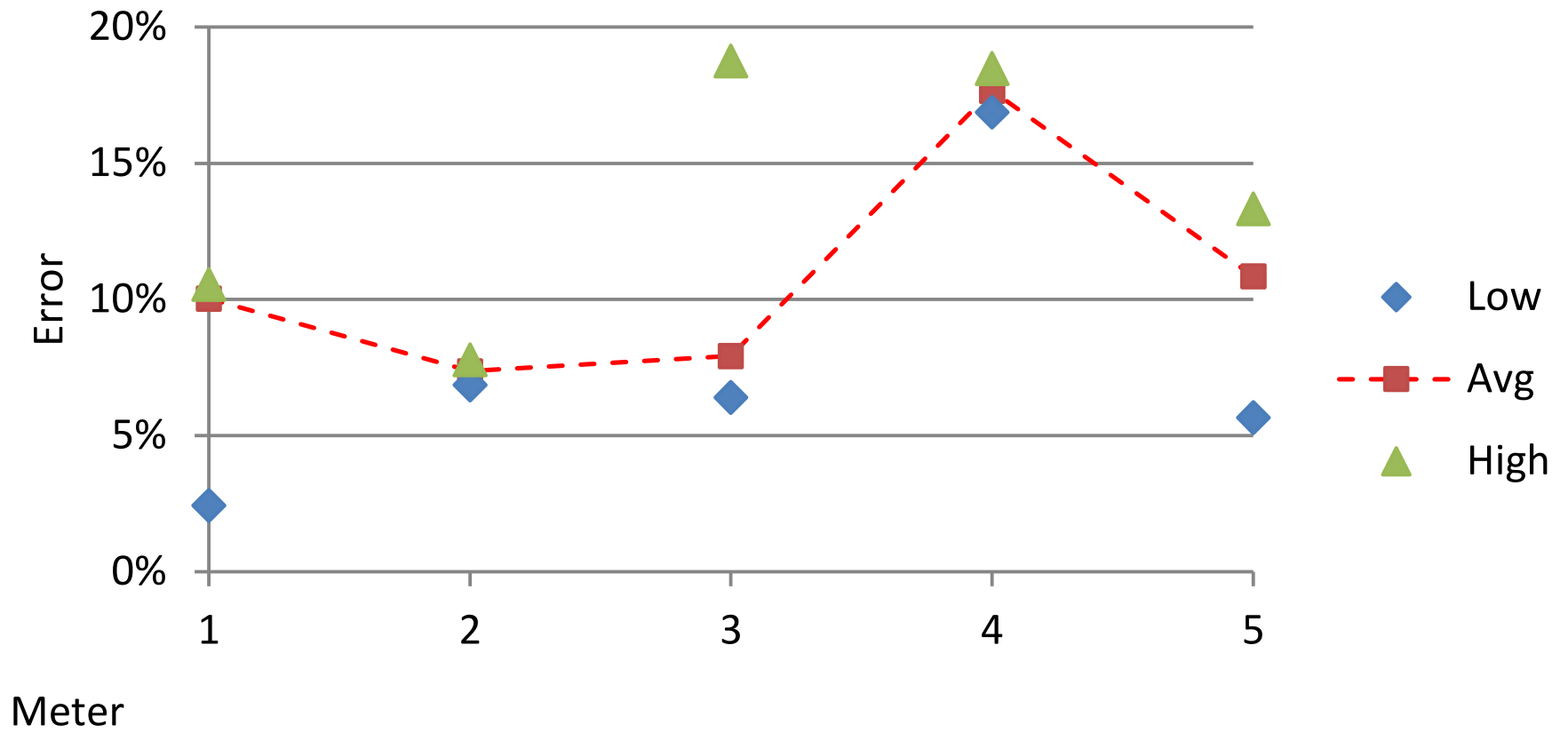
Check Valve Downstream - 8 fps



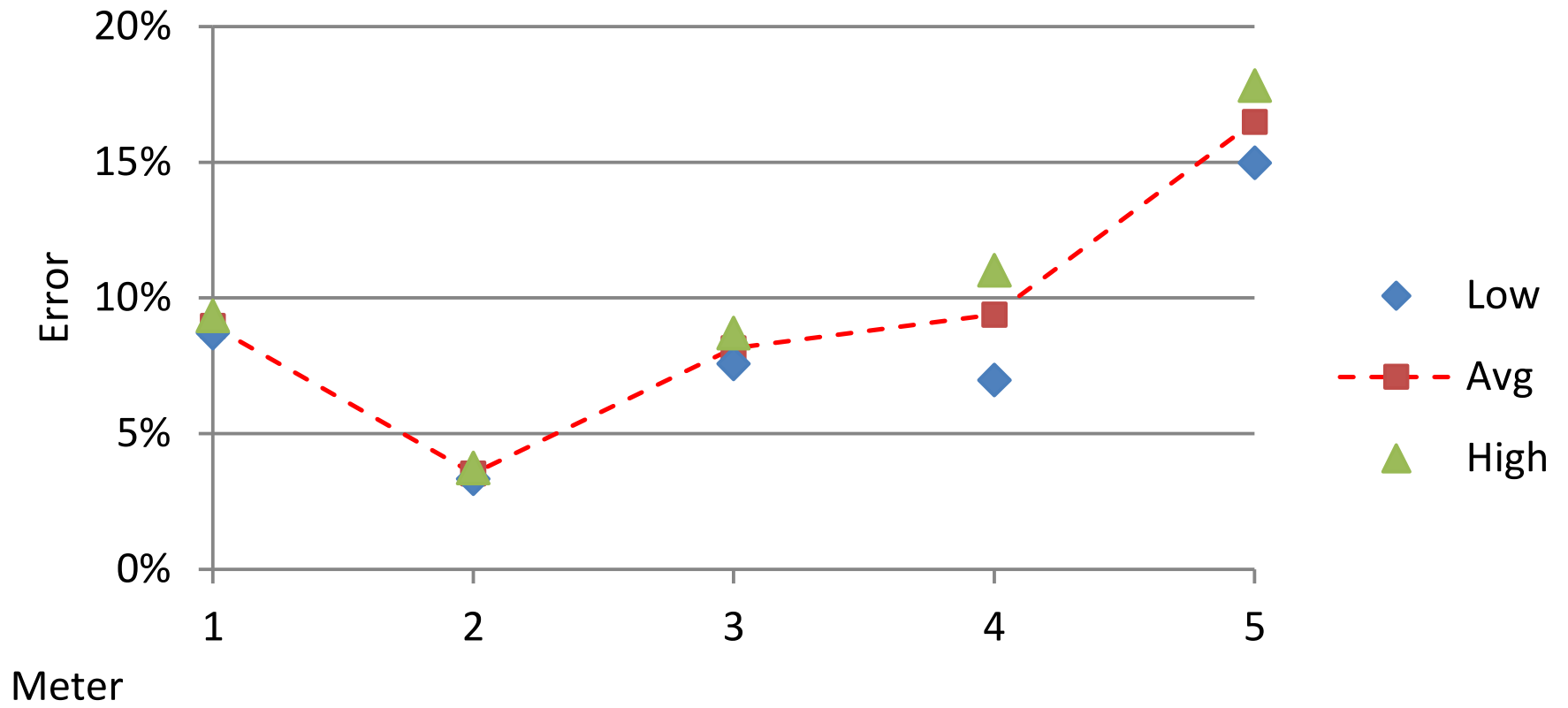
Check Valve Upstream - 8 fps



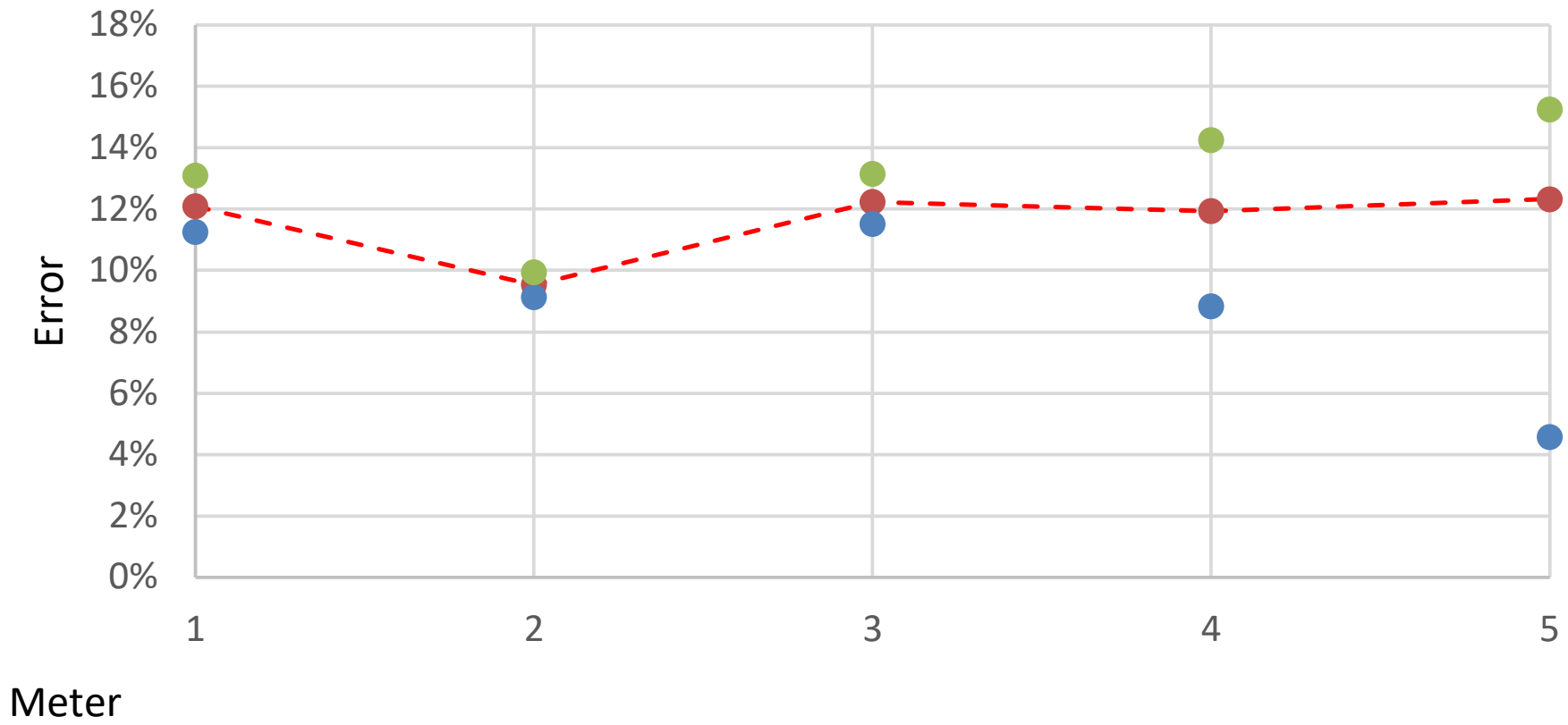
90° Bend Downstream - 8 fps



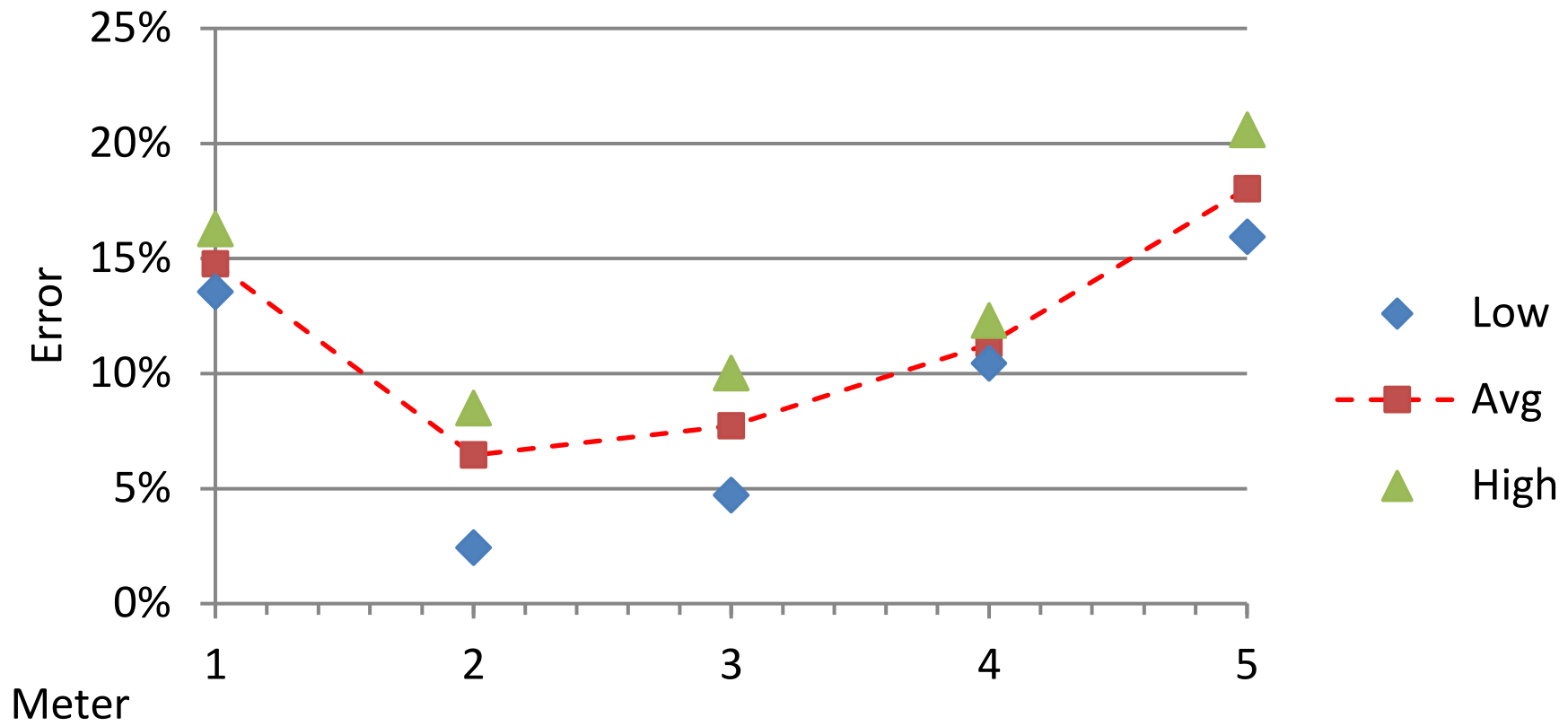
90° Bend Upstream - 8 fps



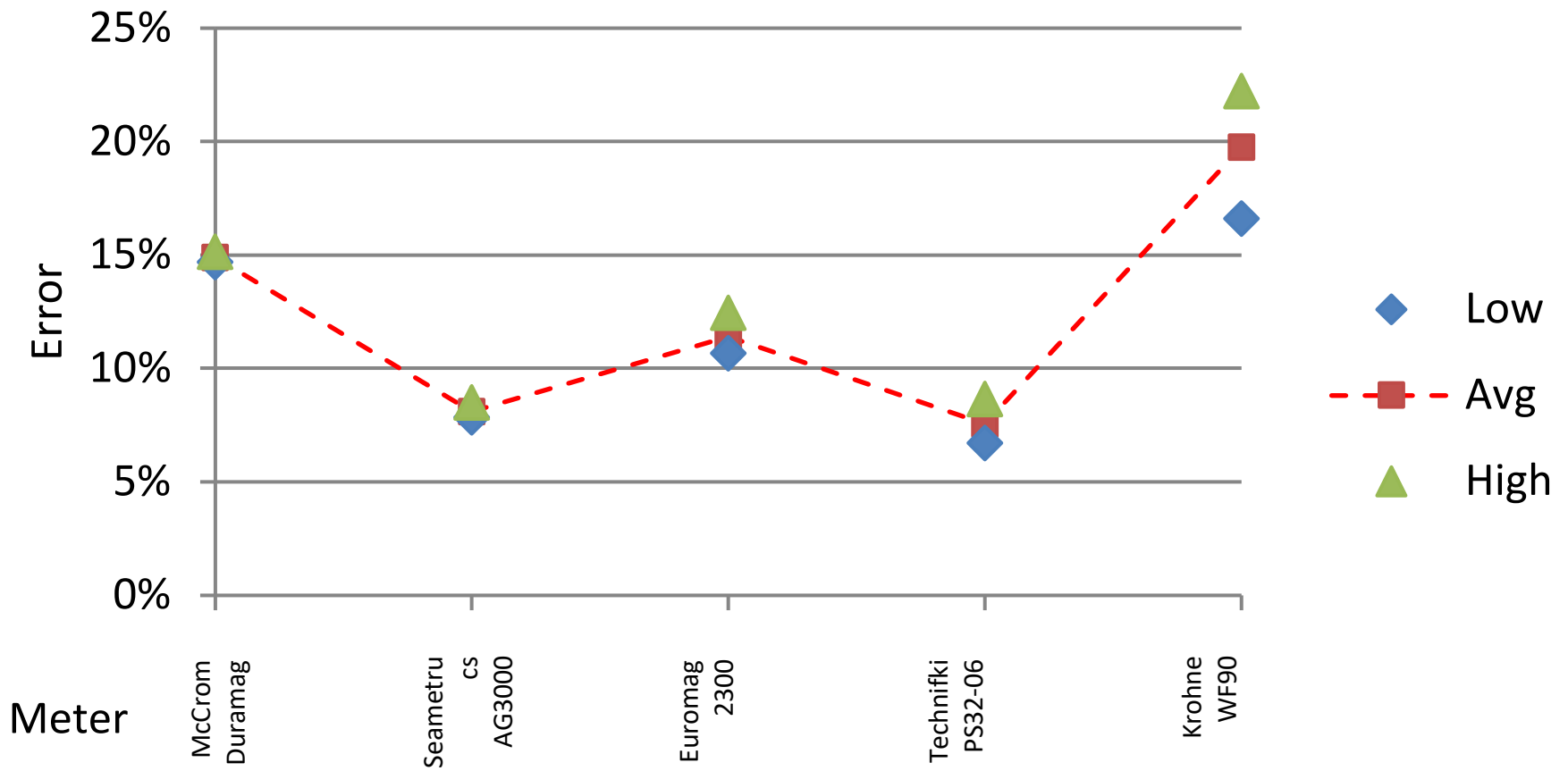
Pump Upstream - 8 fps



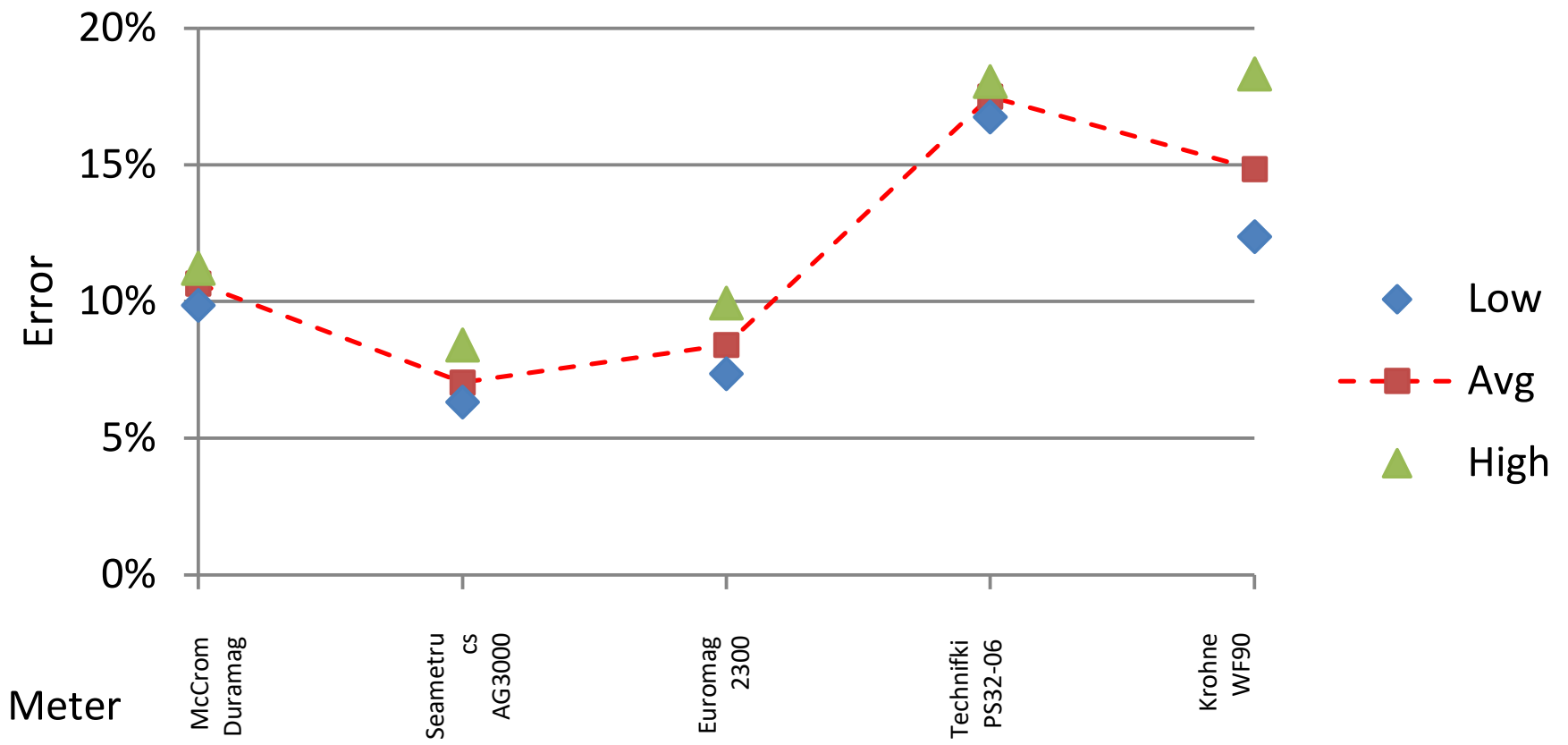
CV Downstream - 14 fps



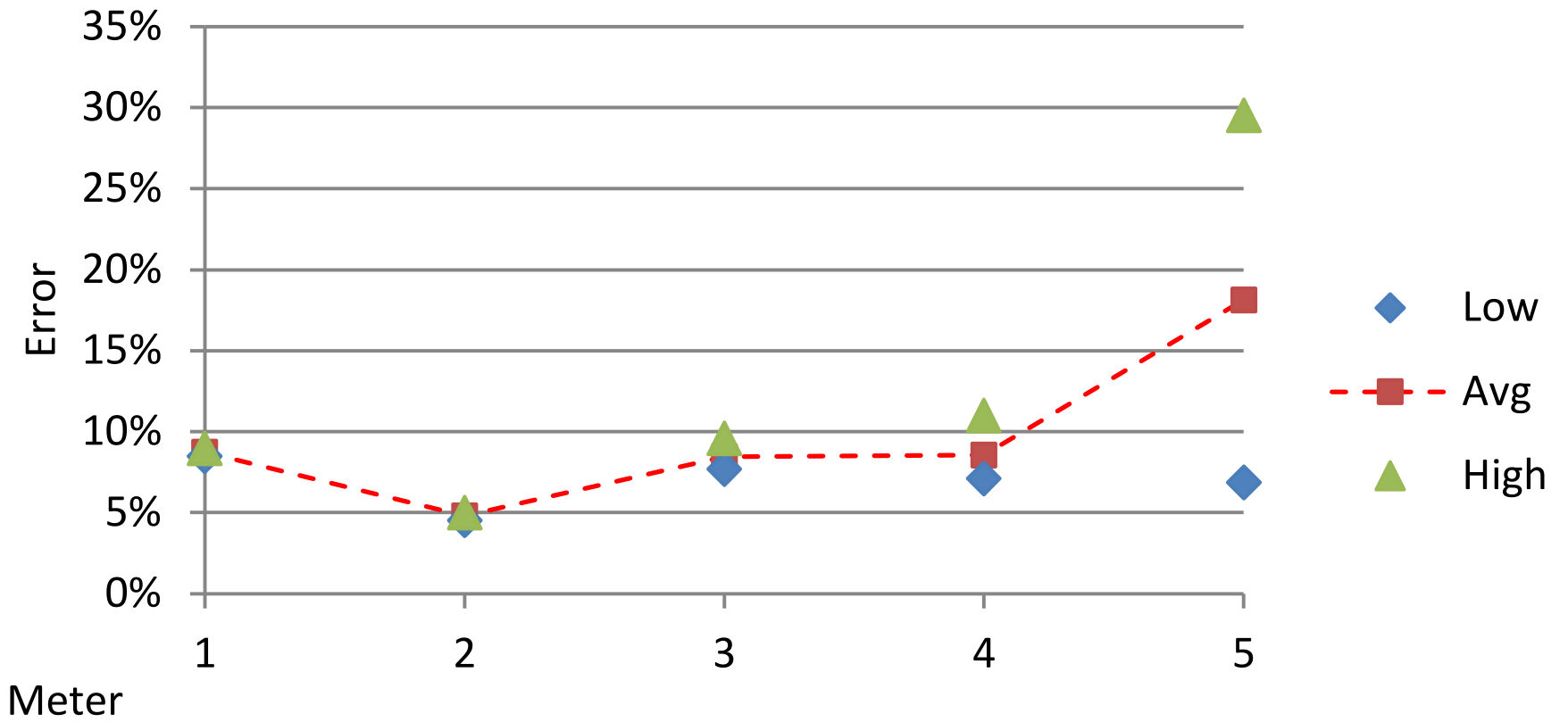
CV Upstream - 14 fps



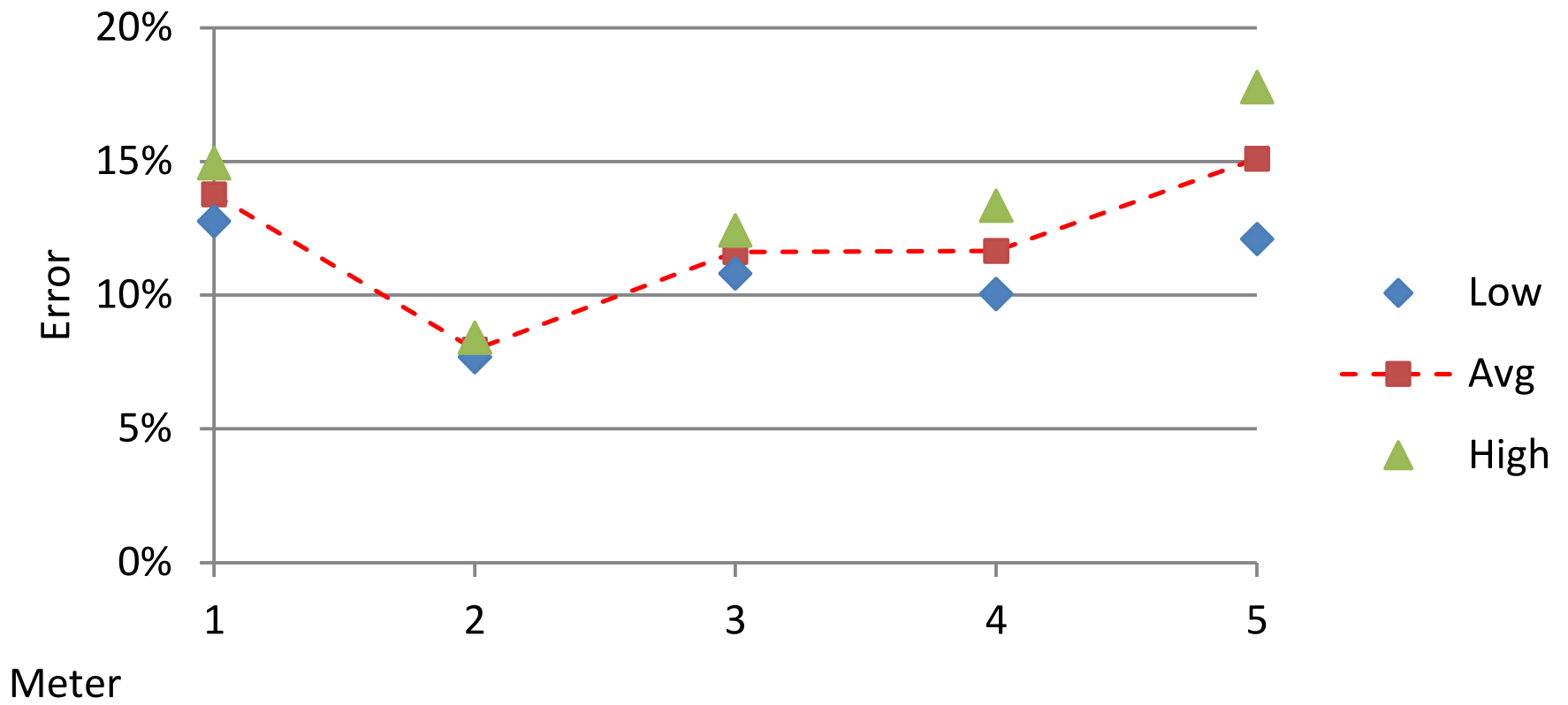
90° Bend Downstream - 14 fps



90° Bend Upstream - 14 fps



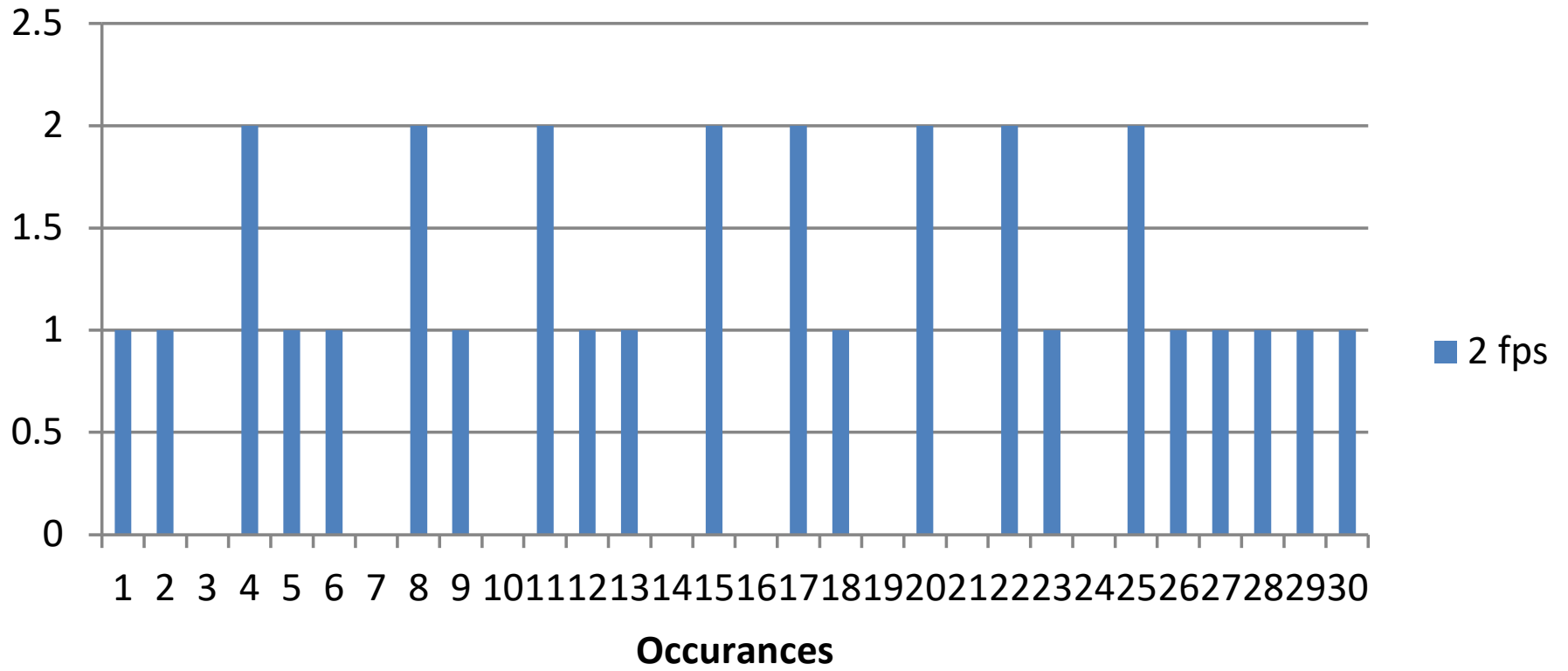
Pump Upstream - 14 fps



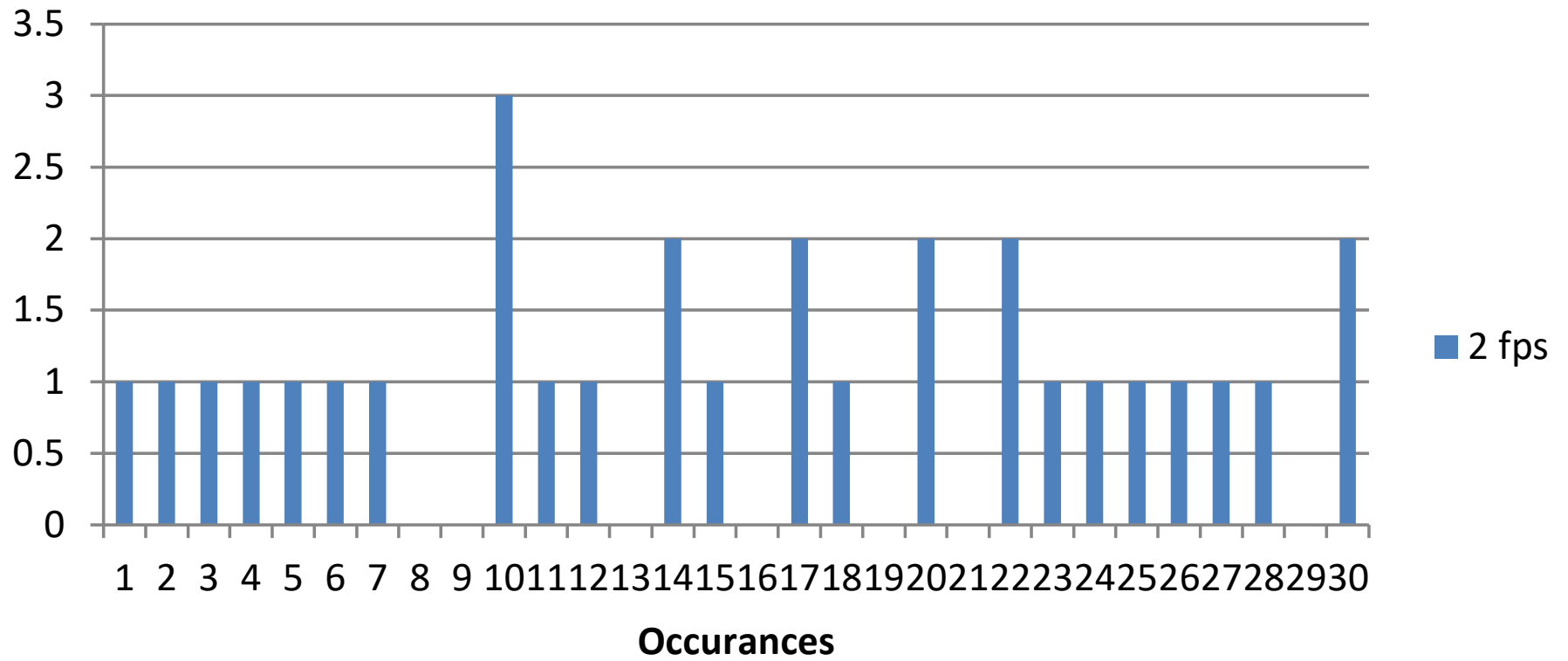
Appendix C – Plots of histograms for all velocities and configurations



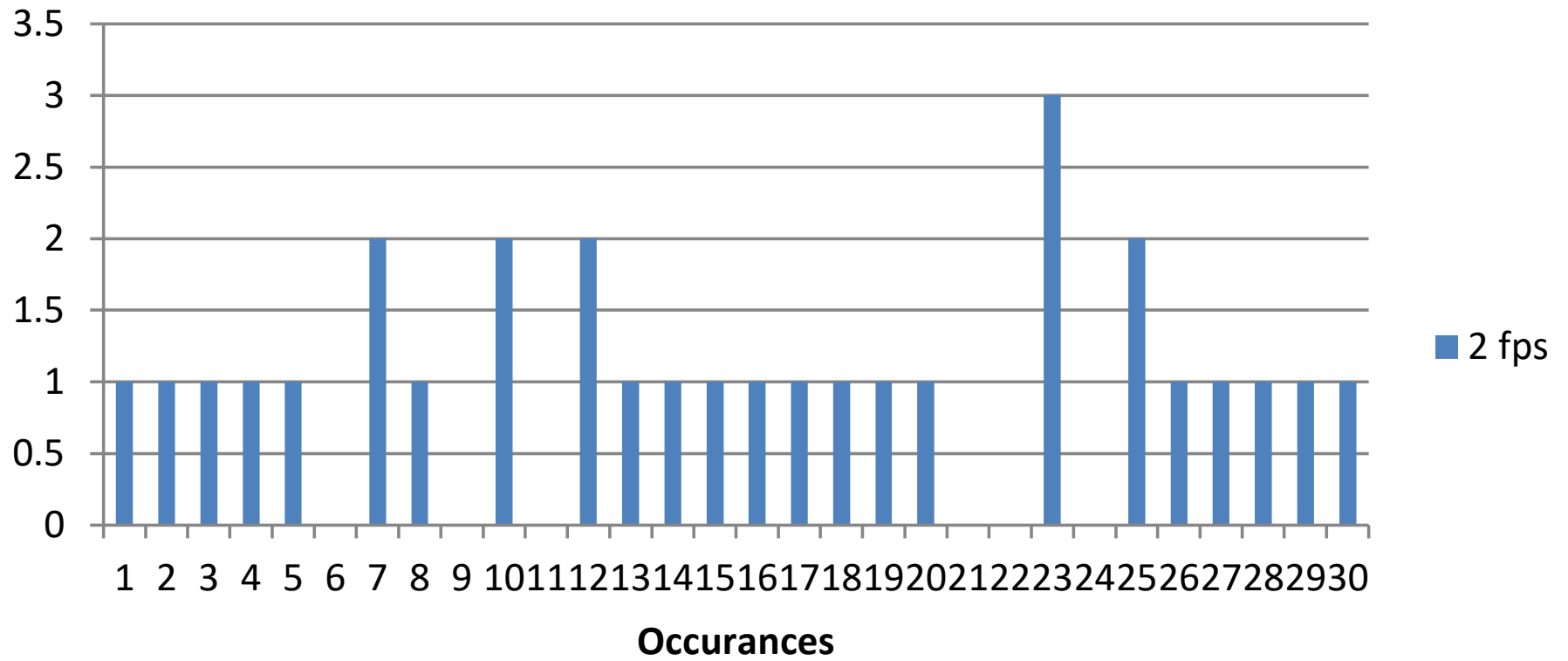
Bermad Chk V DS - 2 fps



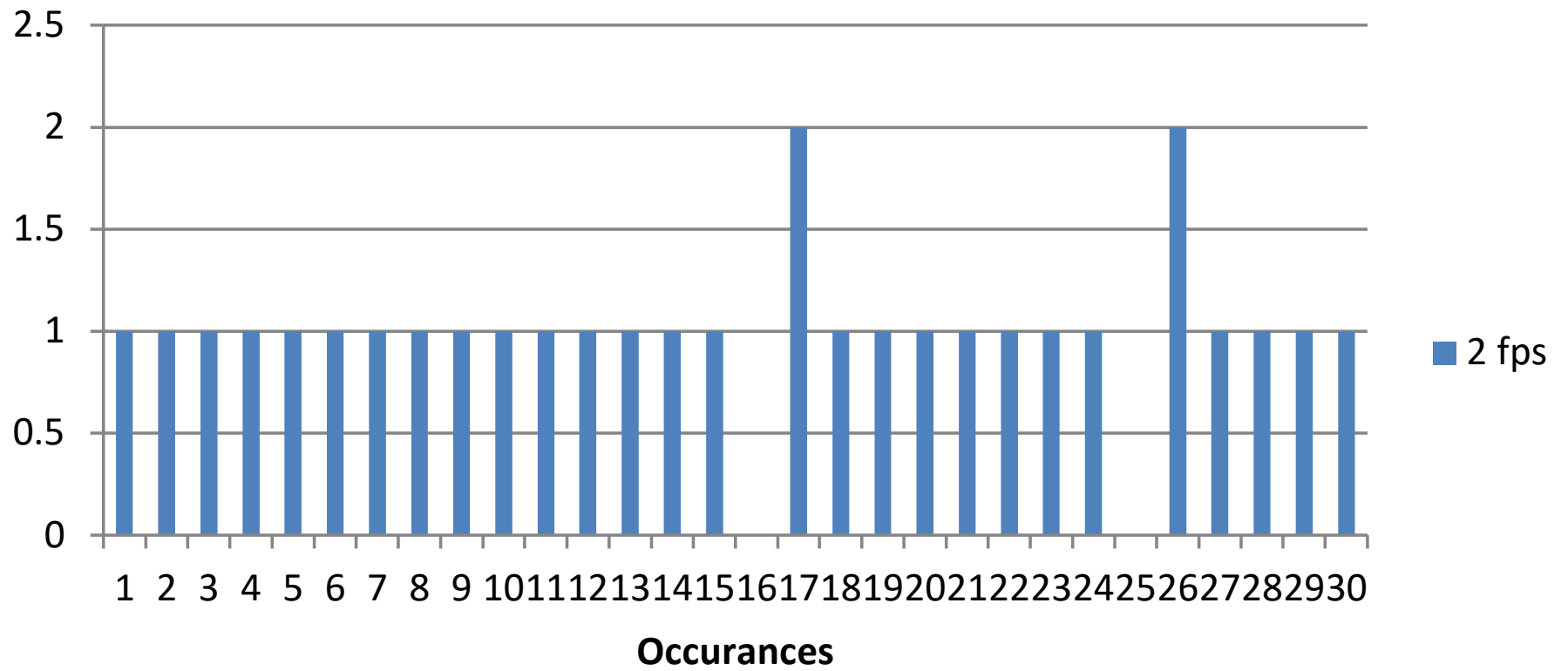
Bermad 90 DS - 2 fps



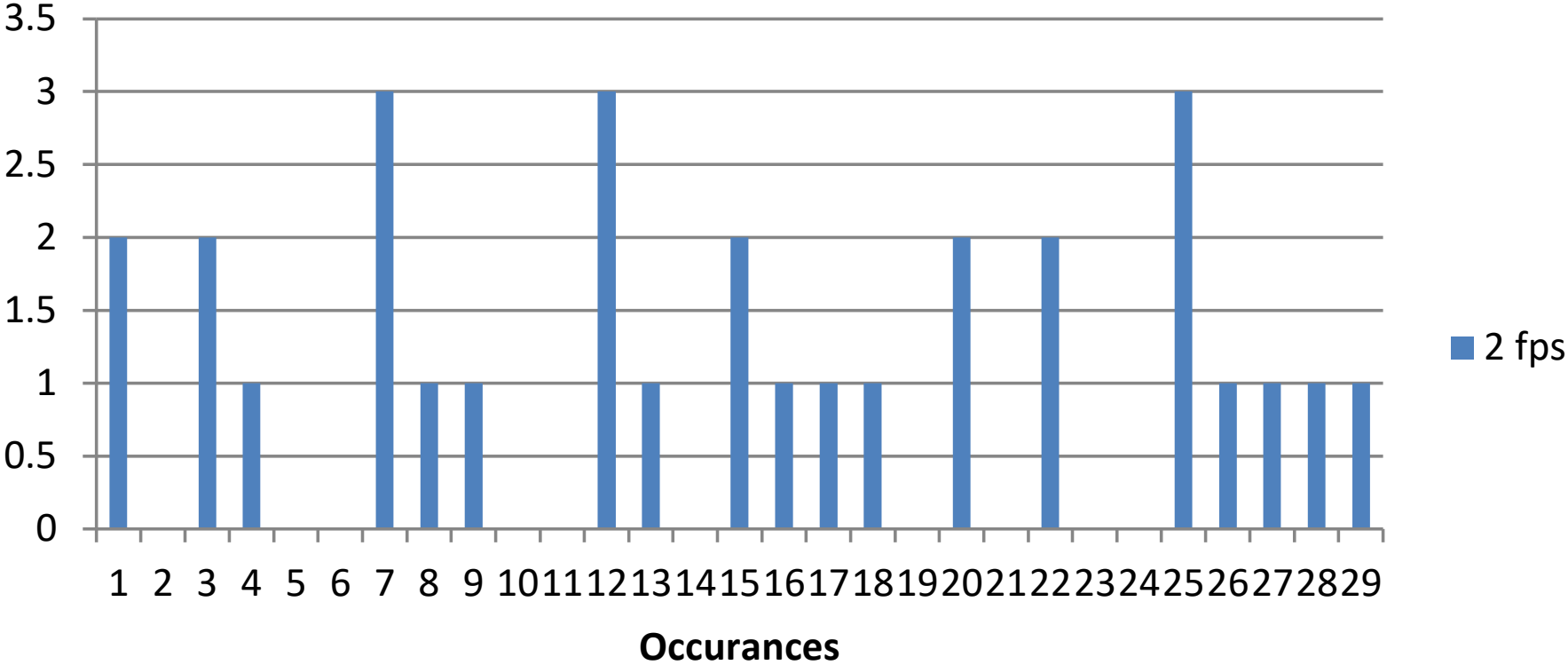
Bermad 90 US - 2 fps



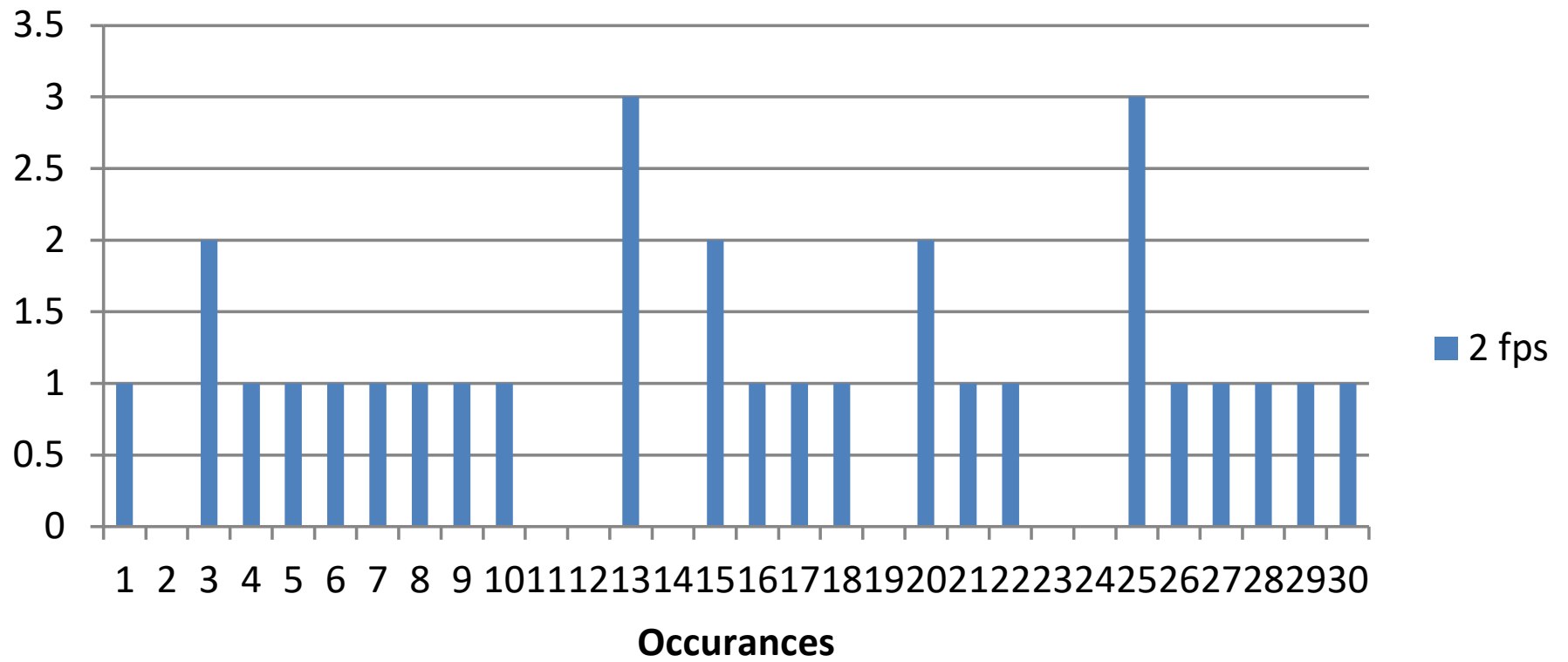
Bermad Chk V US - 2 fps



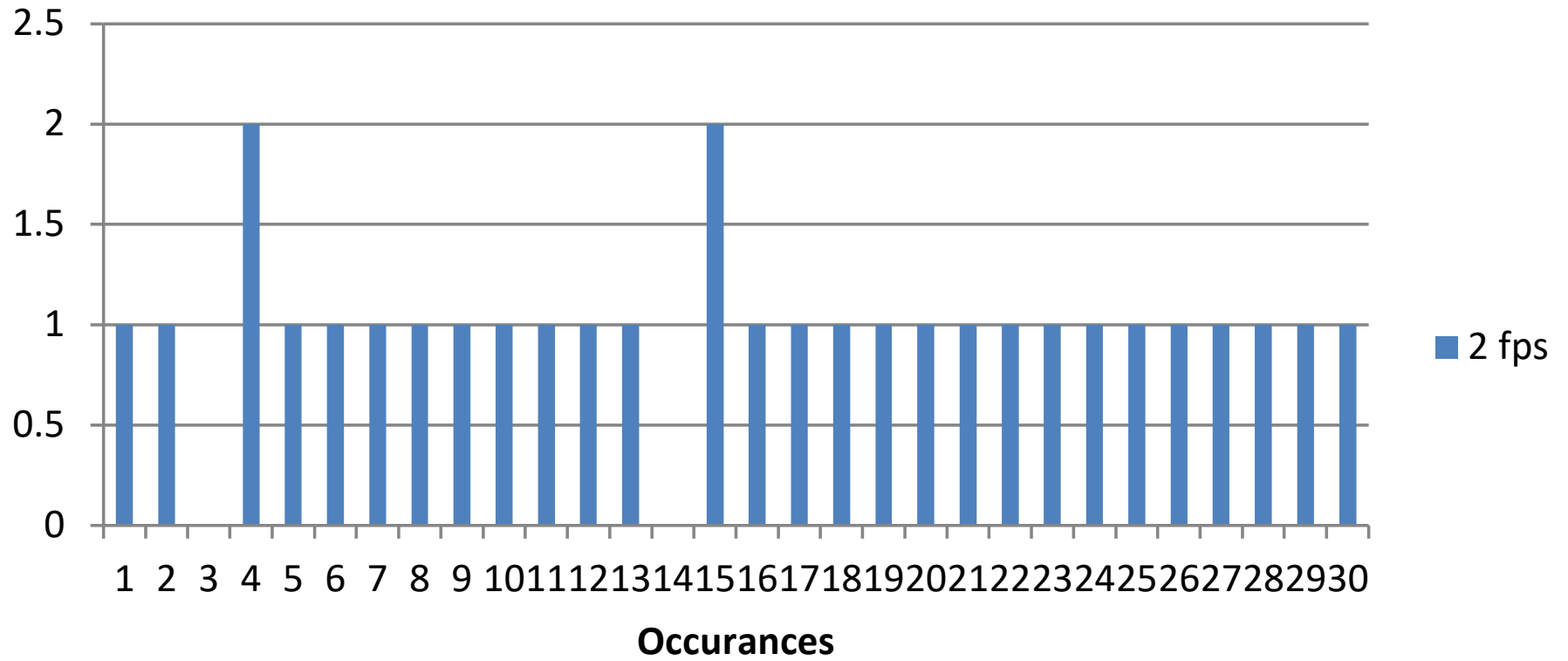
Bermad Pump - 2 fps



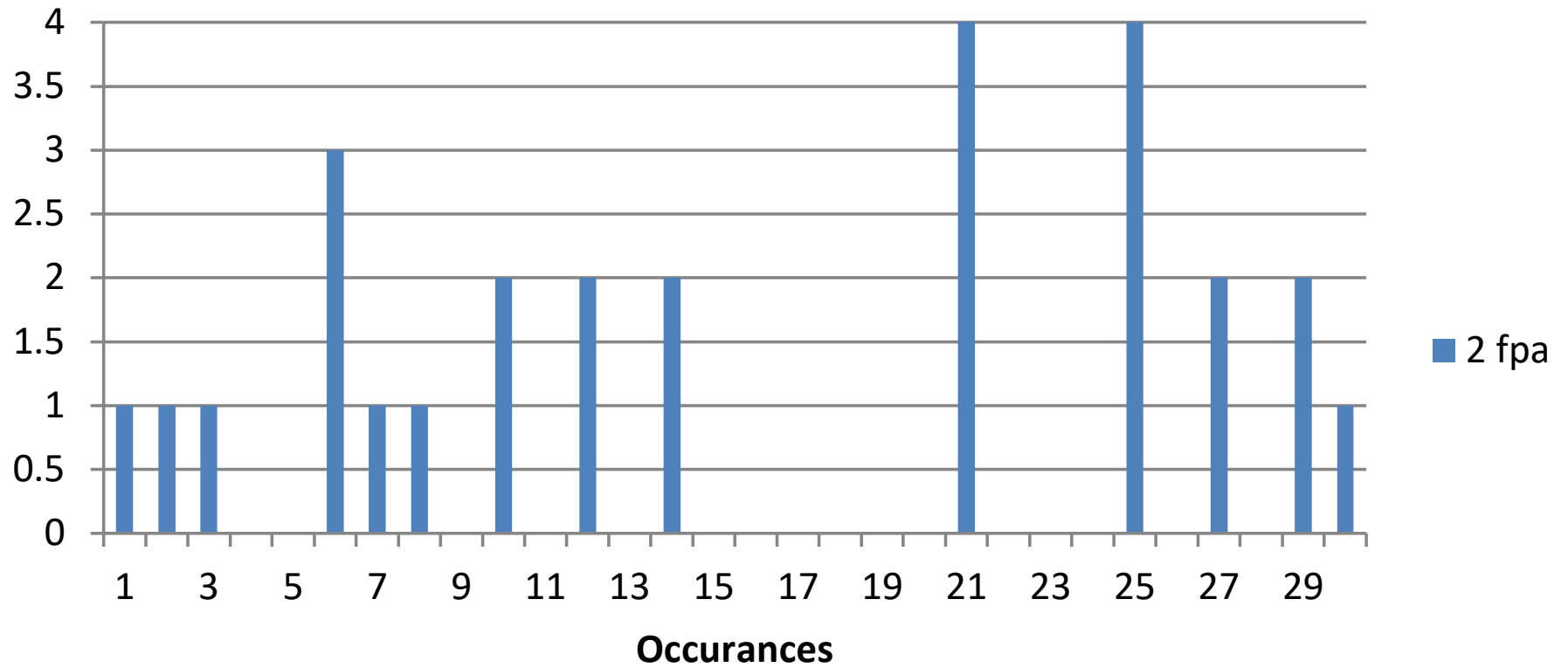
Krohne 90 DS - 2 fps



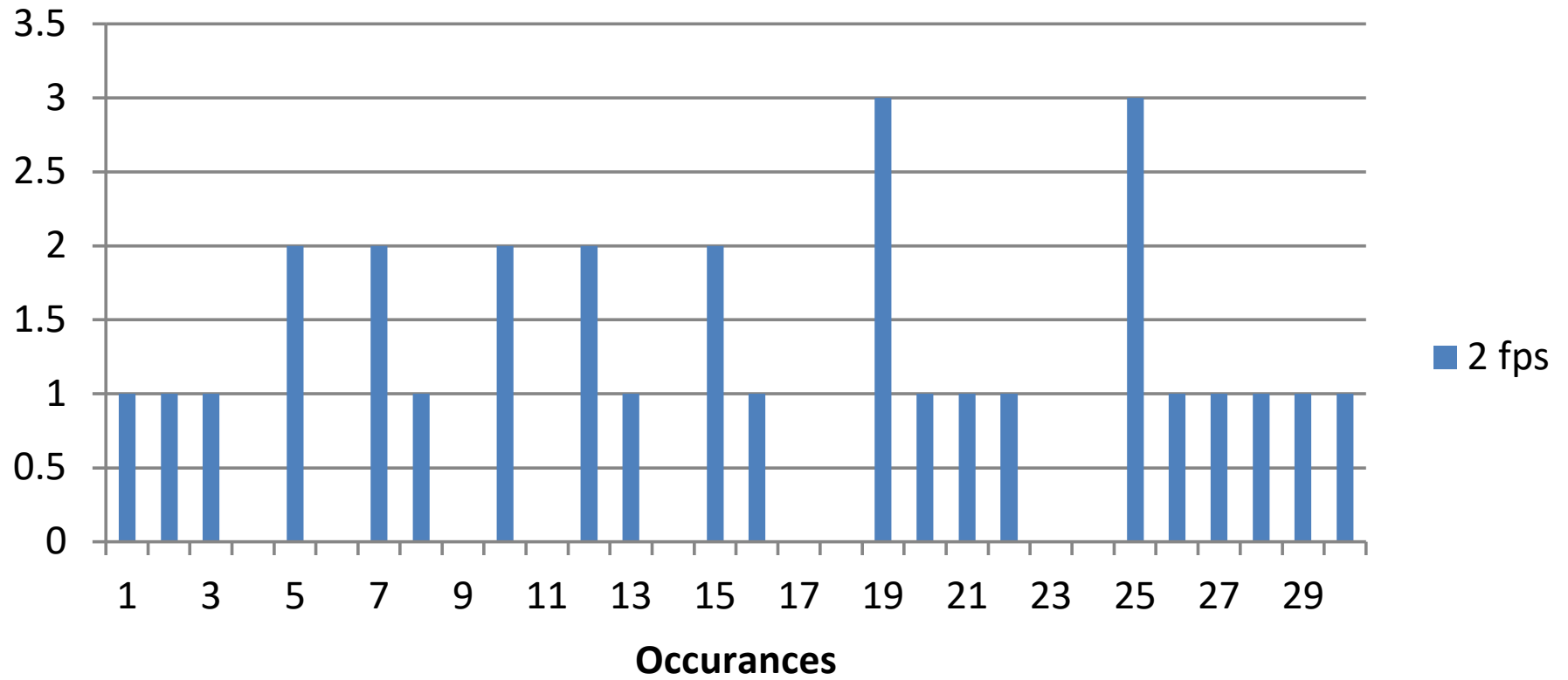
Krohne 90 US - 2 fps



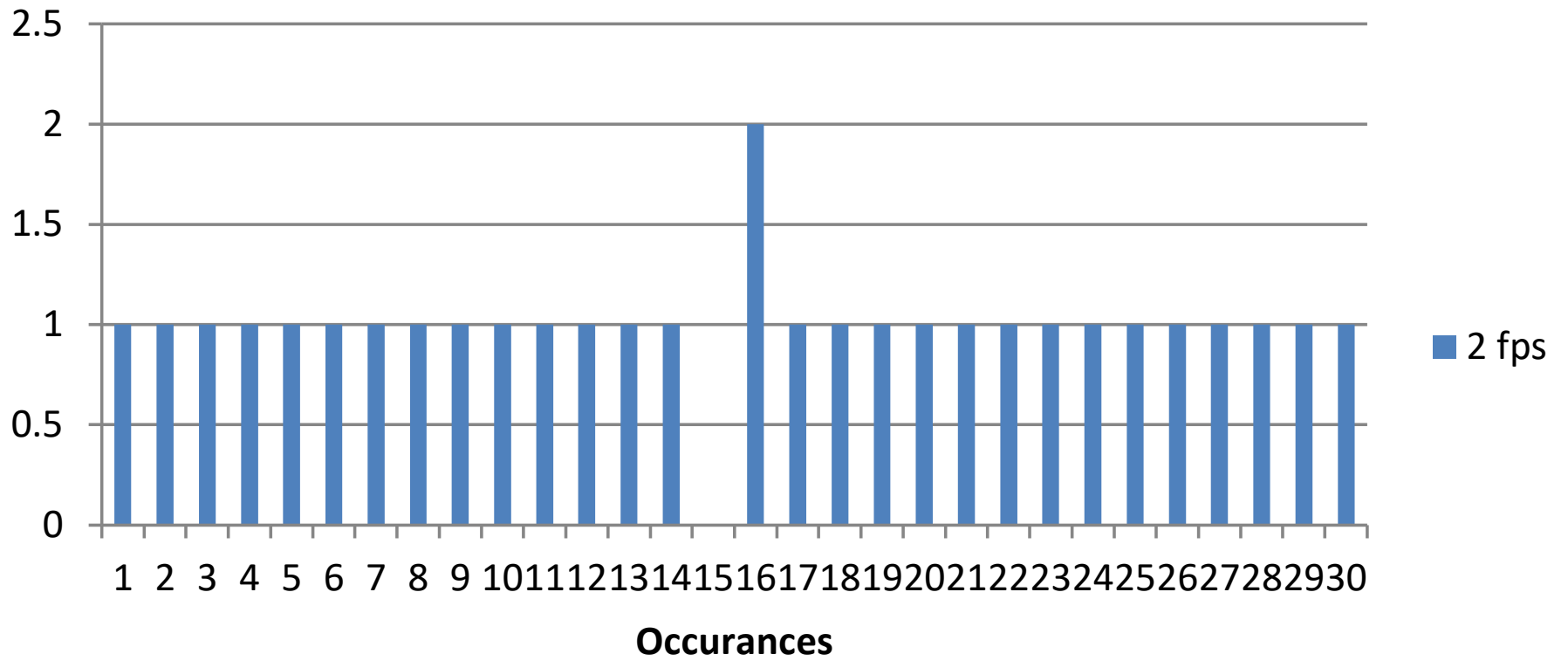
Krohne Chk V DS - 2 fps



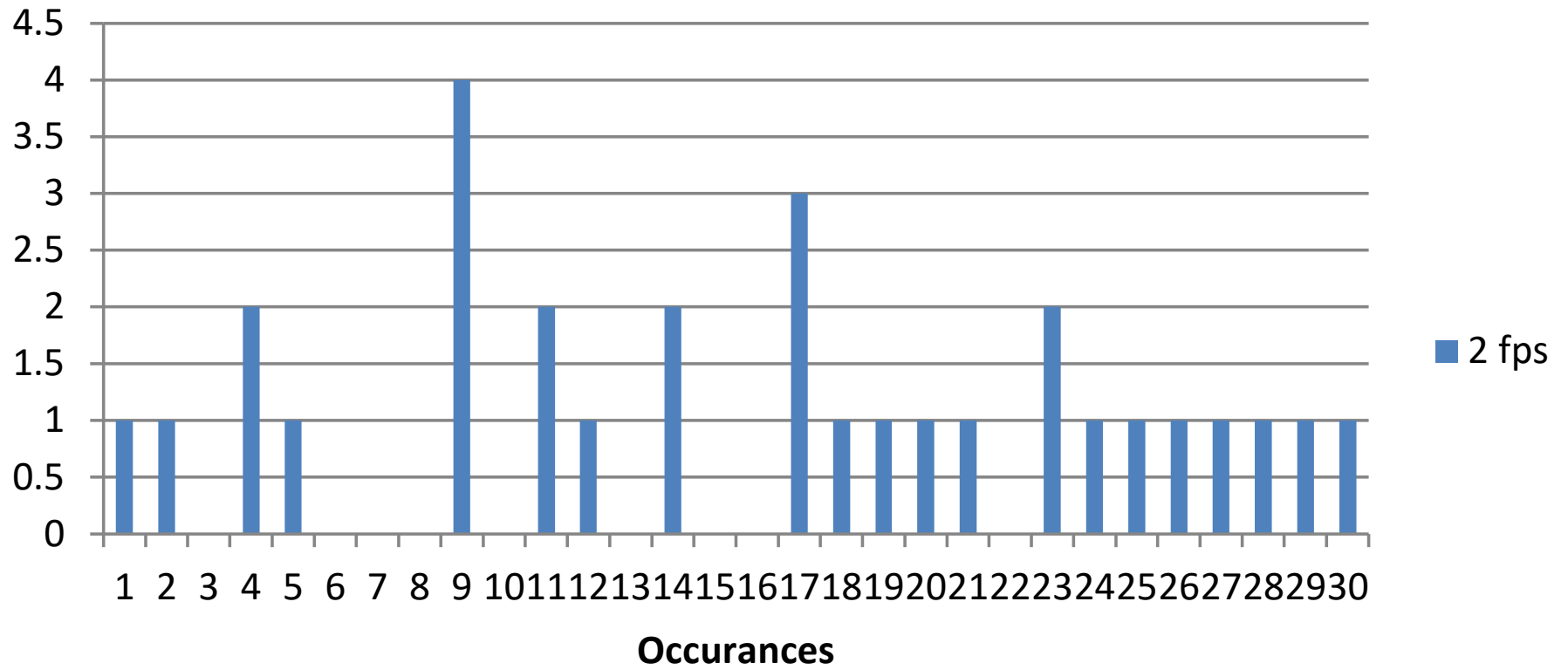
Krohne Chk V US - 2 fps



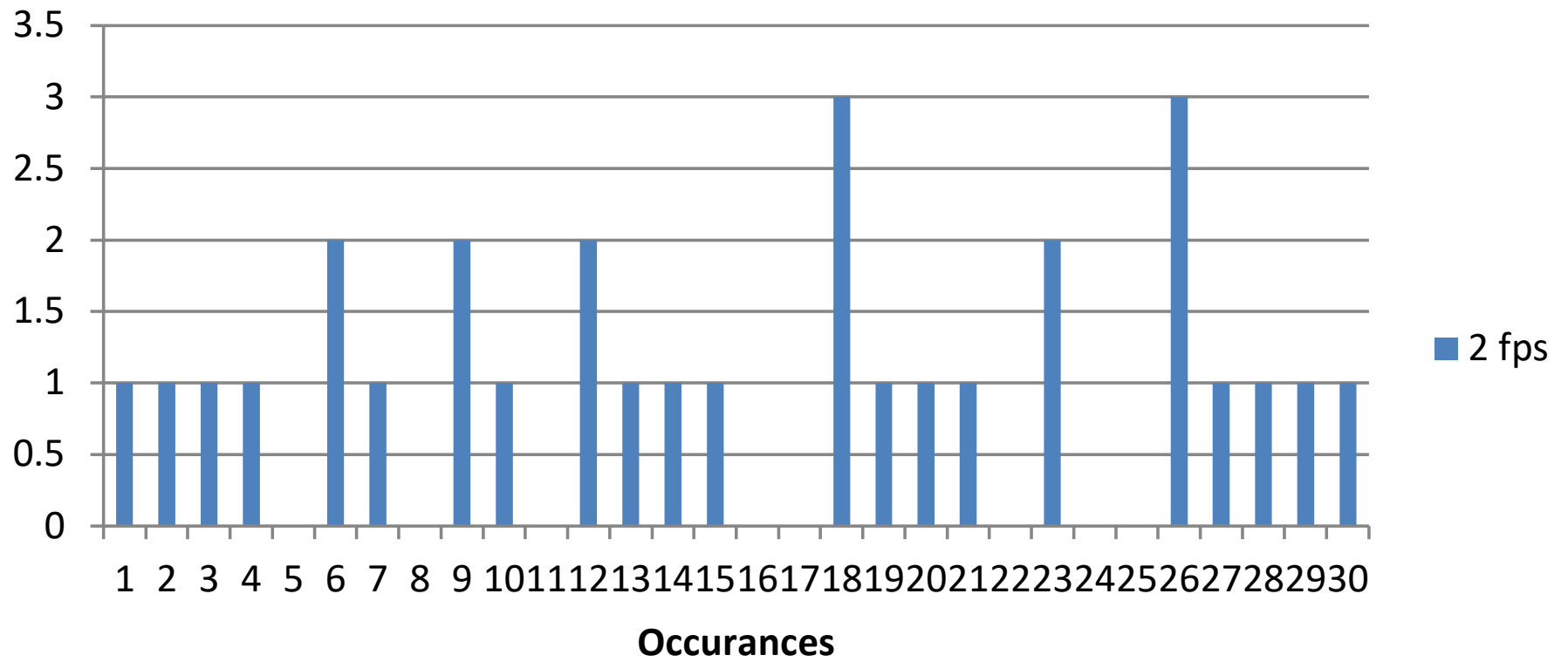
Krohne Pump - 2 fps



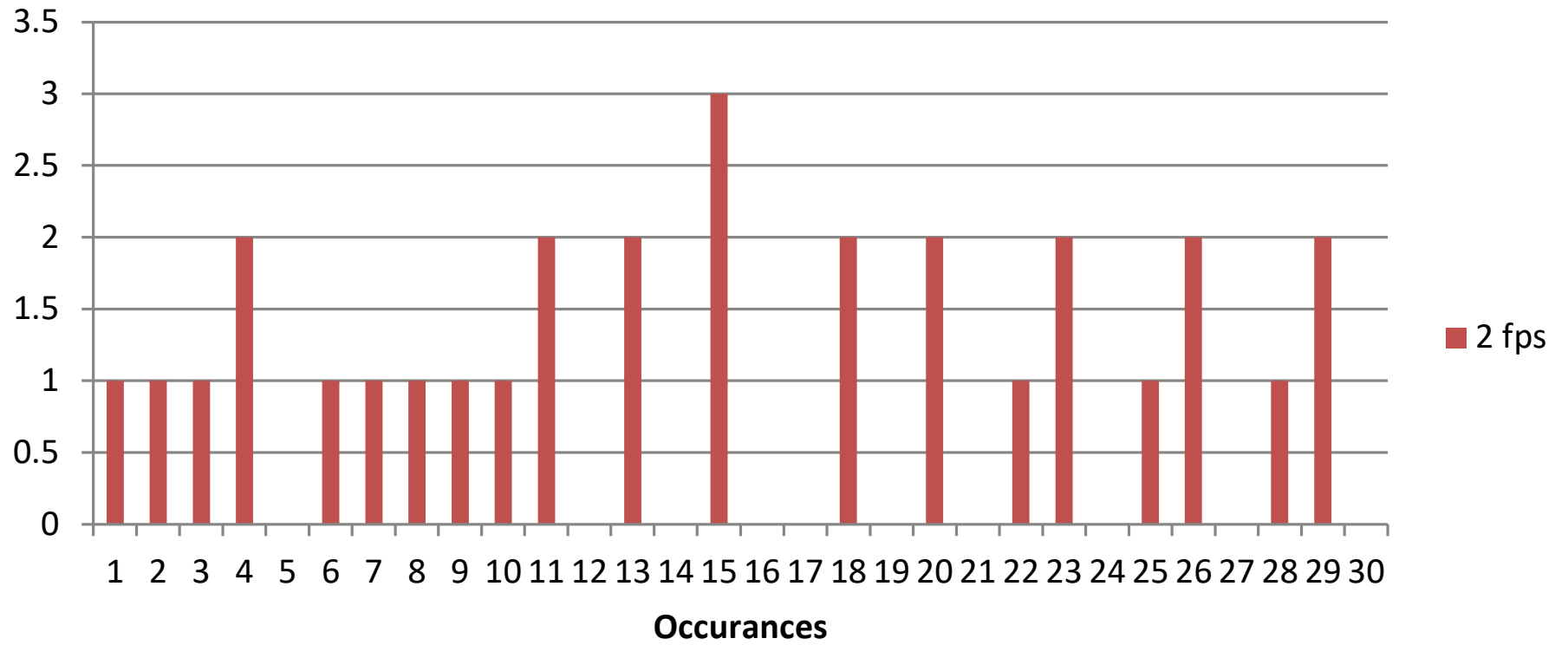
McCrometer 90 DS - 2 fps



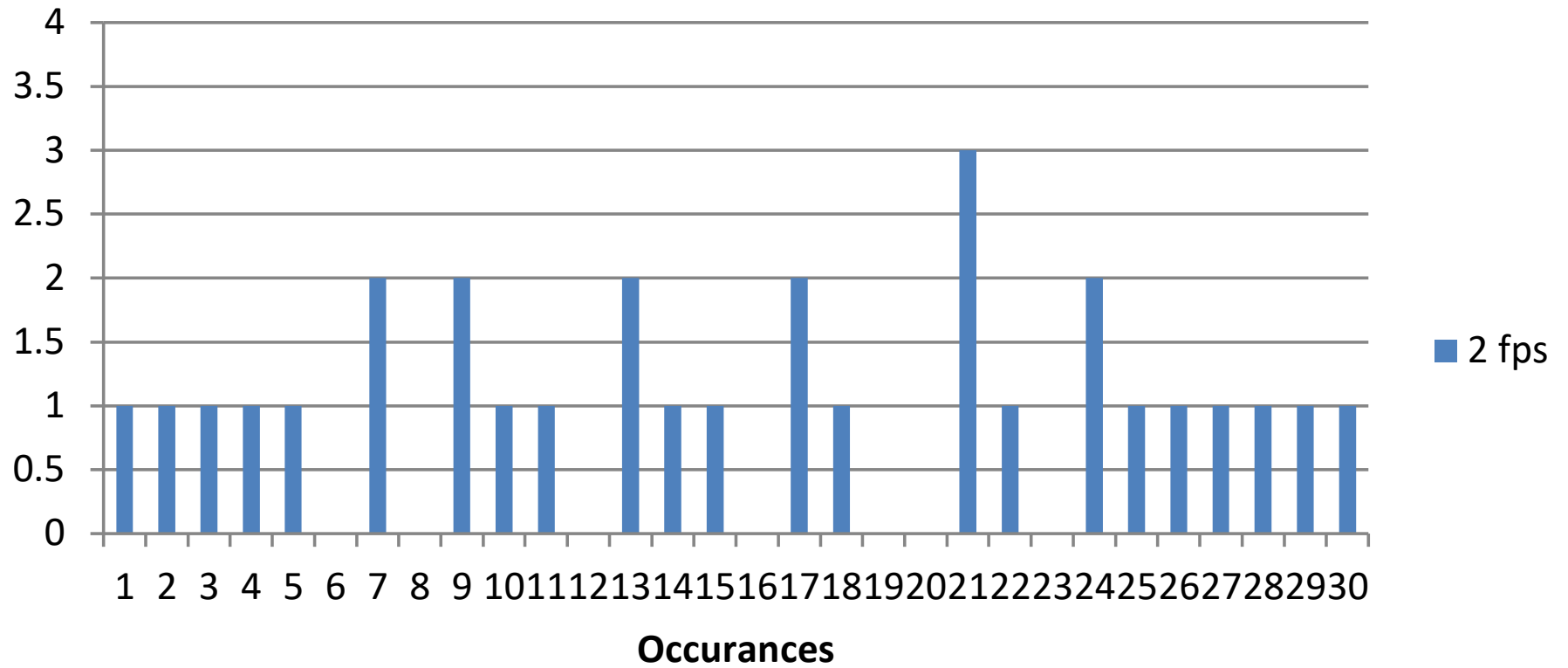
McCrometer 90 US - 2 fps



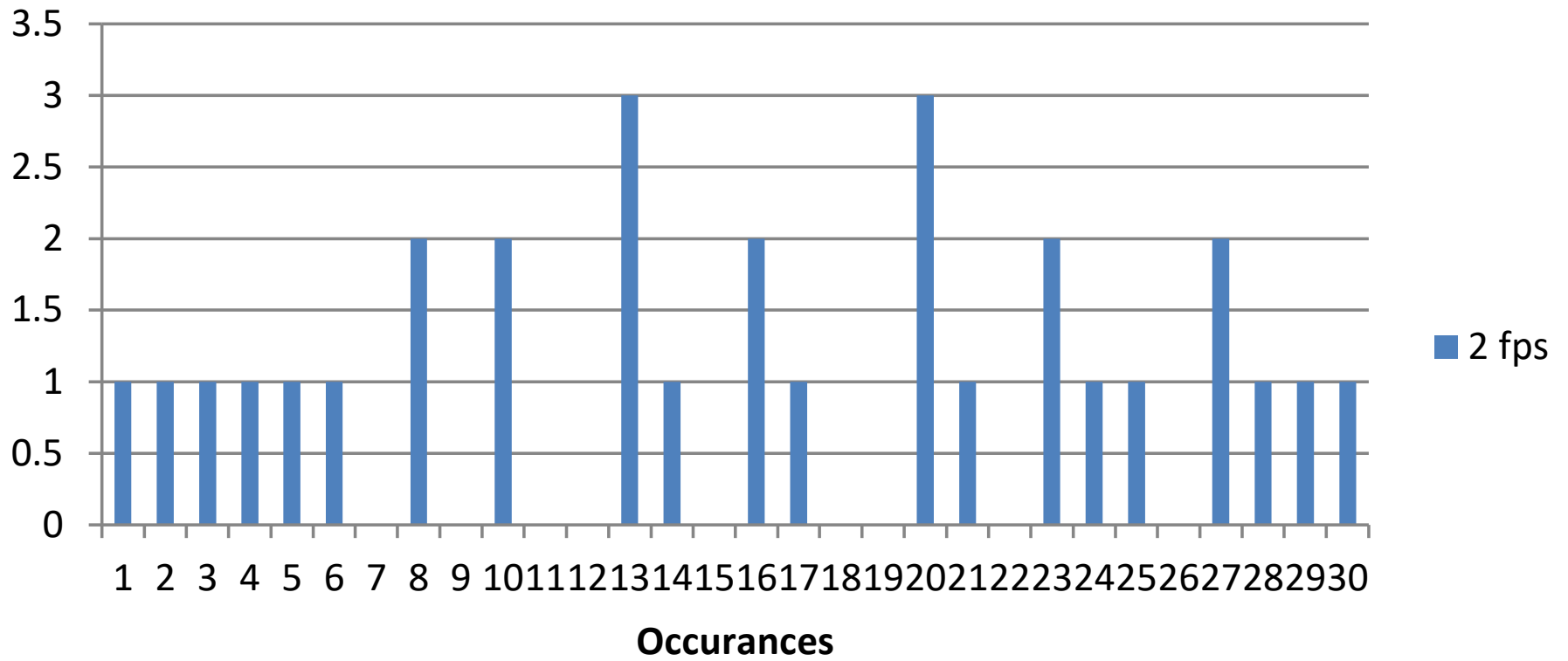
McCrometer Duramag Chk V DS - 2 fps



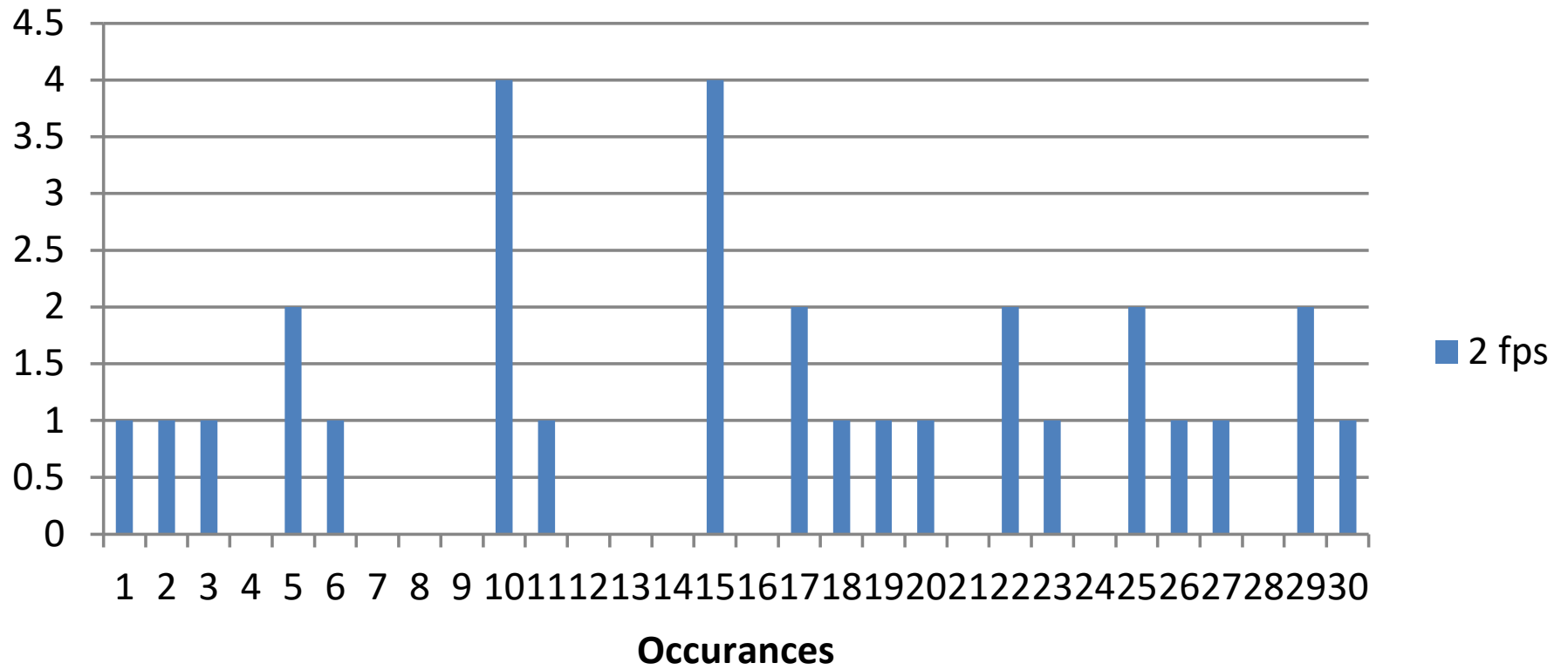
McCometer Chk V US - 2 fps



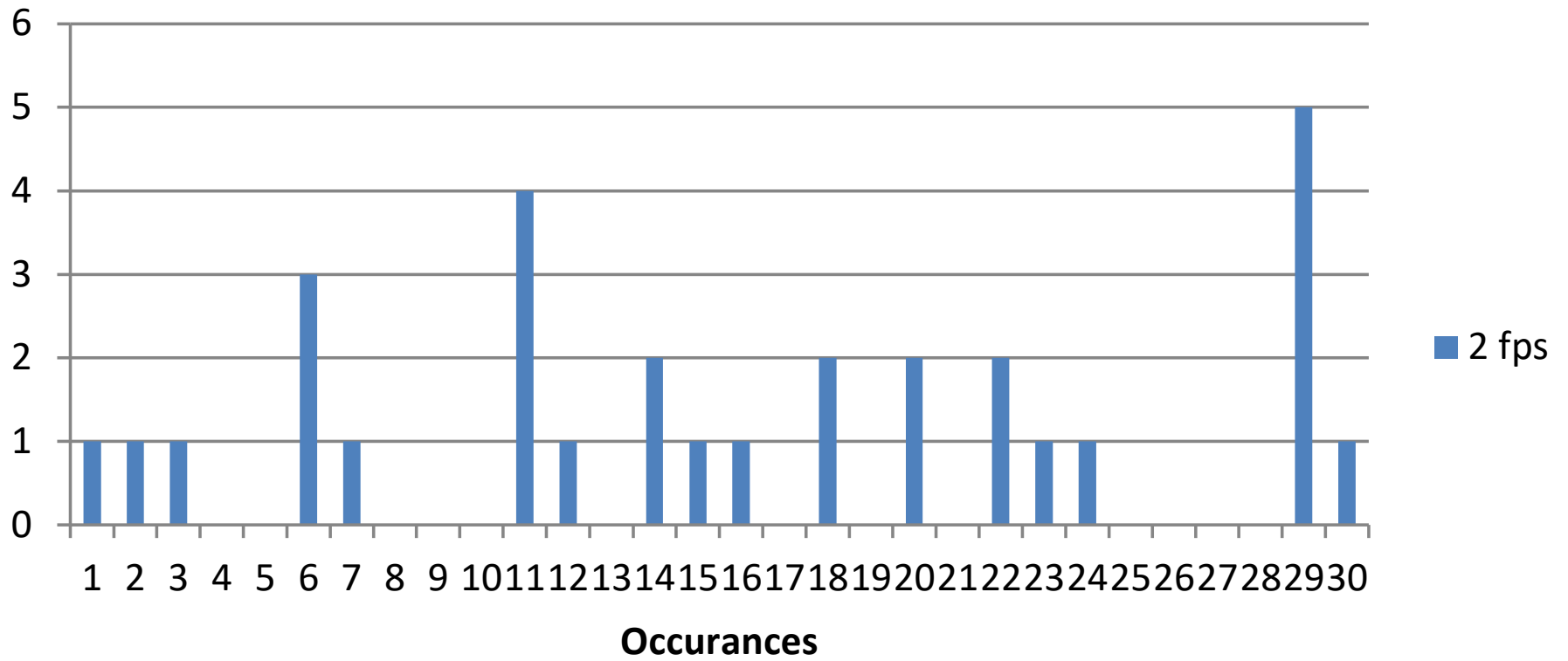
McCrometer Pump - 2 fps



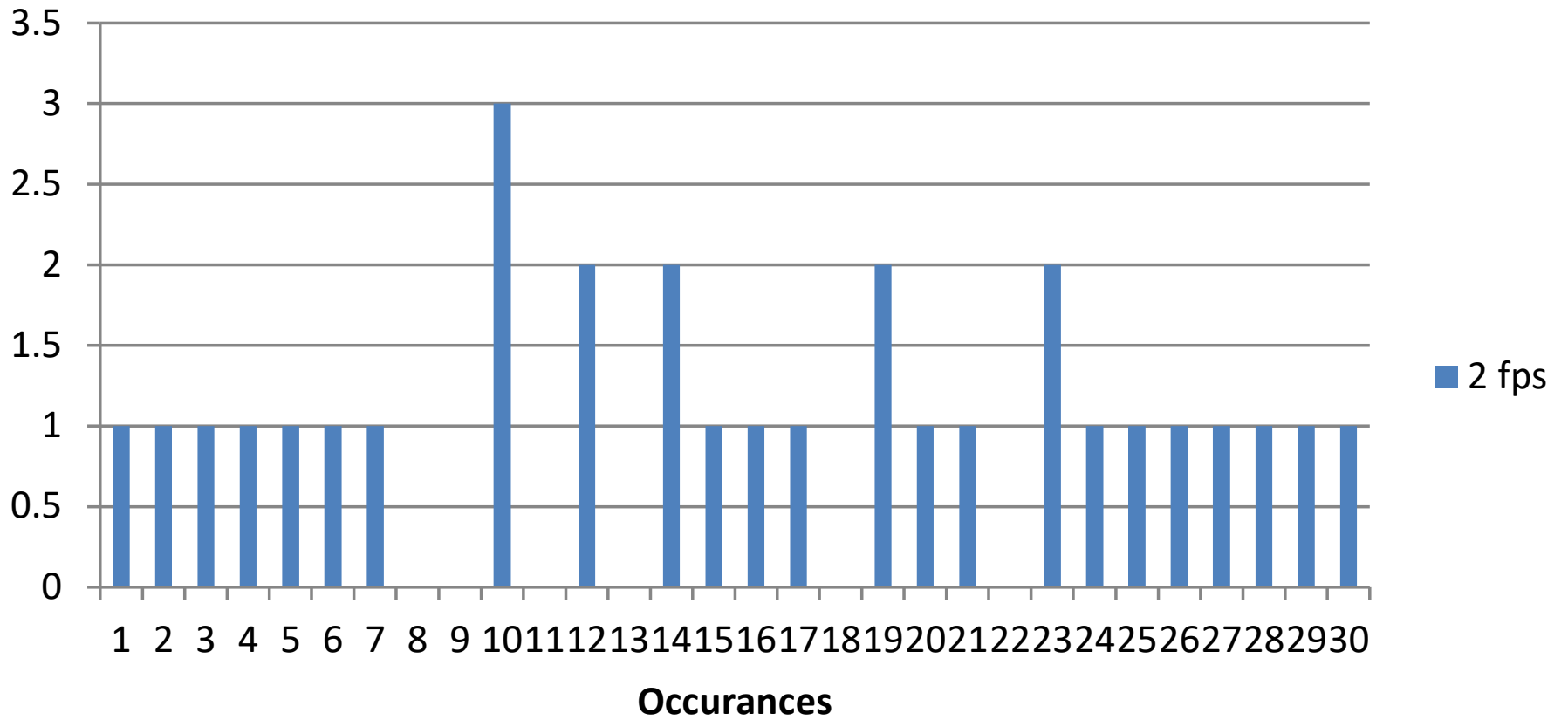
Seametrics 90 DS - 2 fps



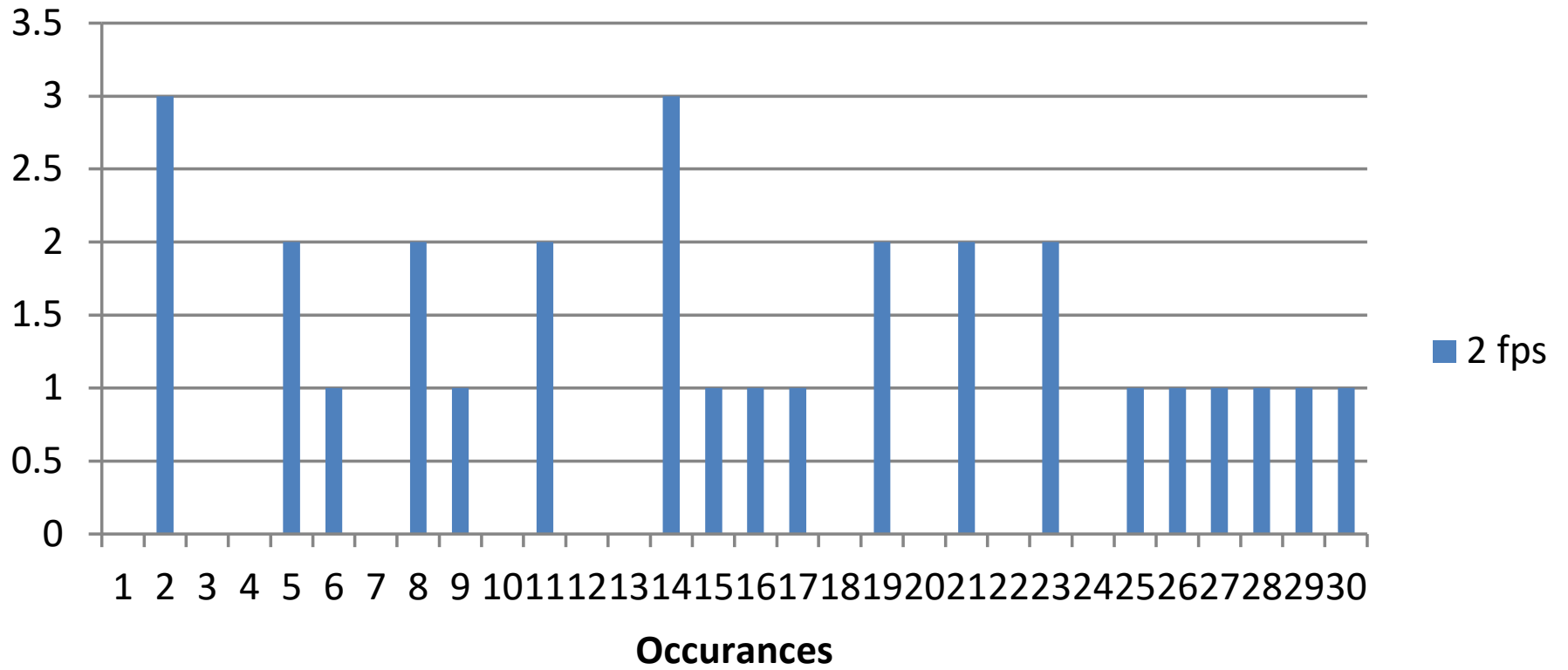
Seametrics 90 US - 2 fps



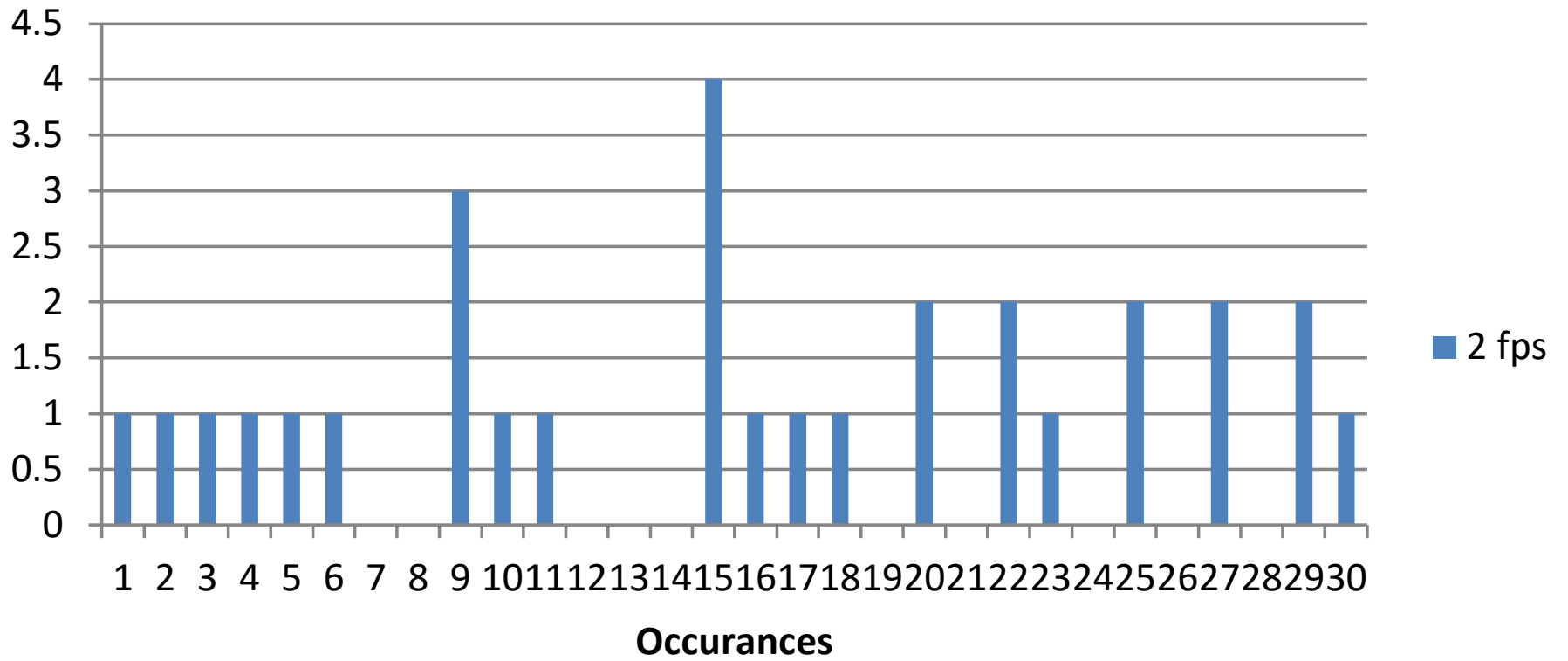
Seametrics Chk V DS - 2 fps



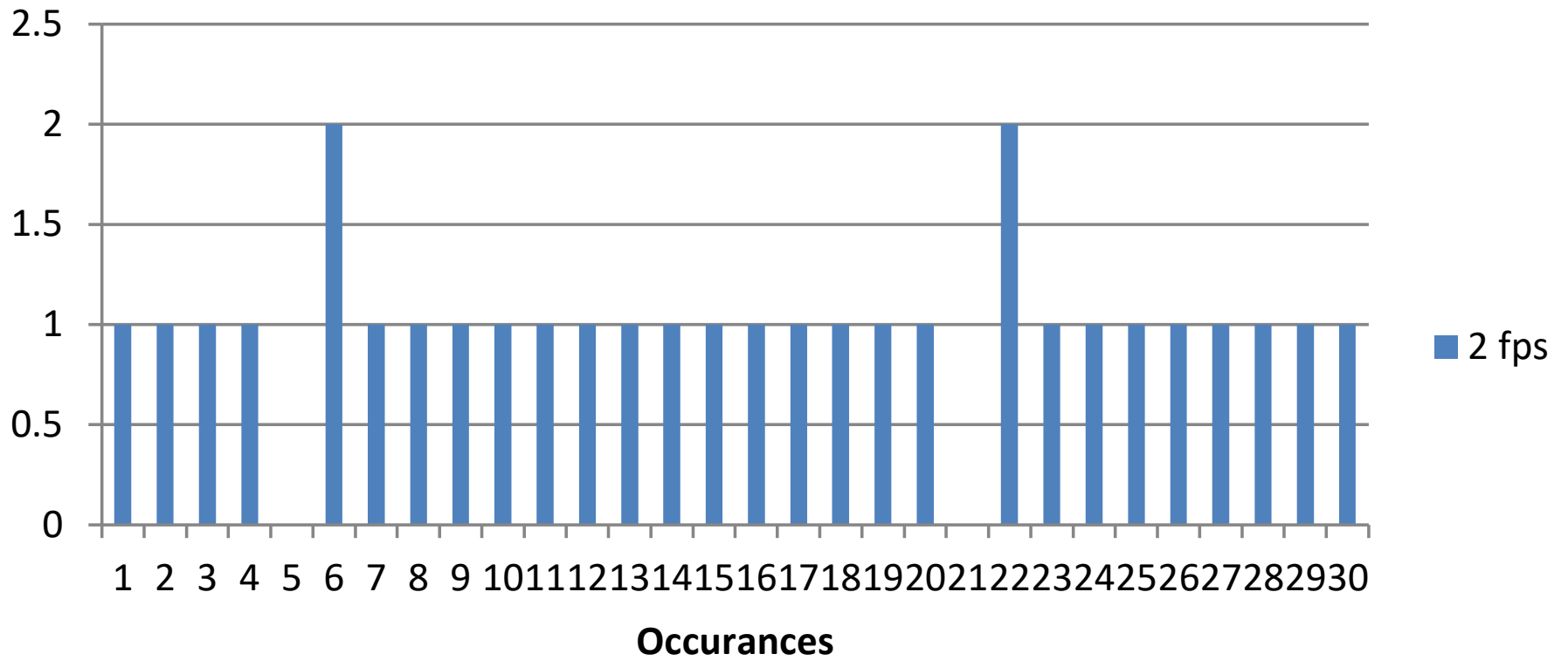
Seametrics Chk V US - 2 fps



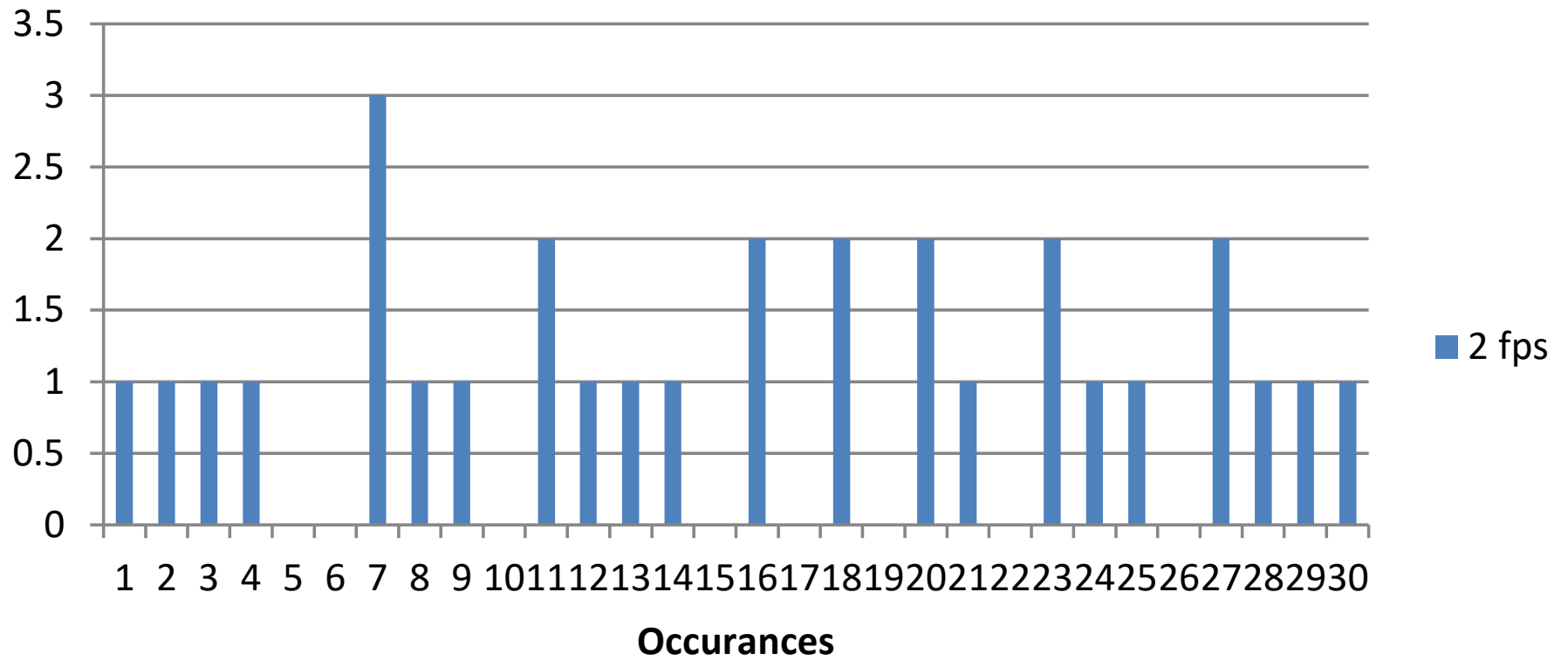
Seamatics Pump - 2 fps



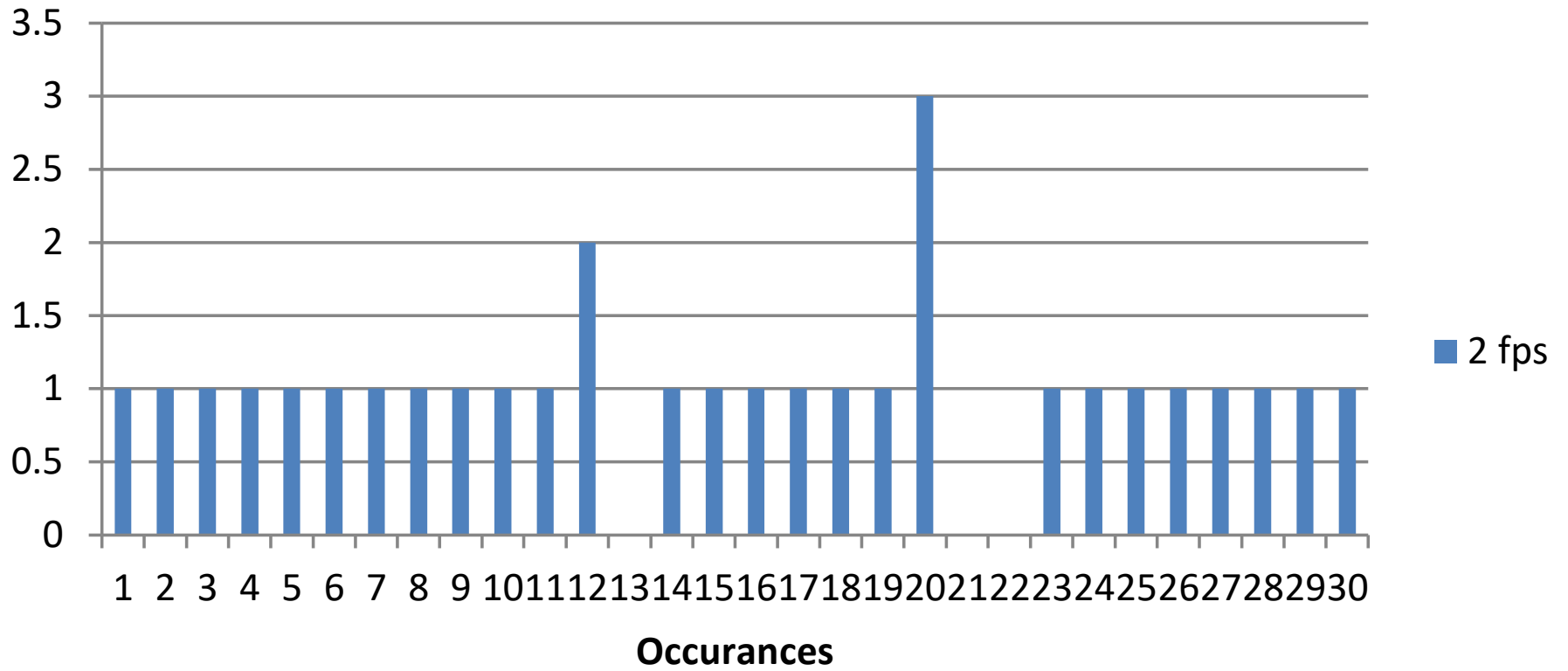
Tecnoflo 90 DS - 2 fps



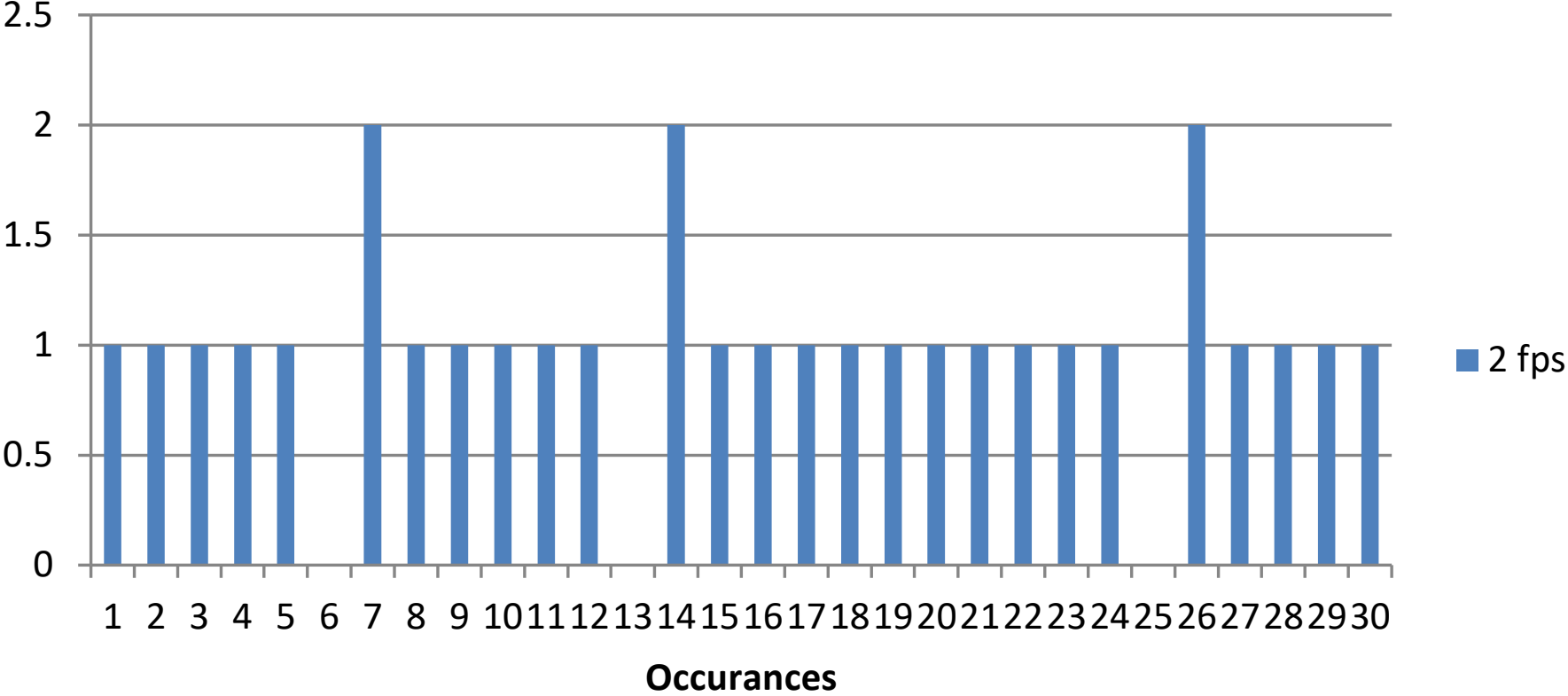
Technoflo 90 US - 2 fps



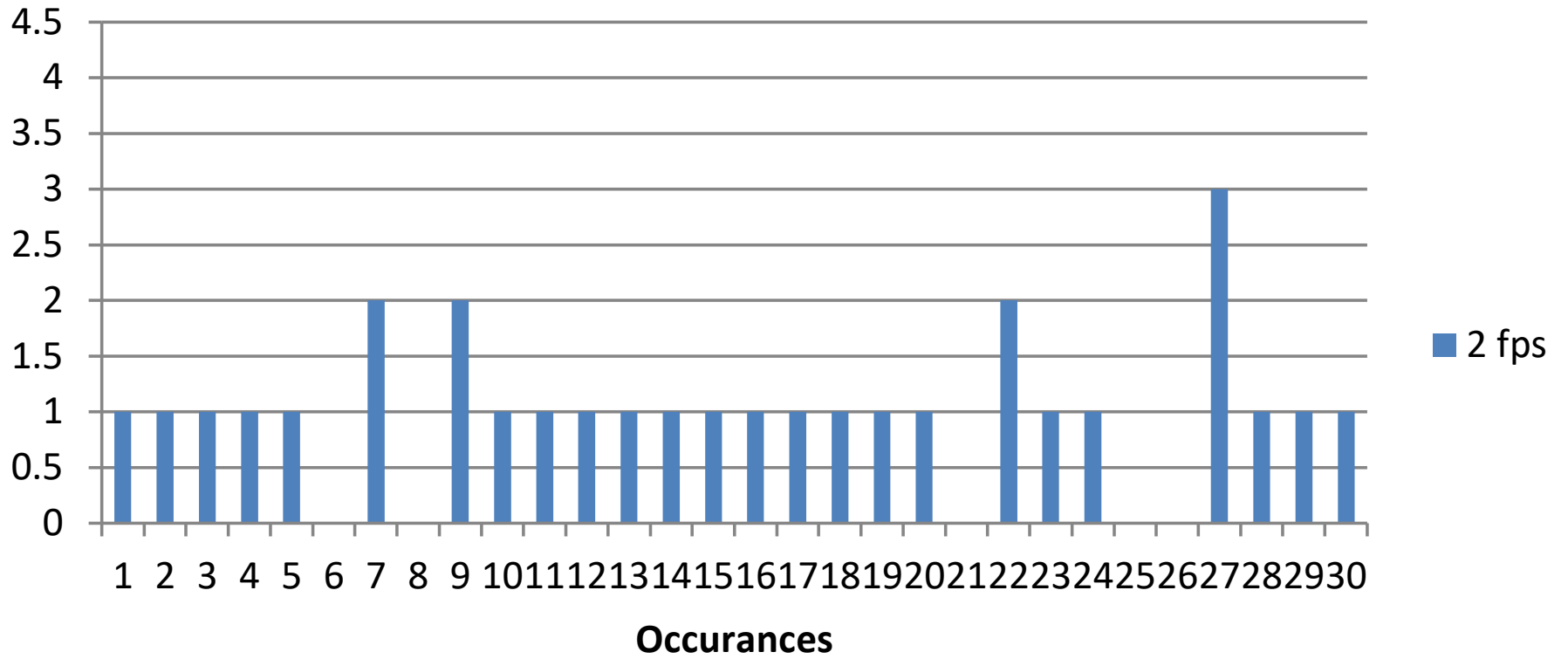
Technoflo Chk V DS - 2 fps



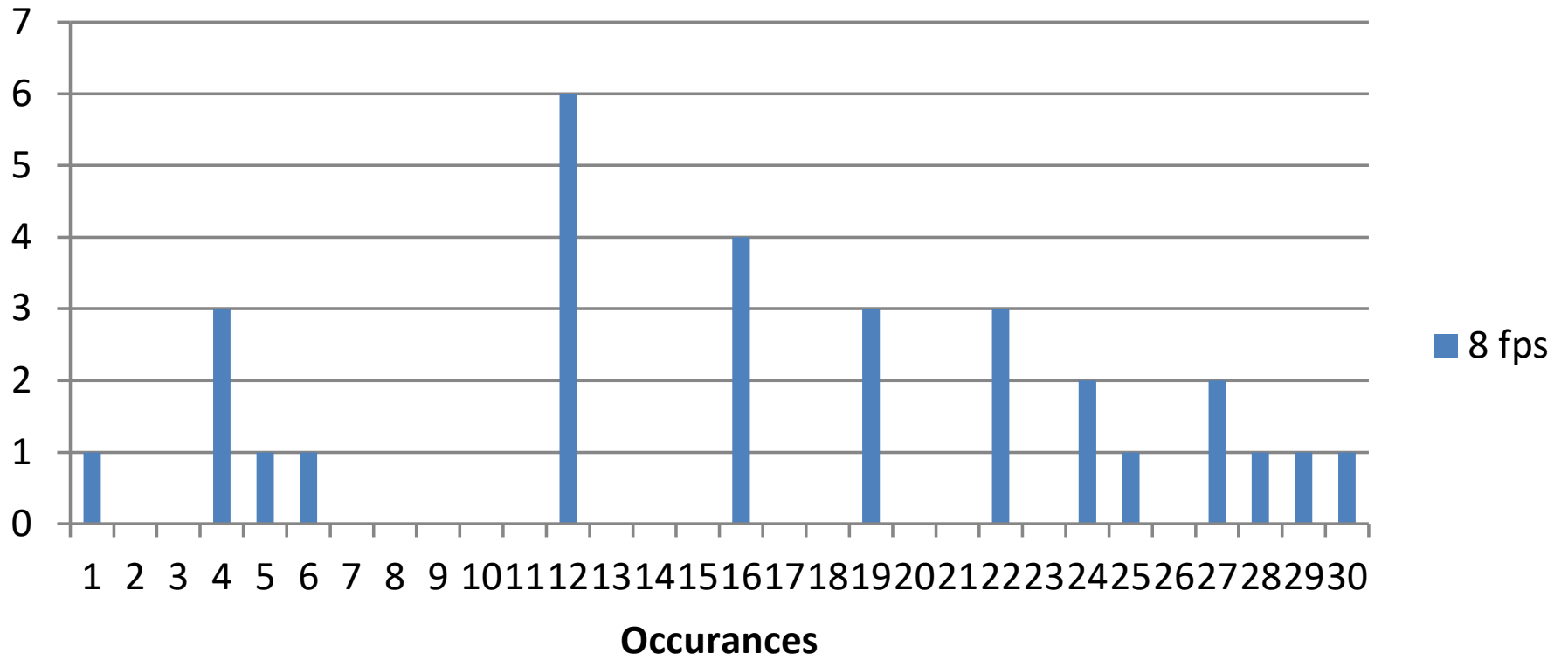
Technoflo Chk V US - 2 fps



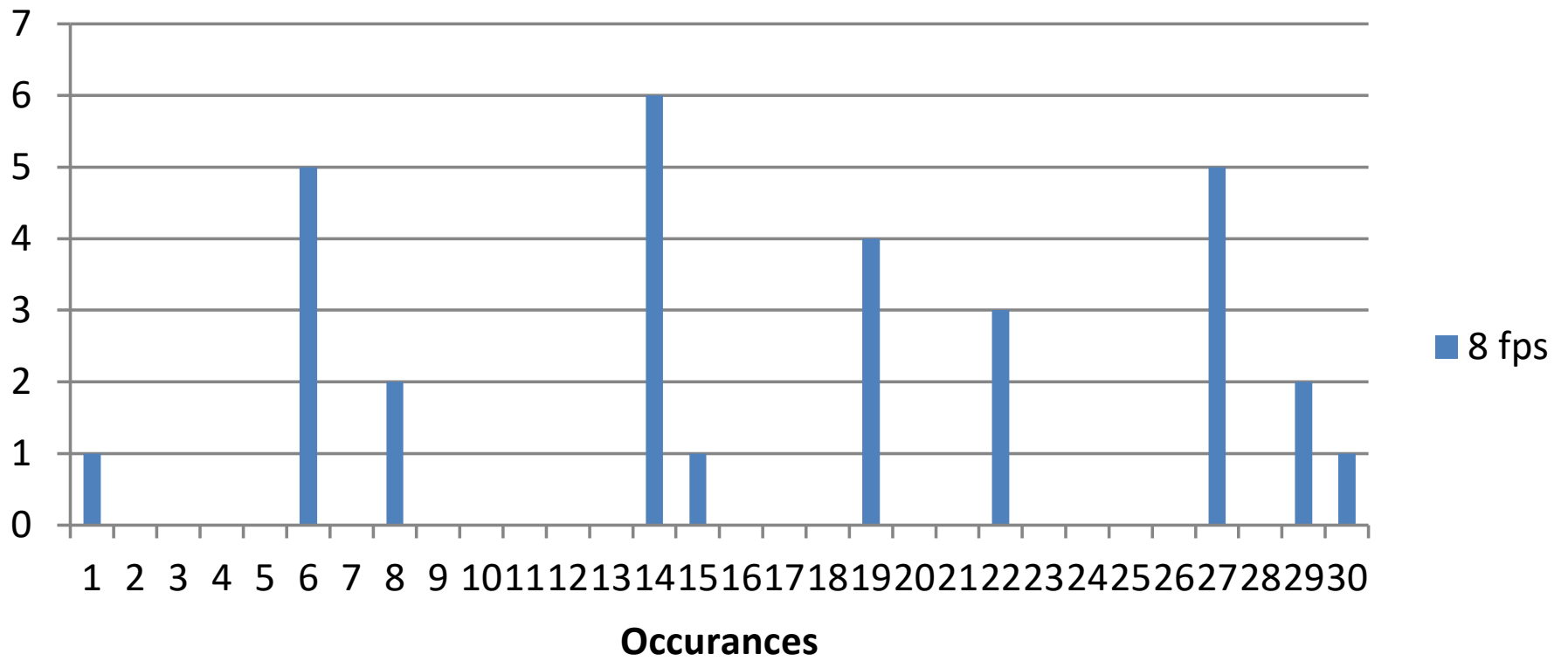
Technoflo Pump - 2 fps



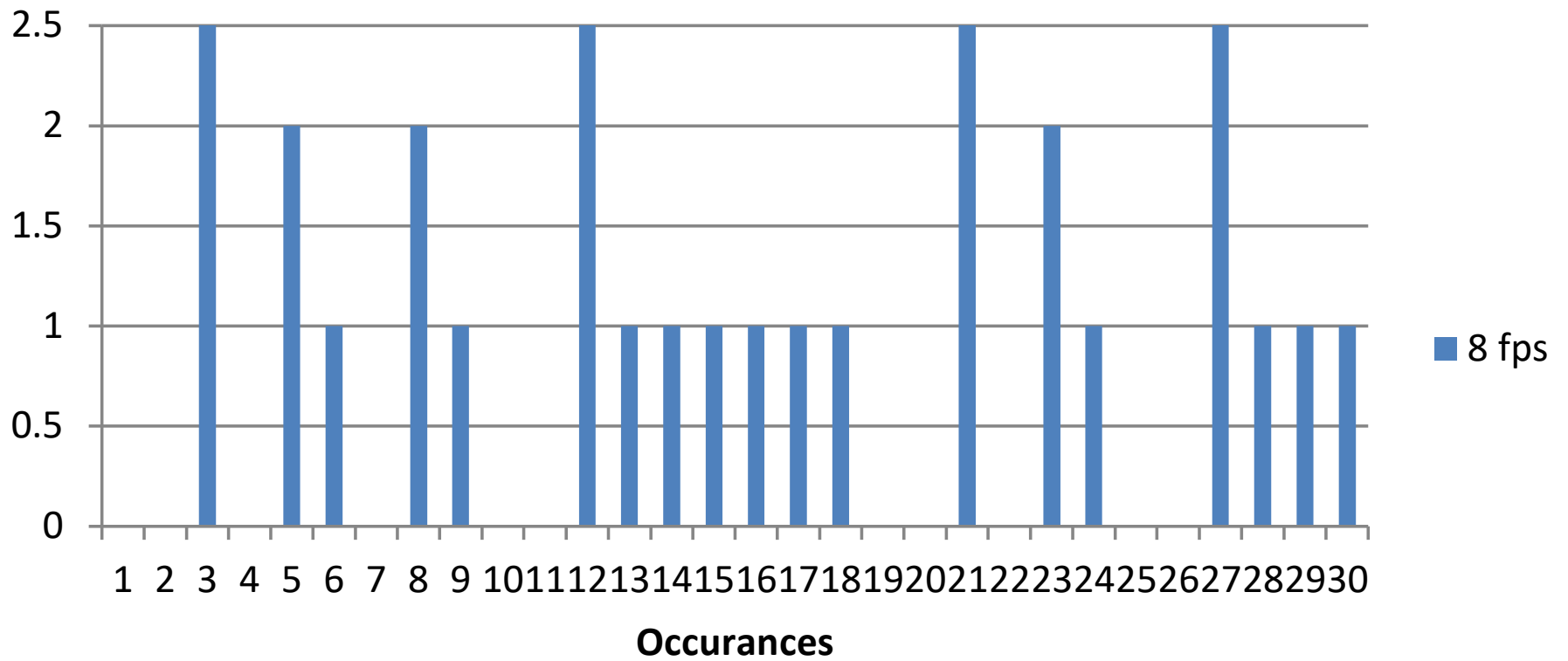
Bermad 90 DS - 8 fps



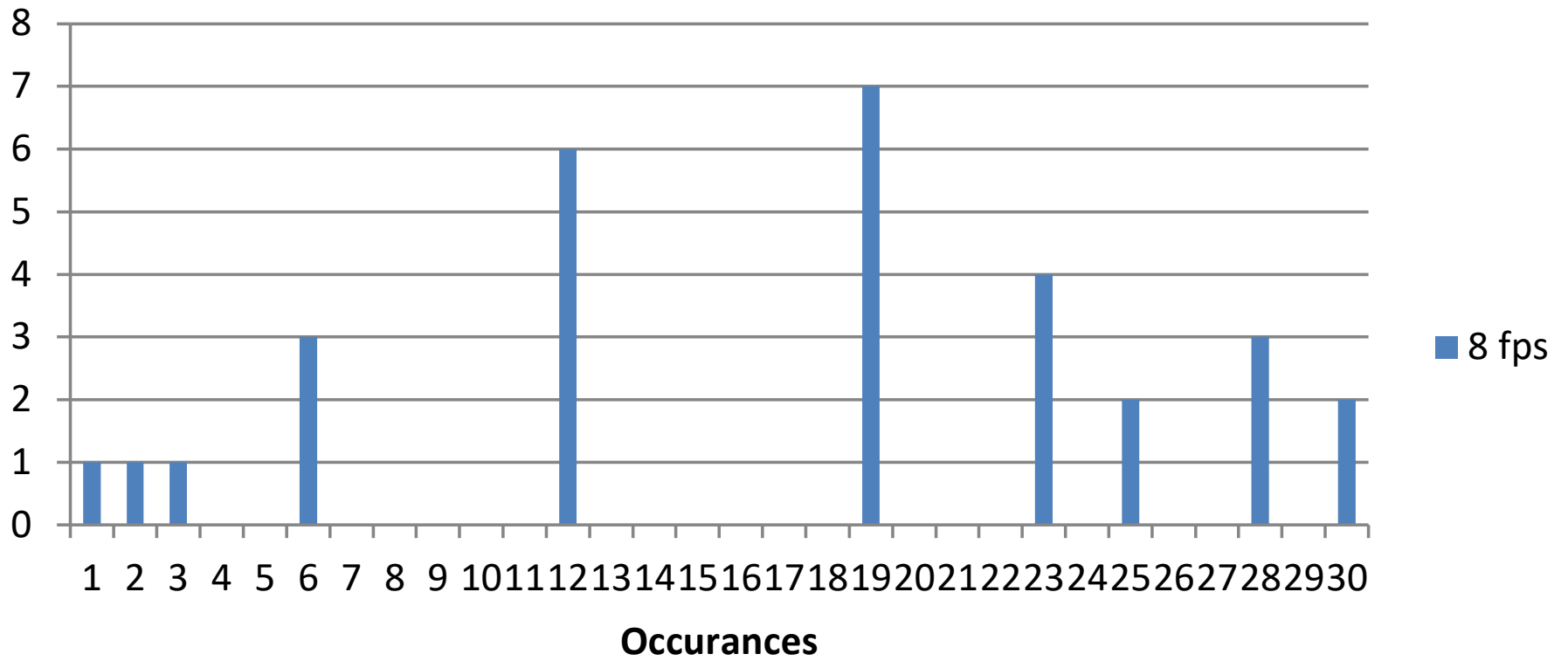
Bermad 90 US - 8 fps



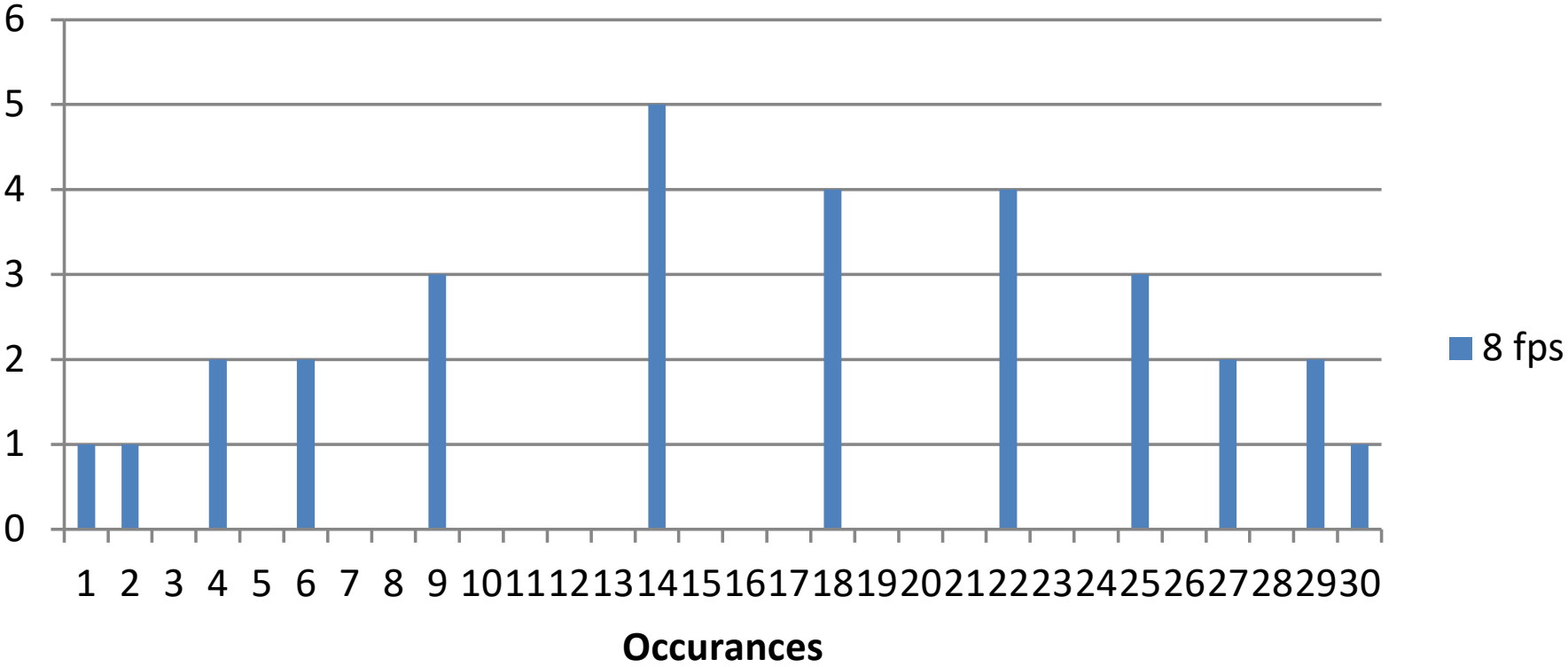
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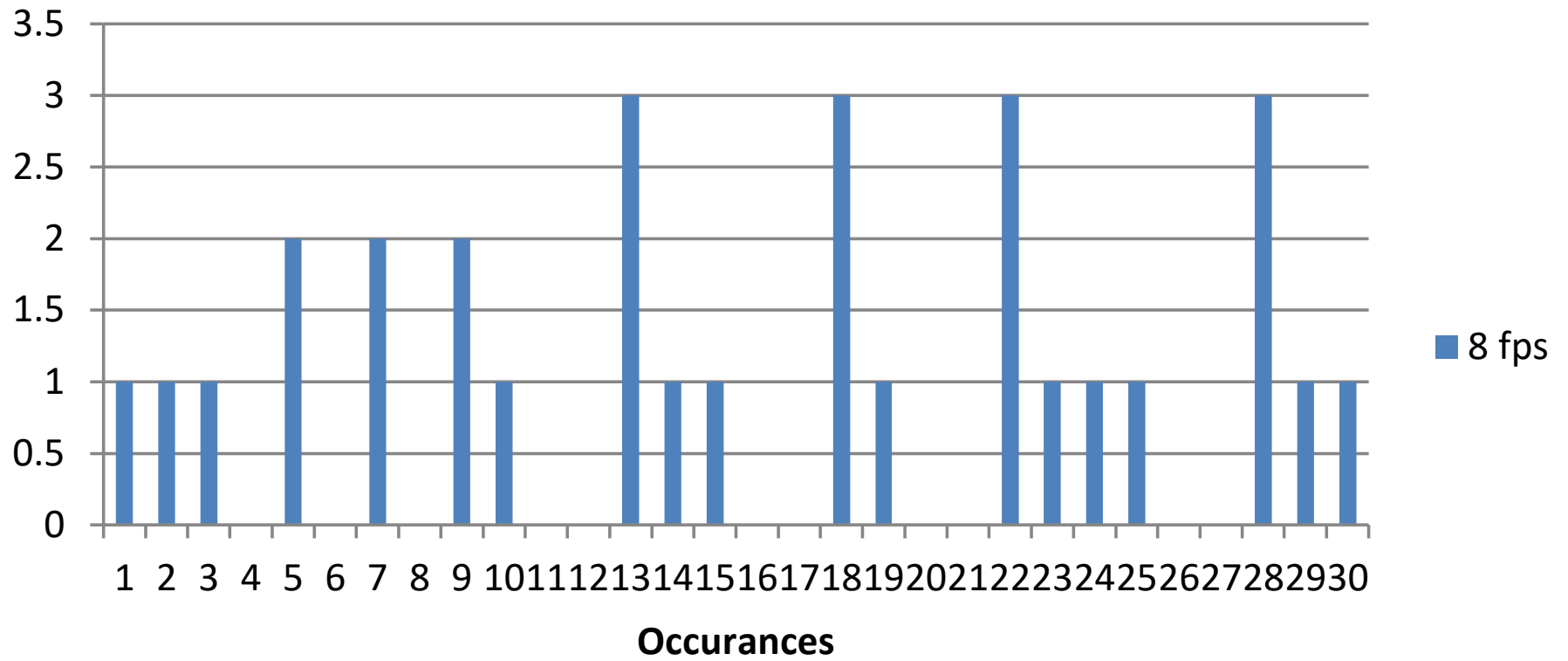
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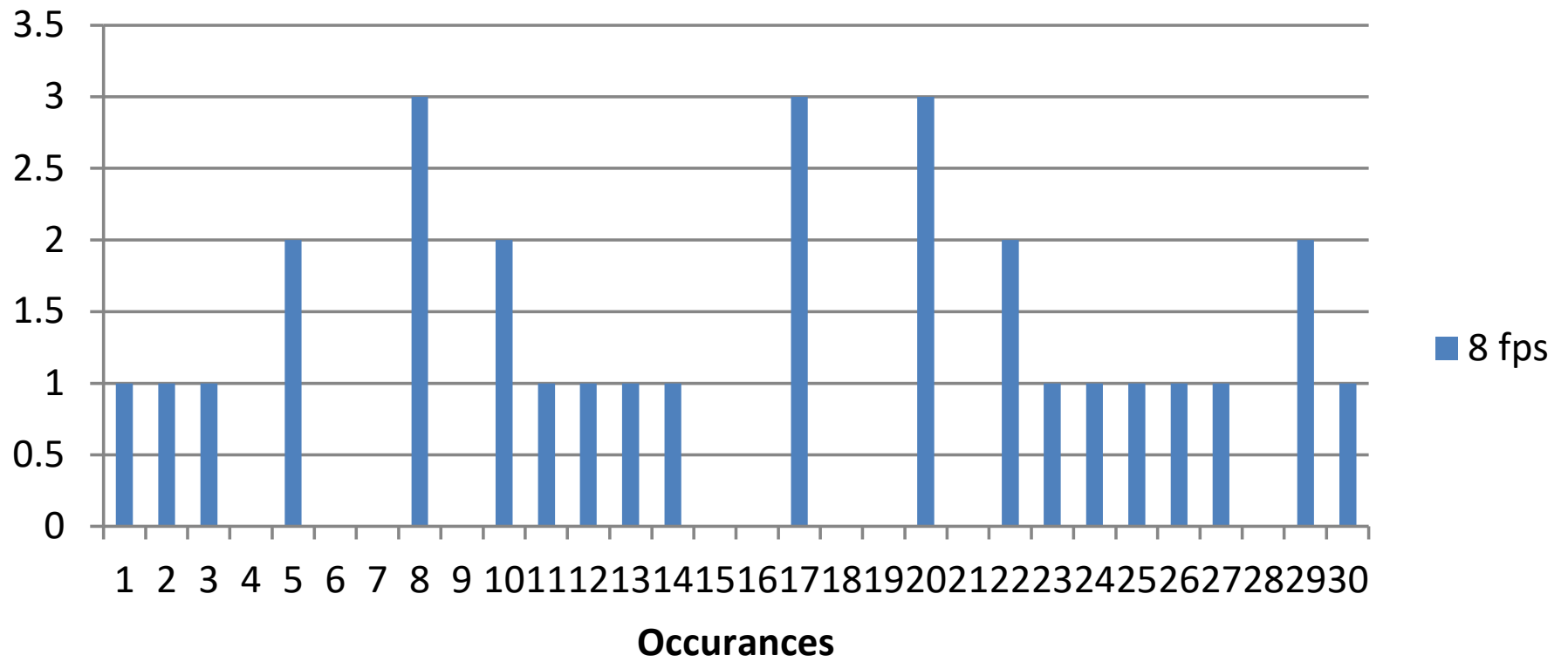
Bermad Pump - 8 fps



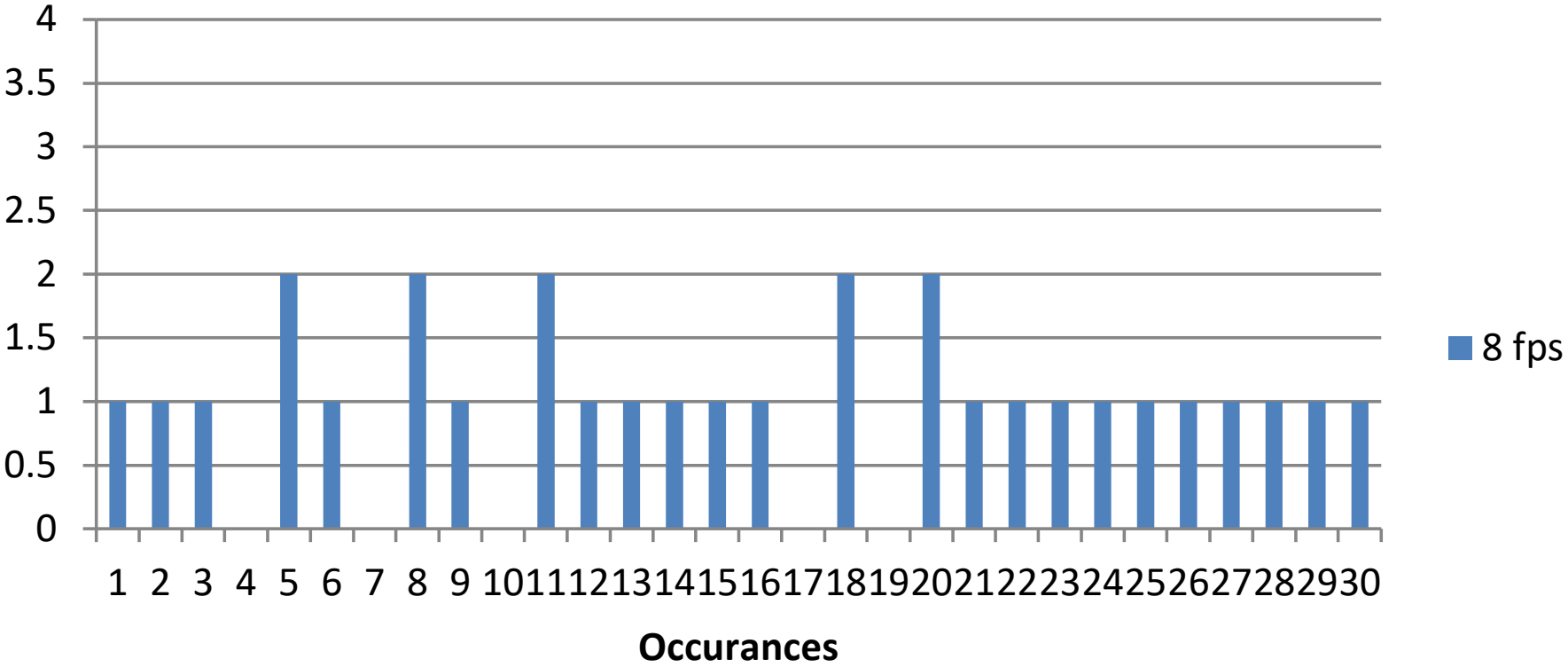
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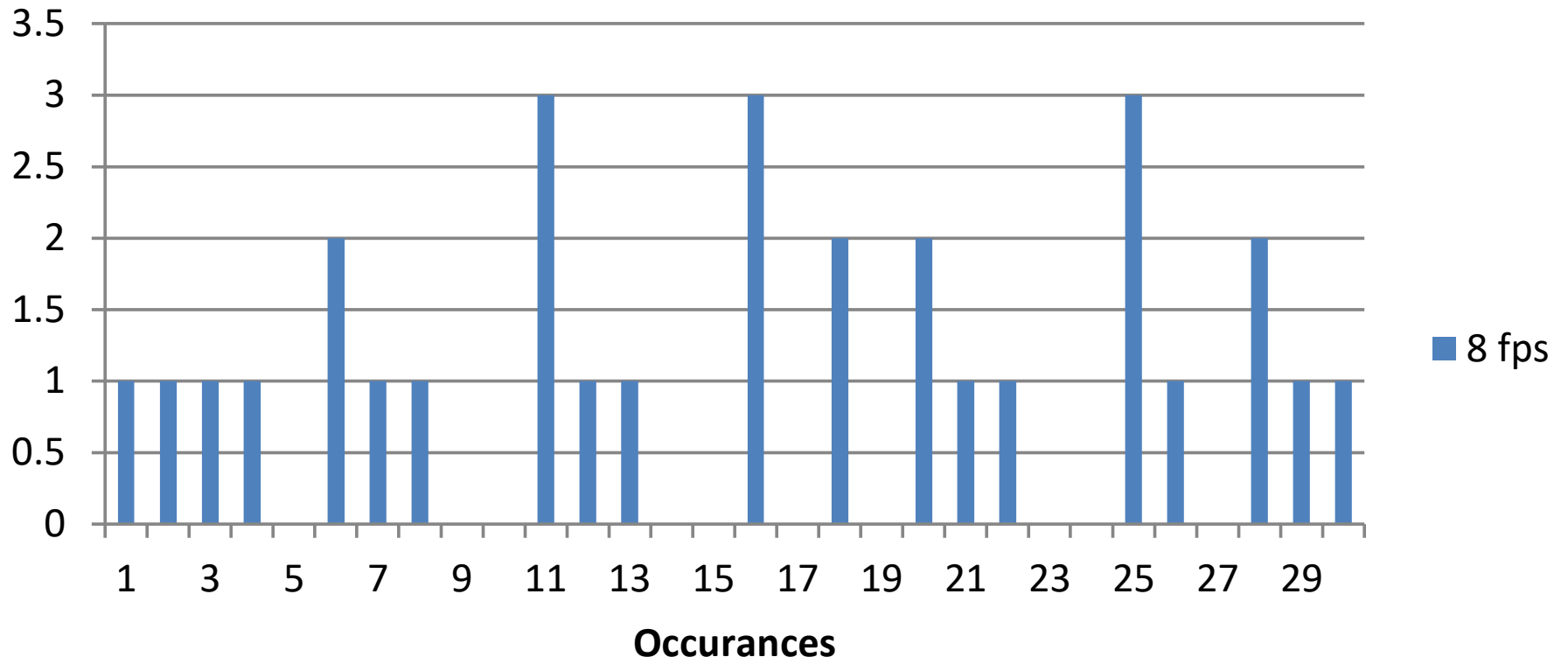
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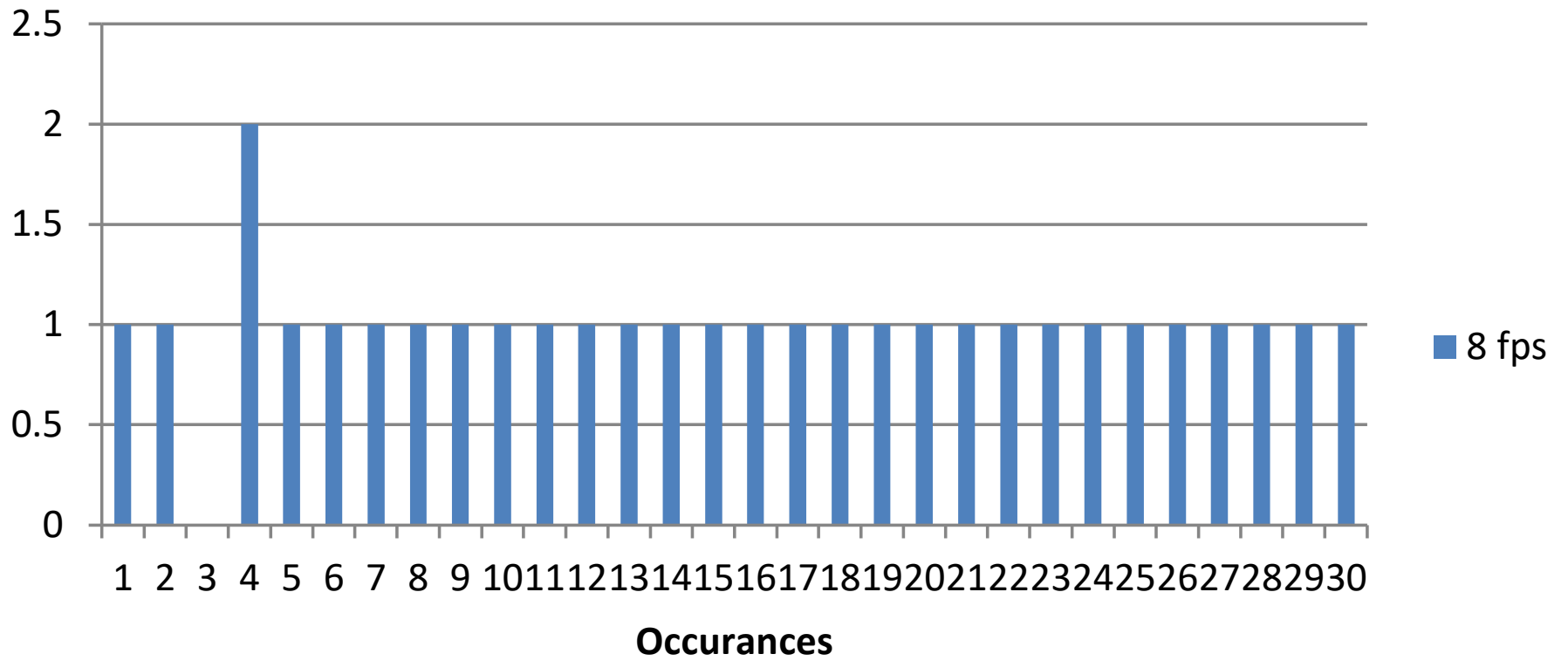
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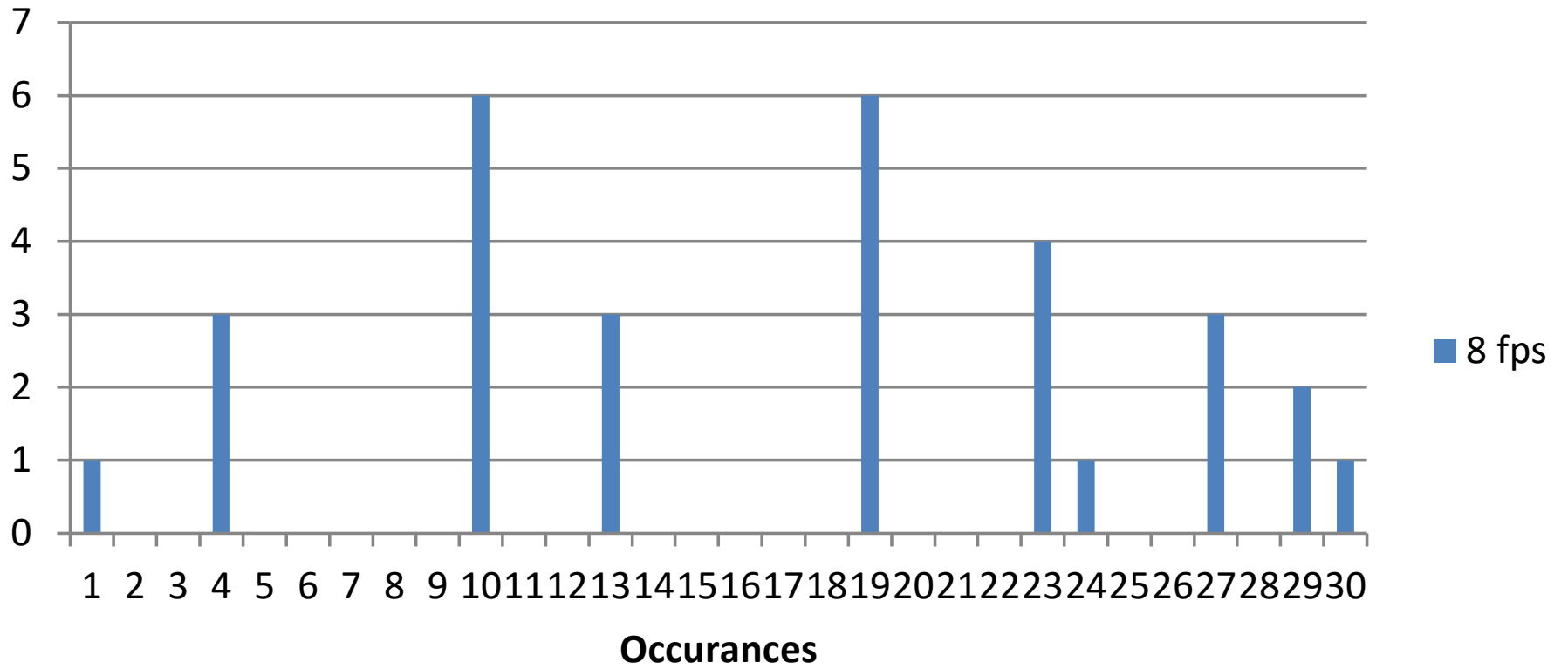
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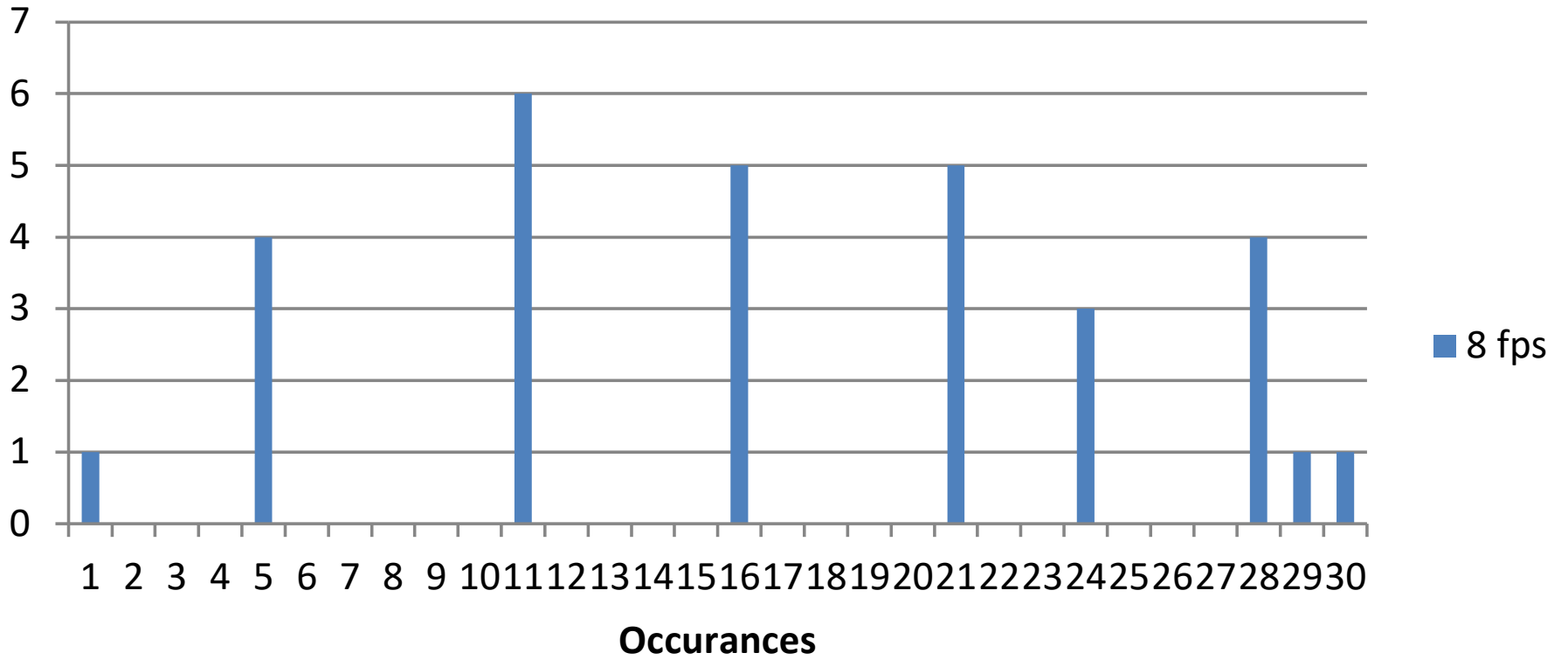
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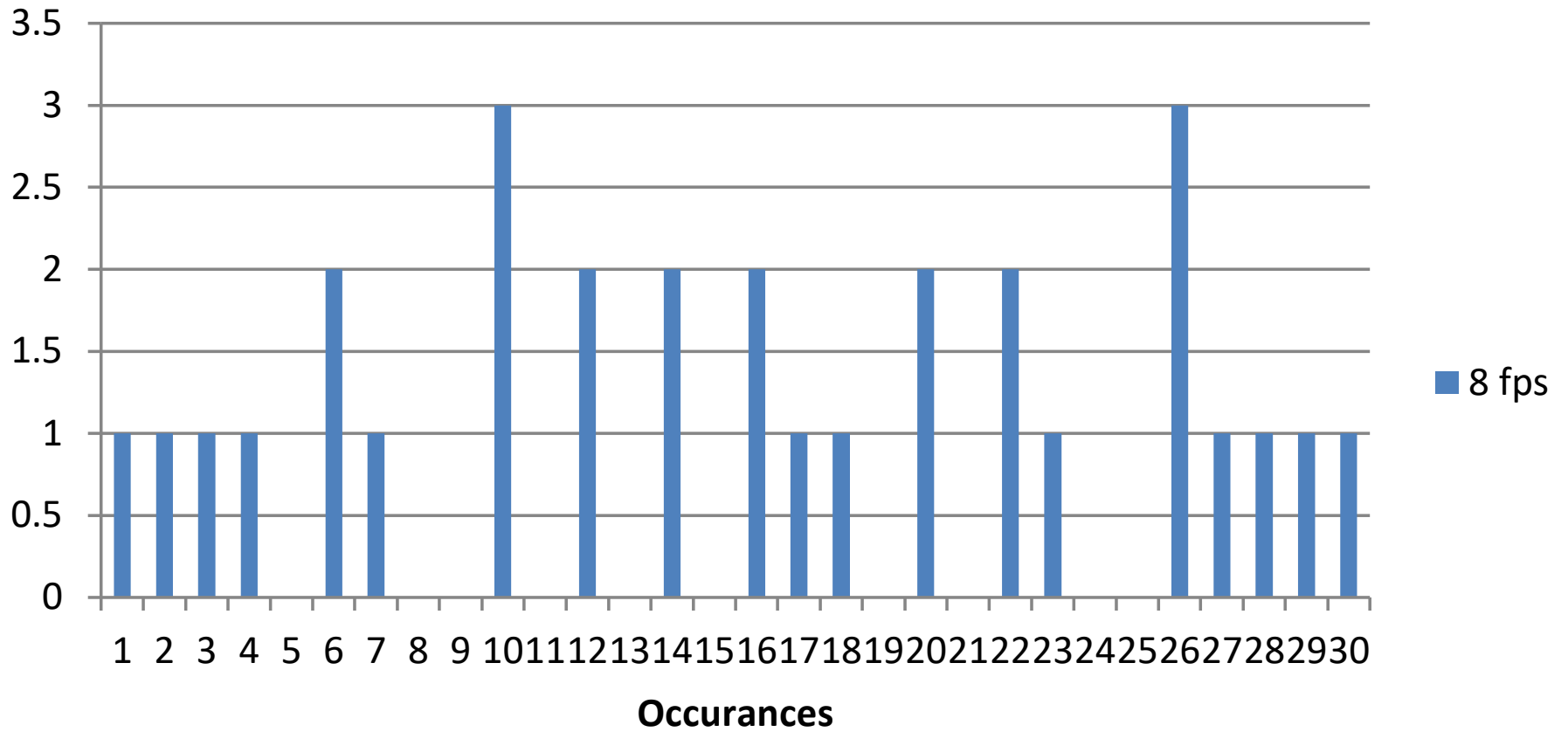
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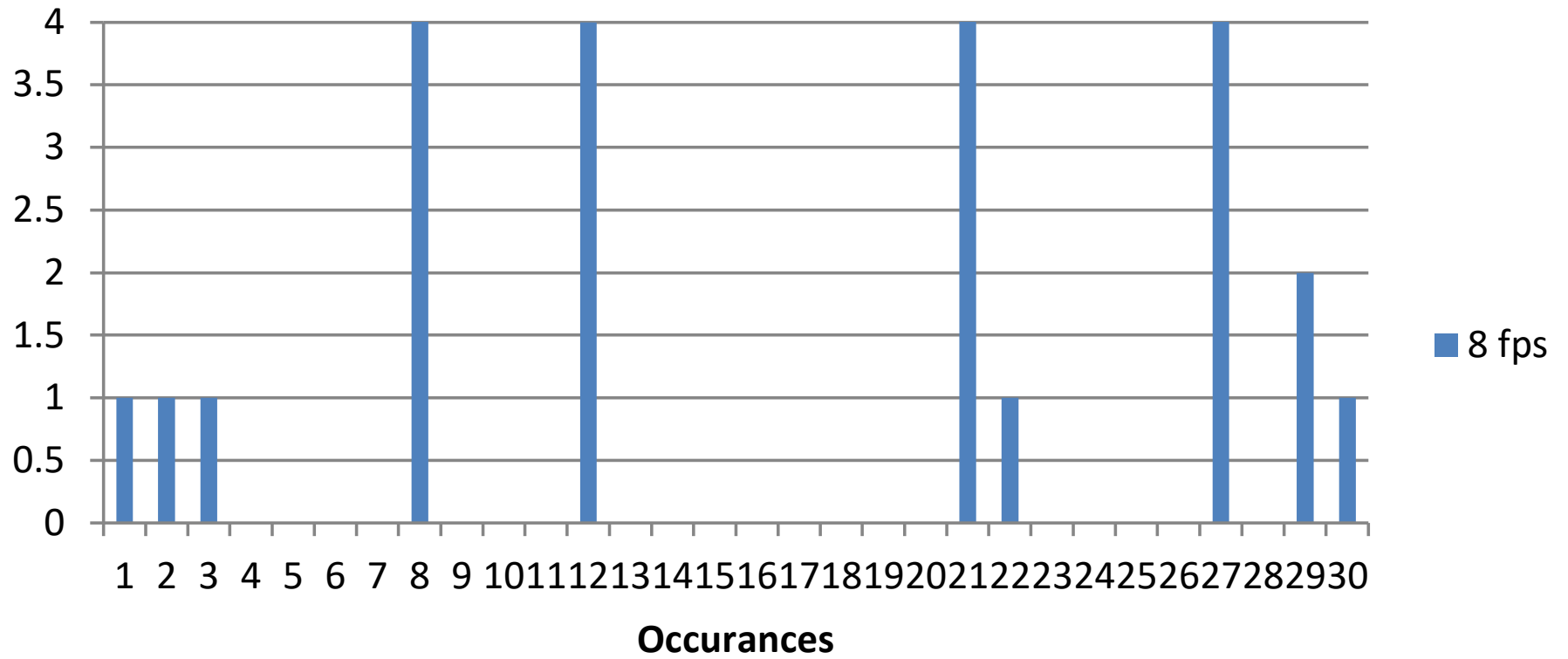
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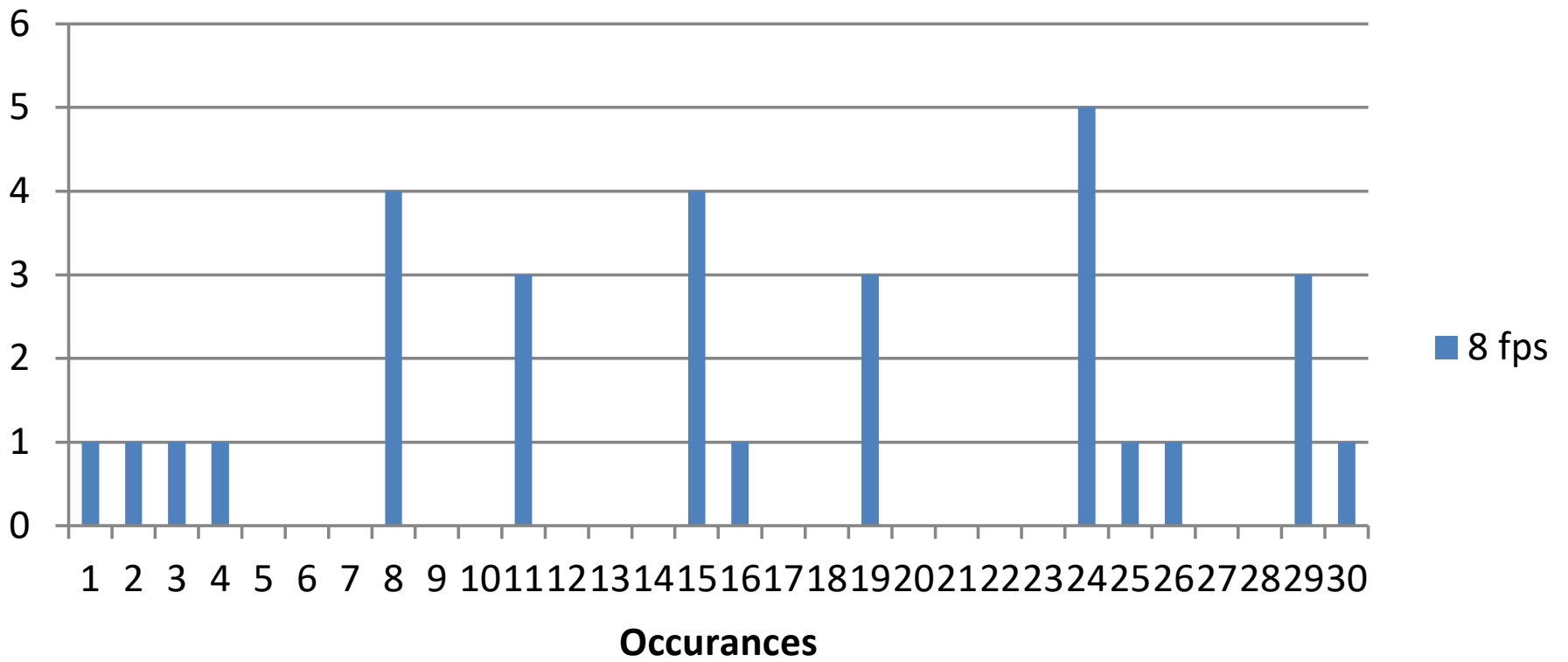
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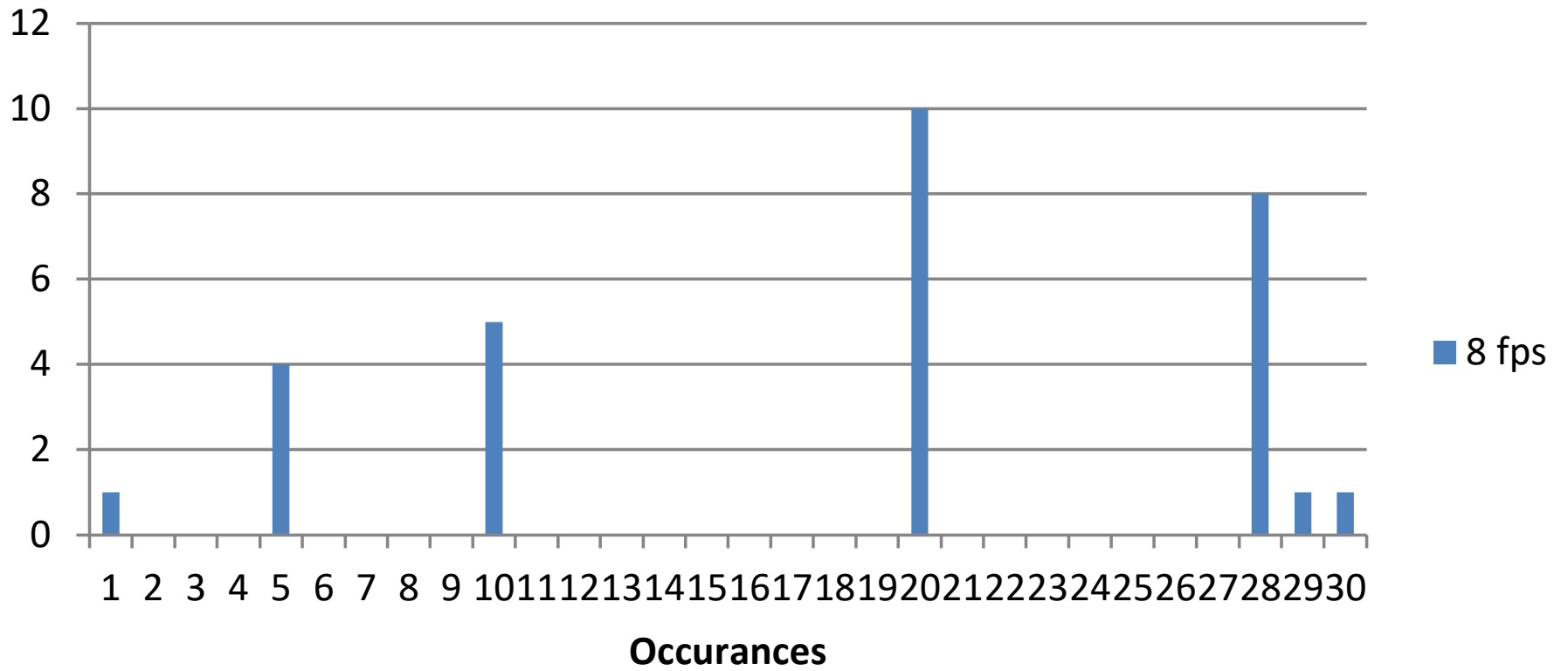
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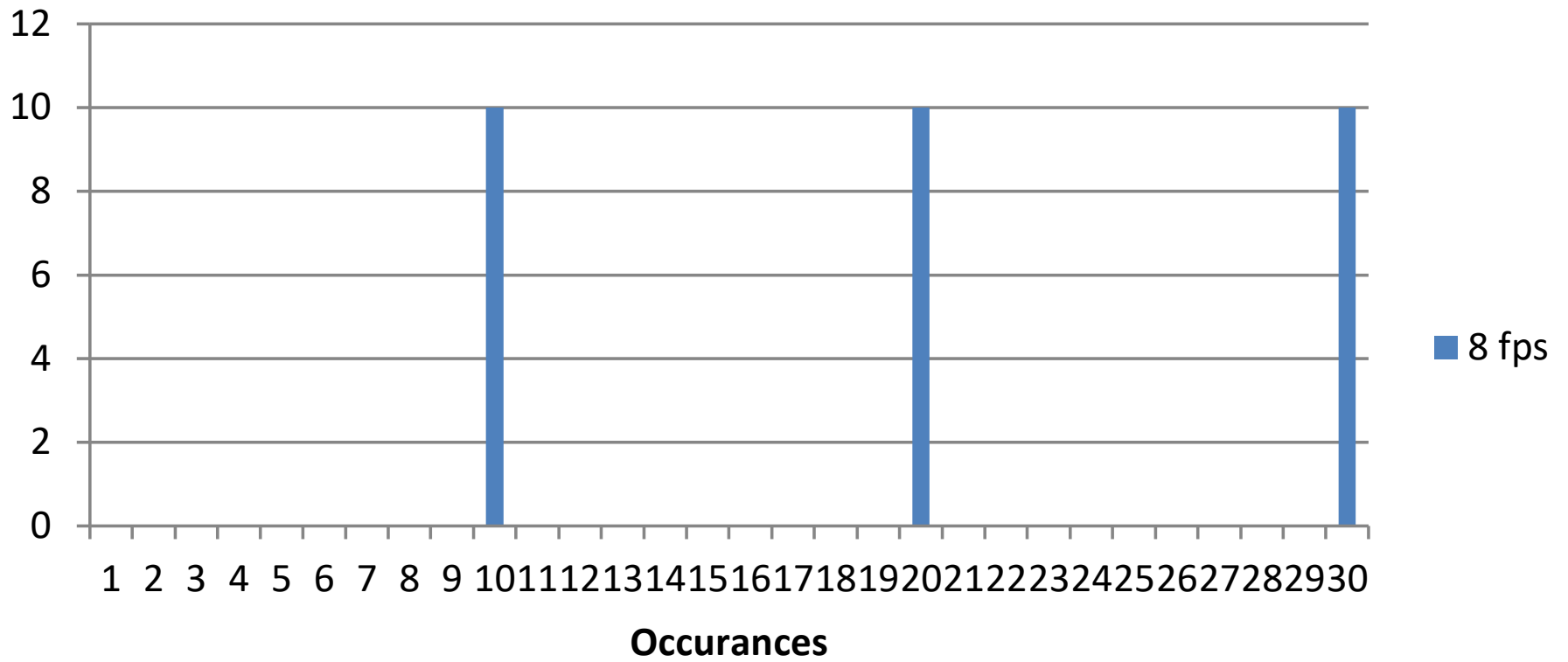
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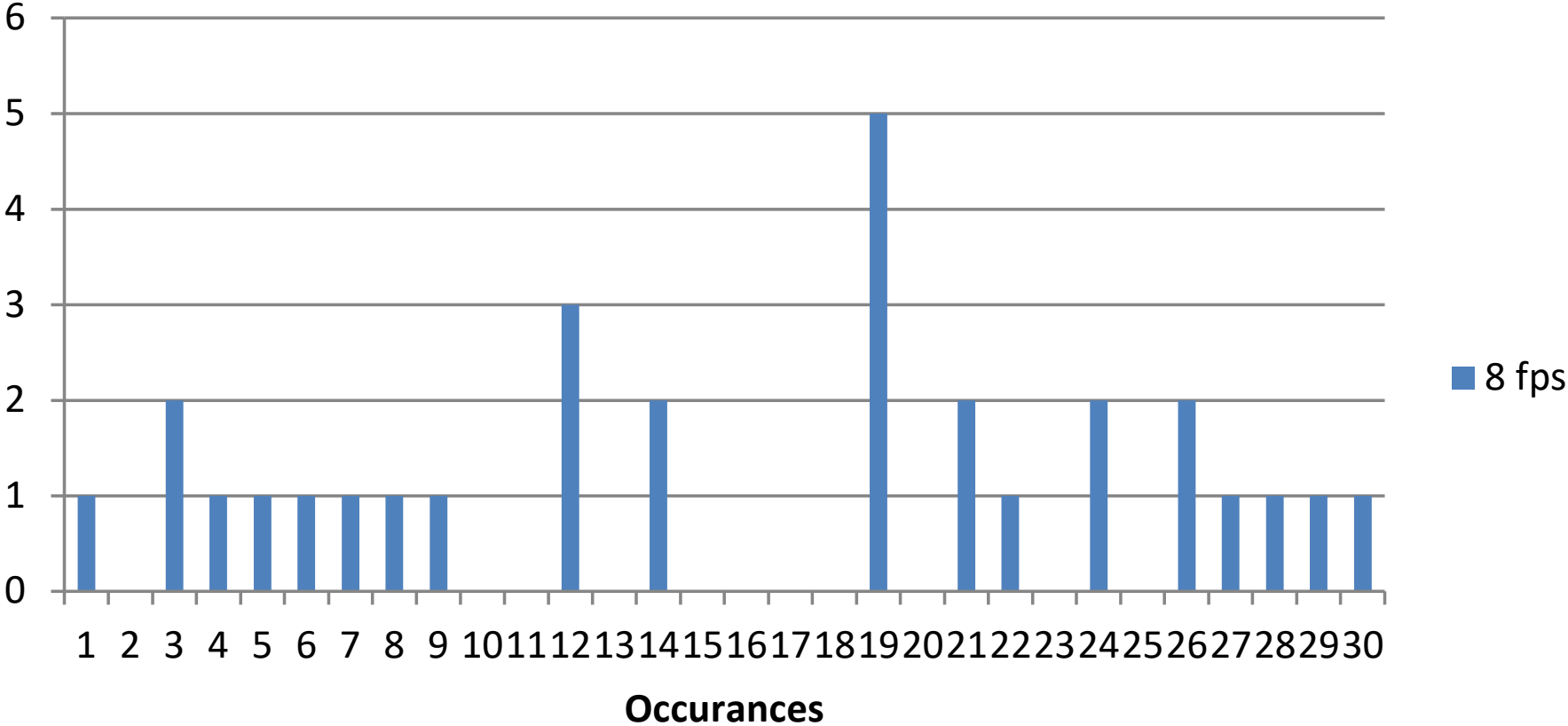
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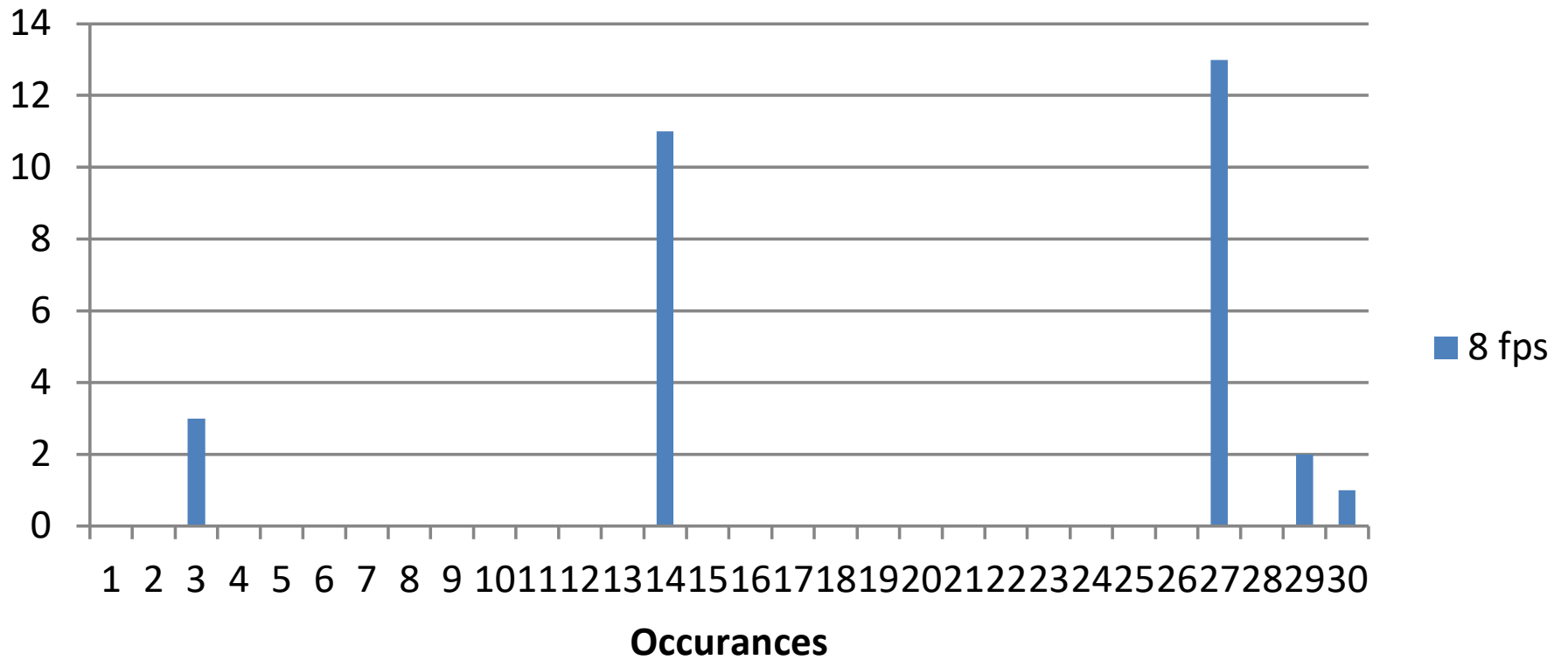
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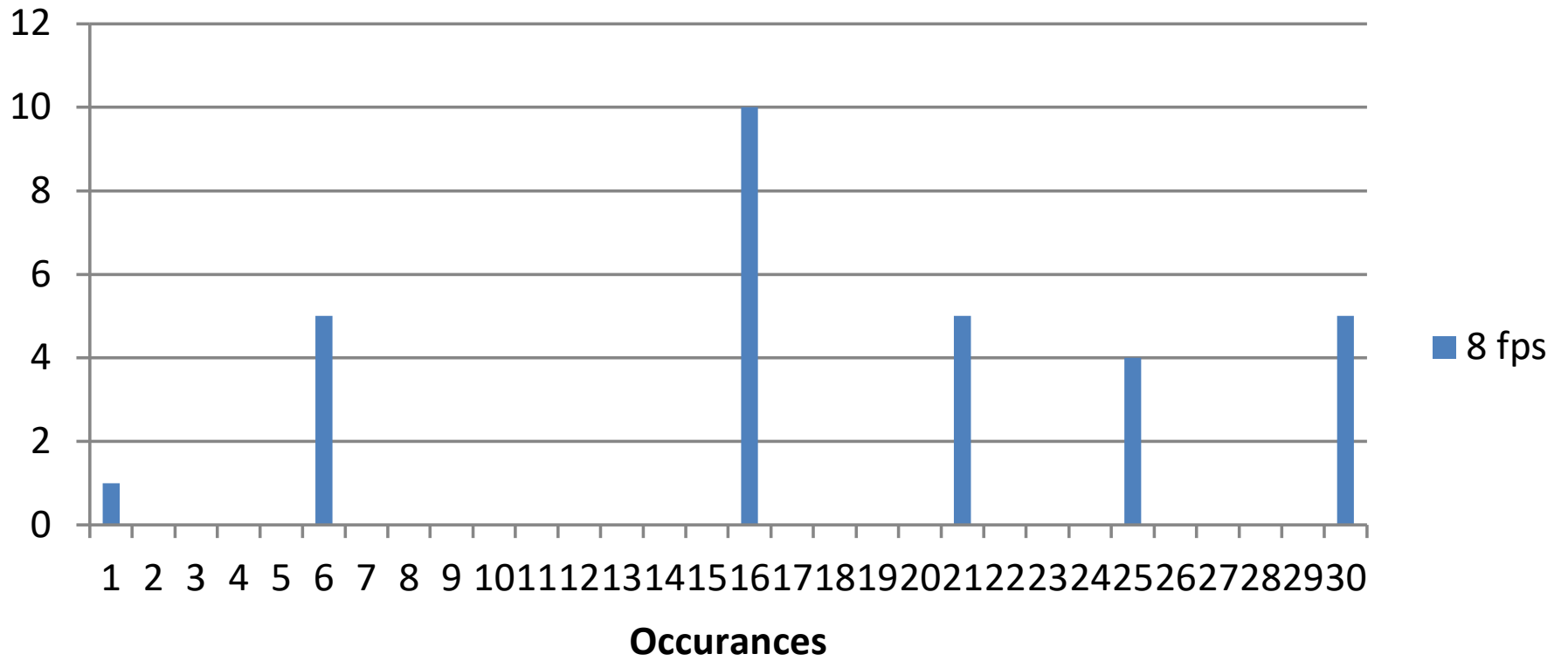
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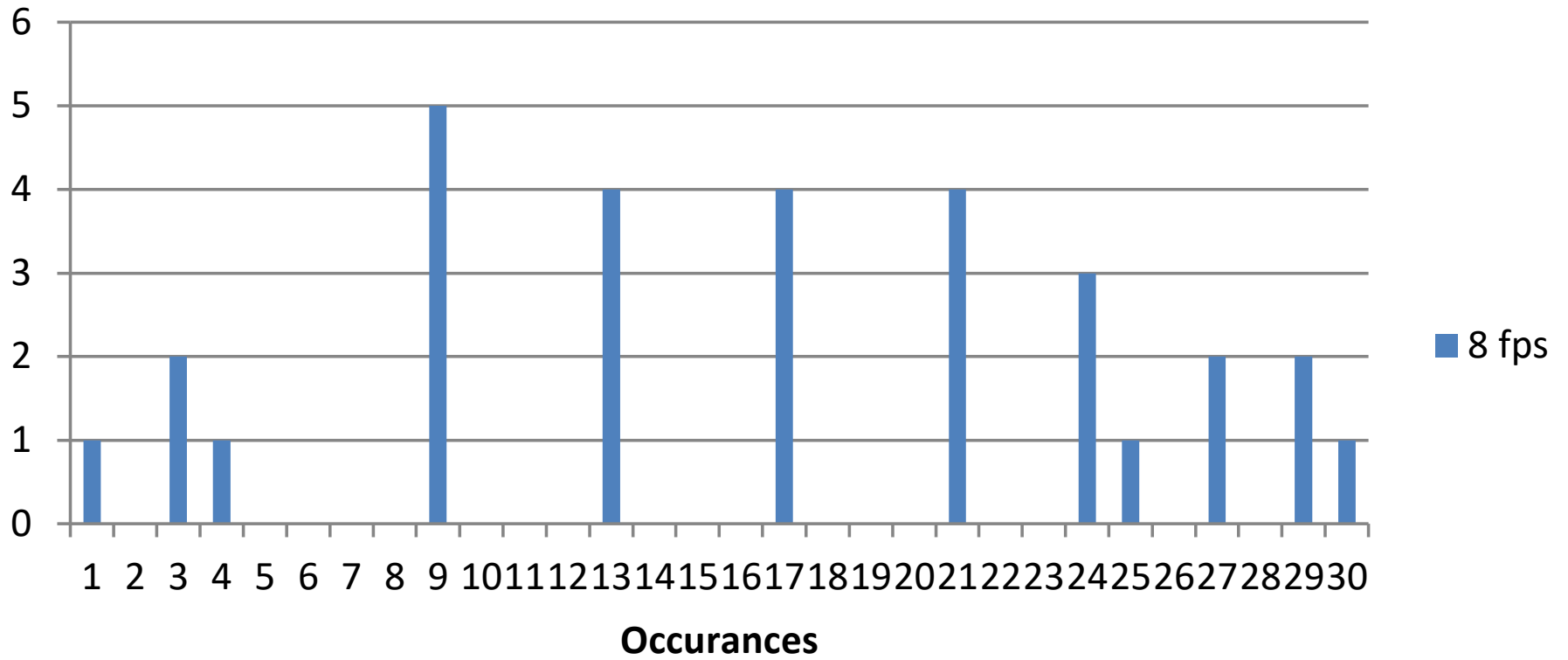
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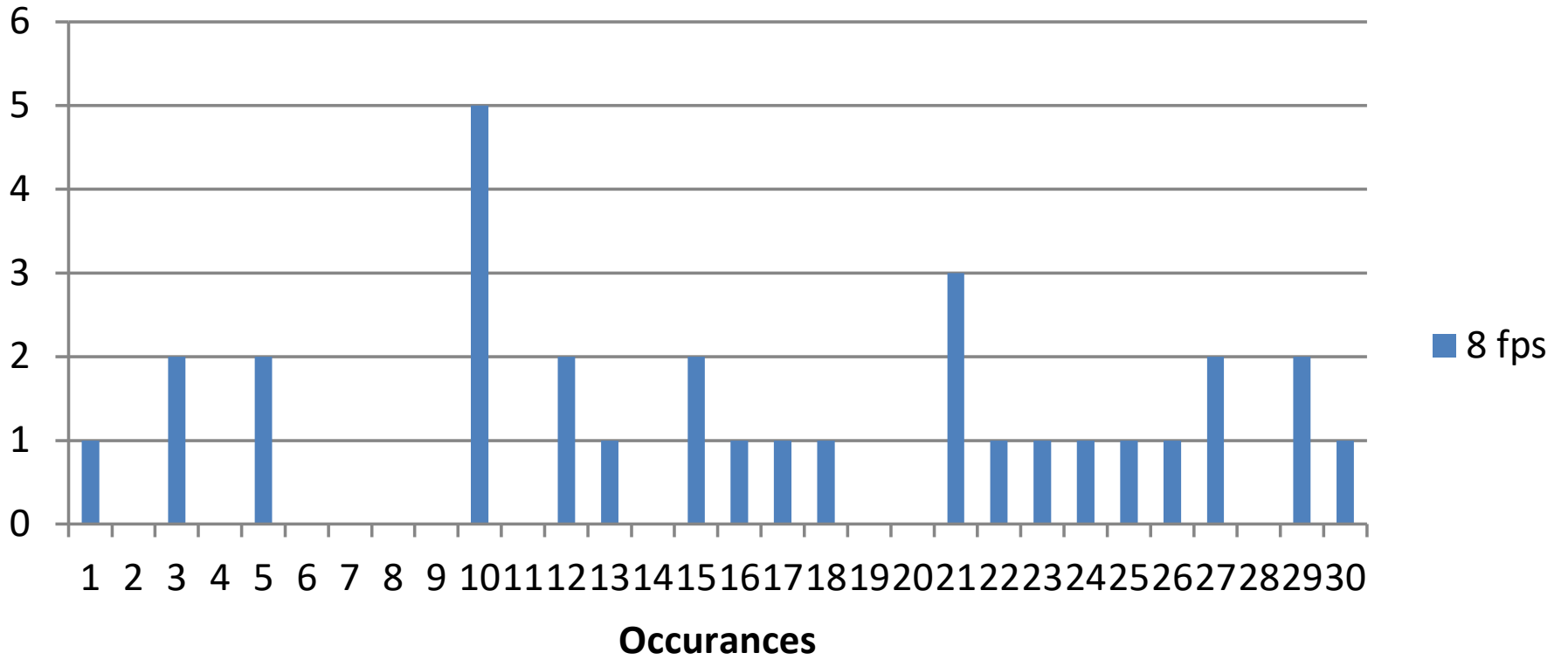
Seamatics Pump - 8 fps



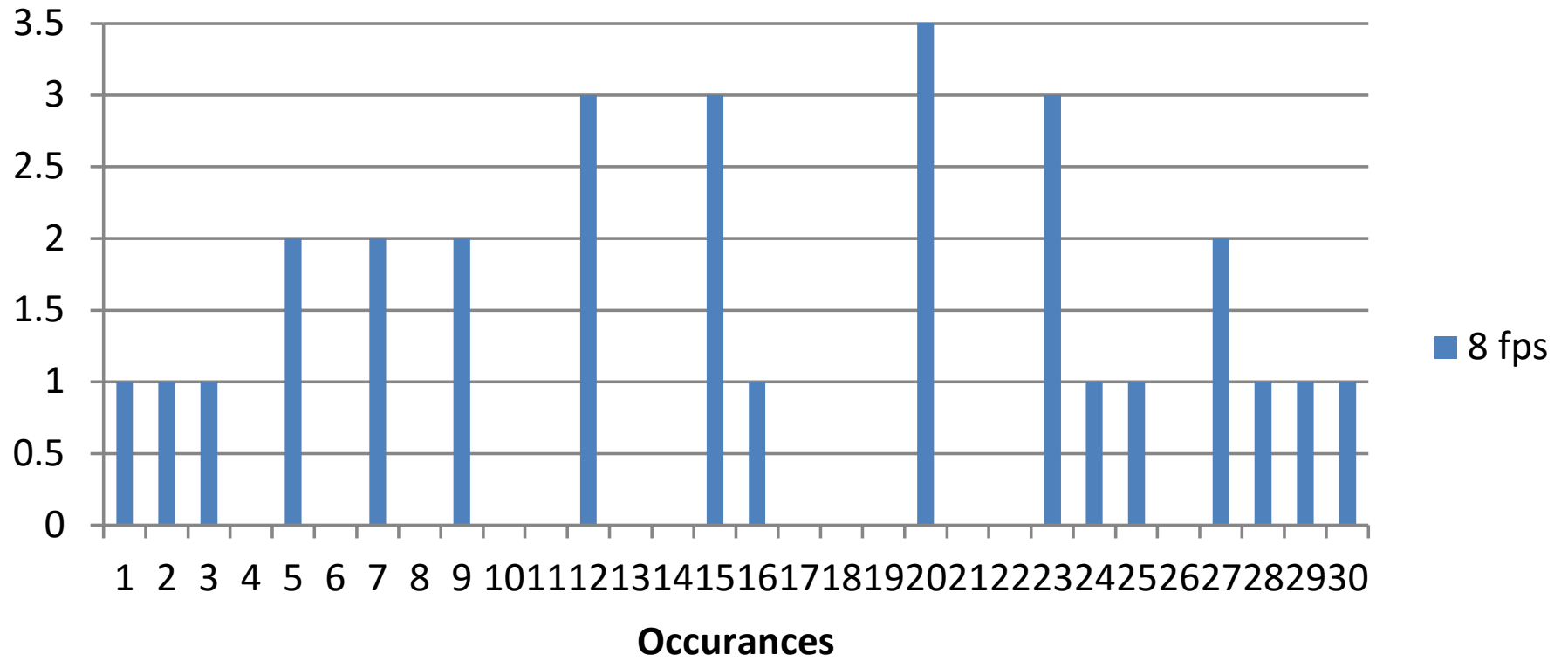
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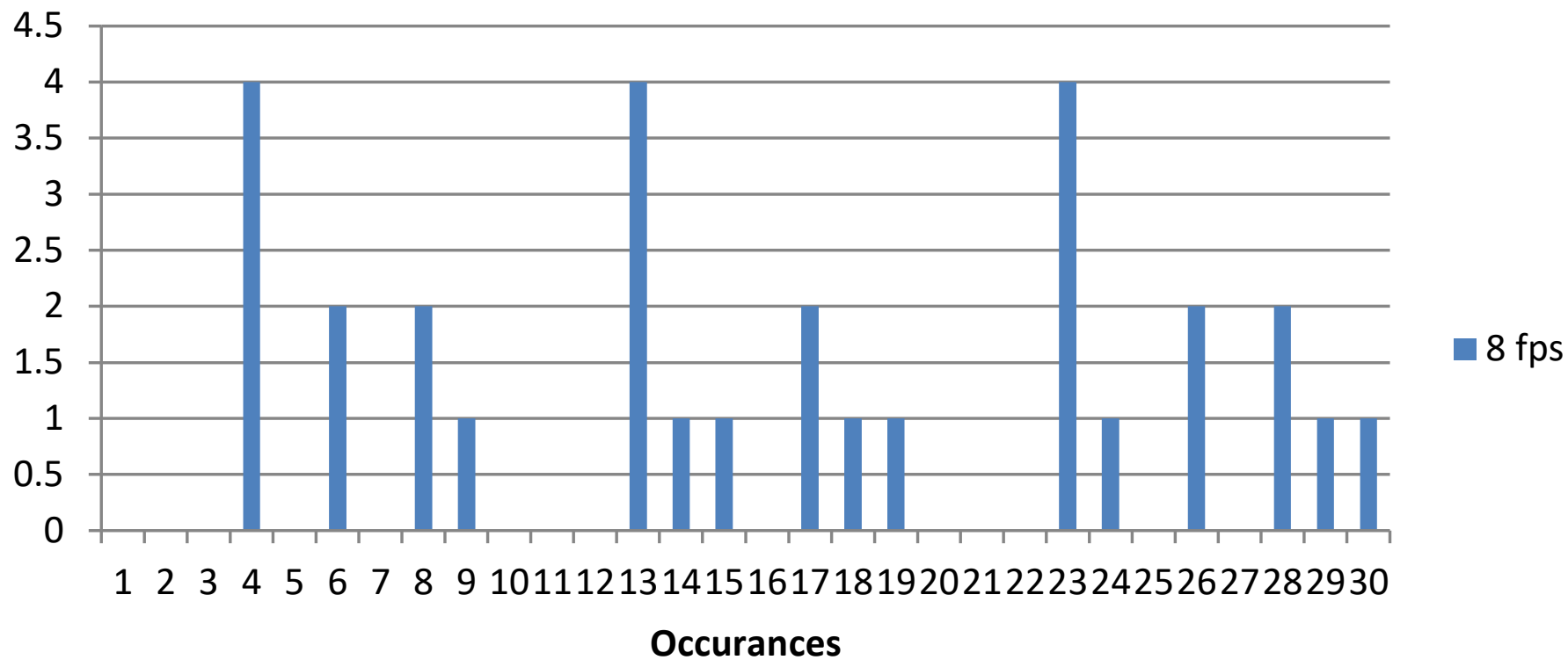
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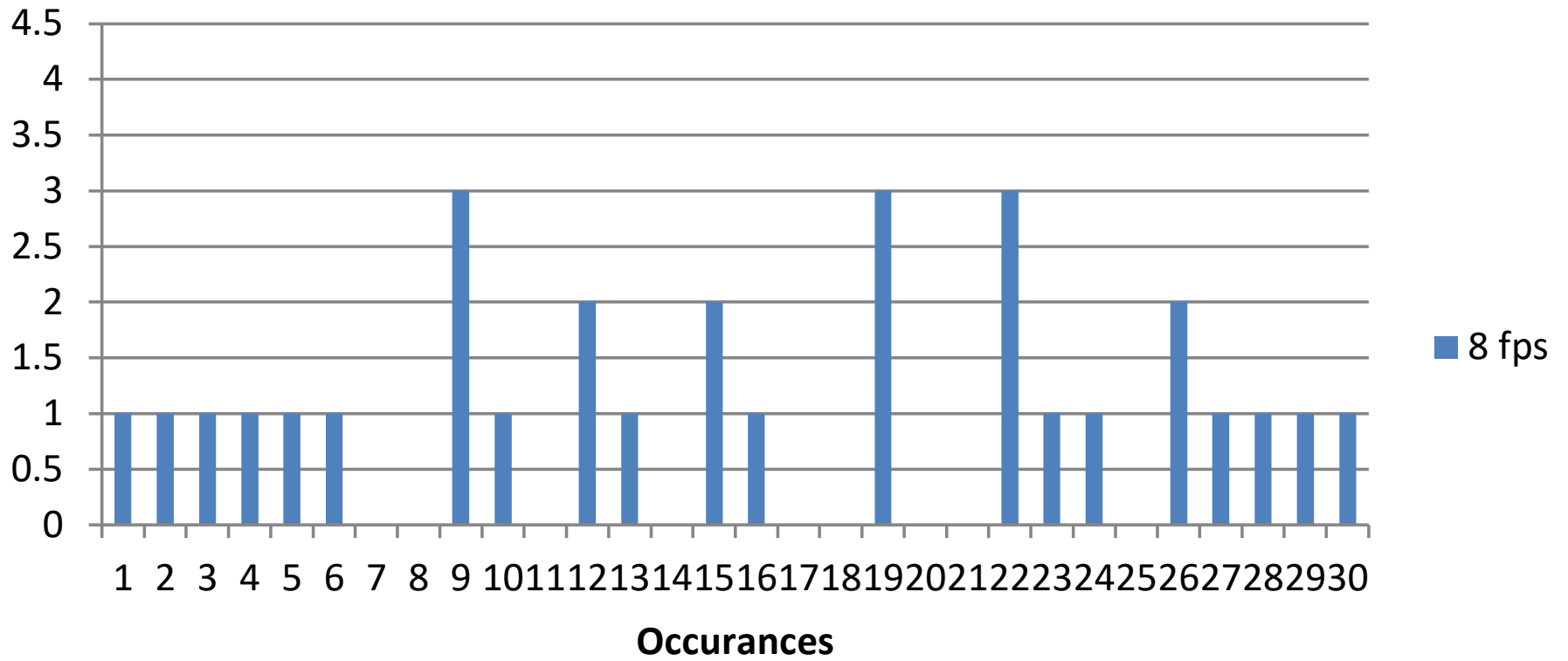
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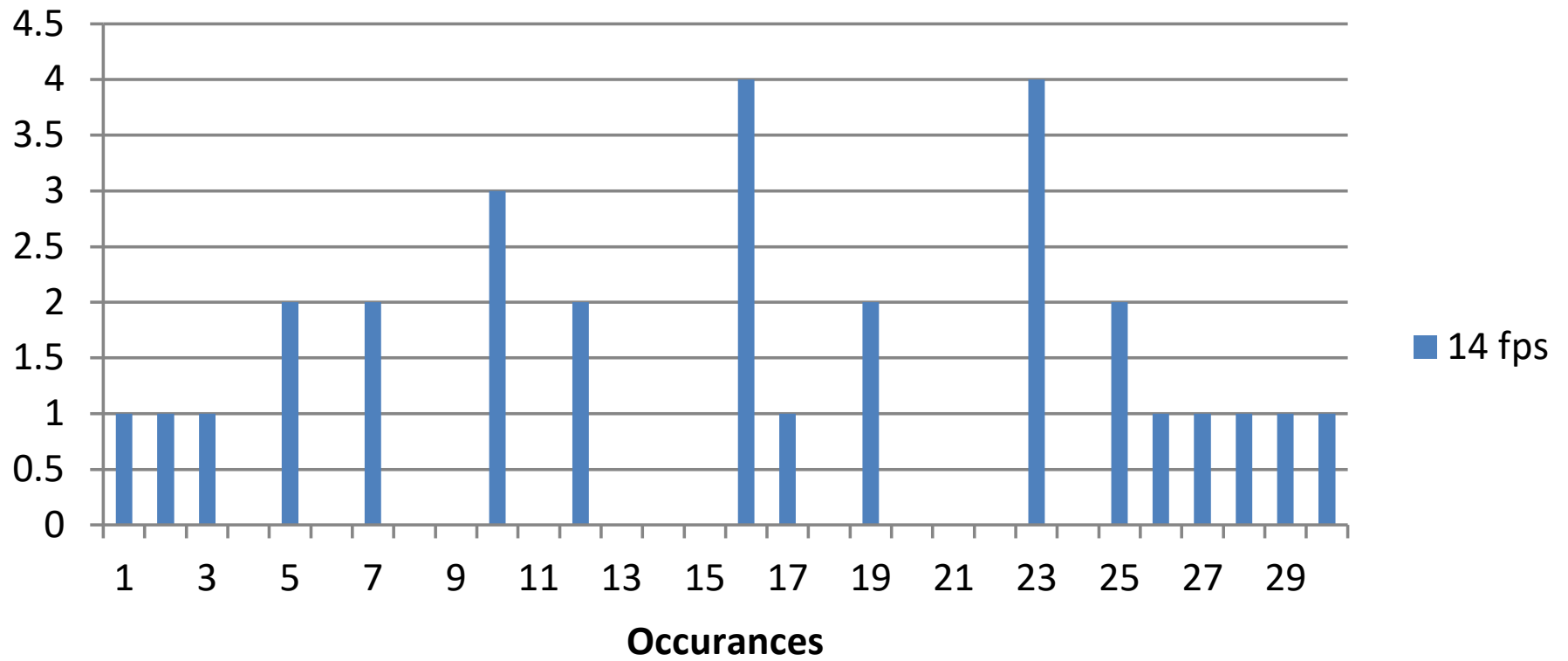
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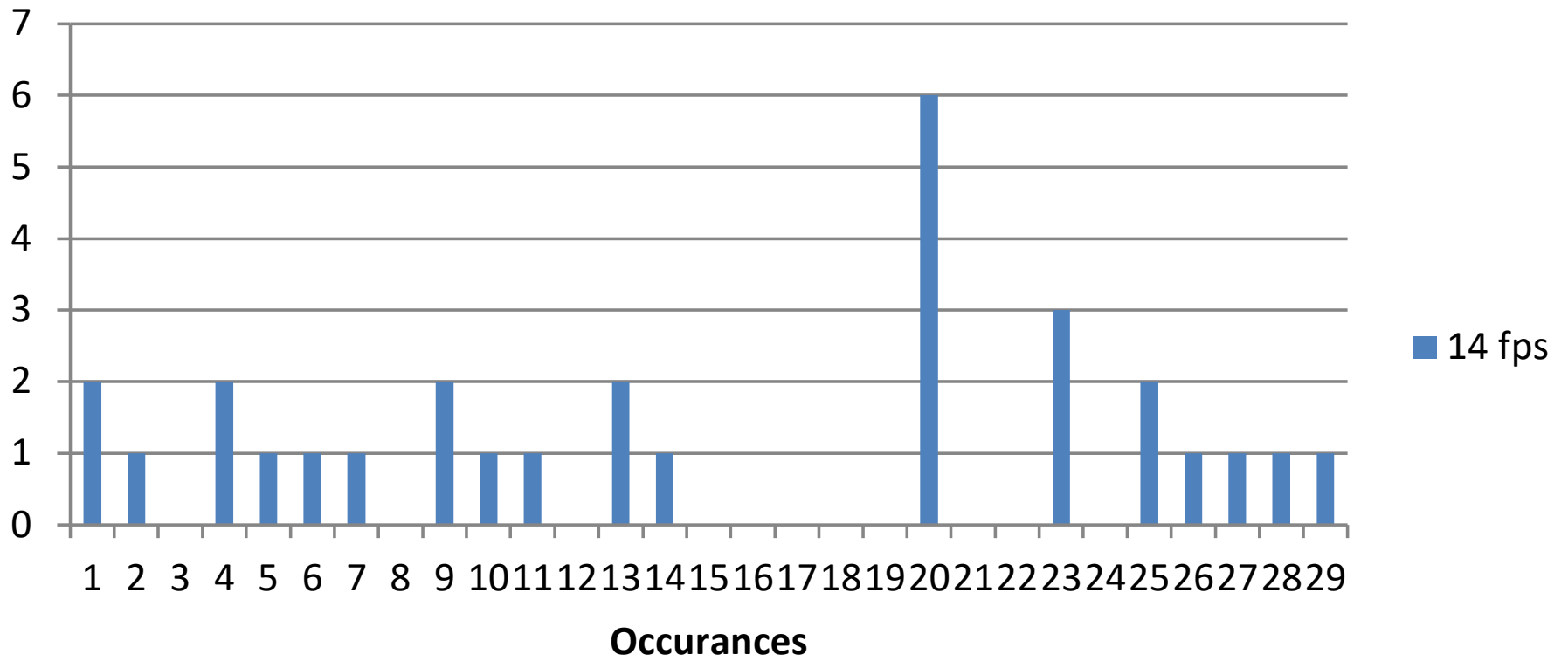
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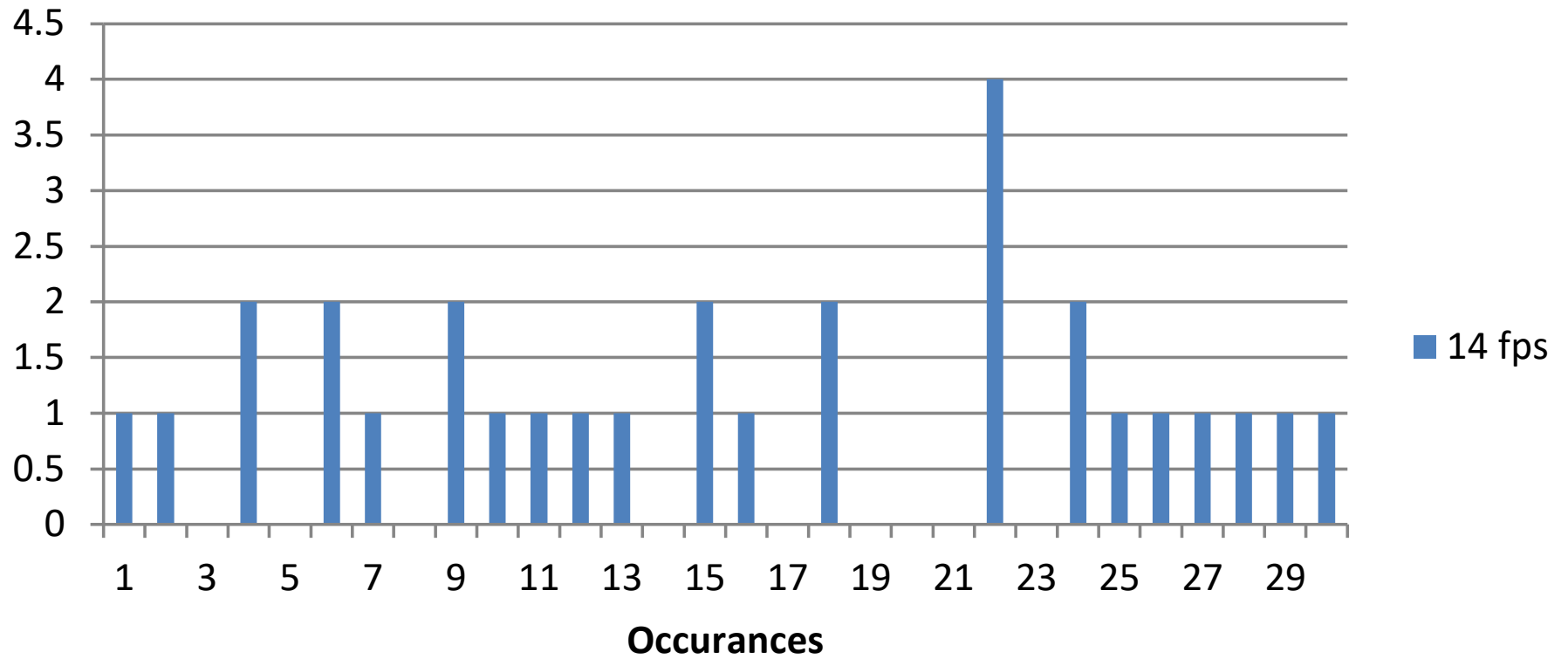
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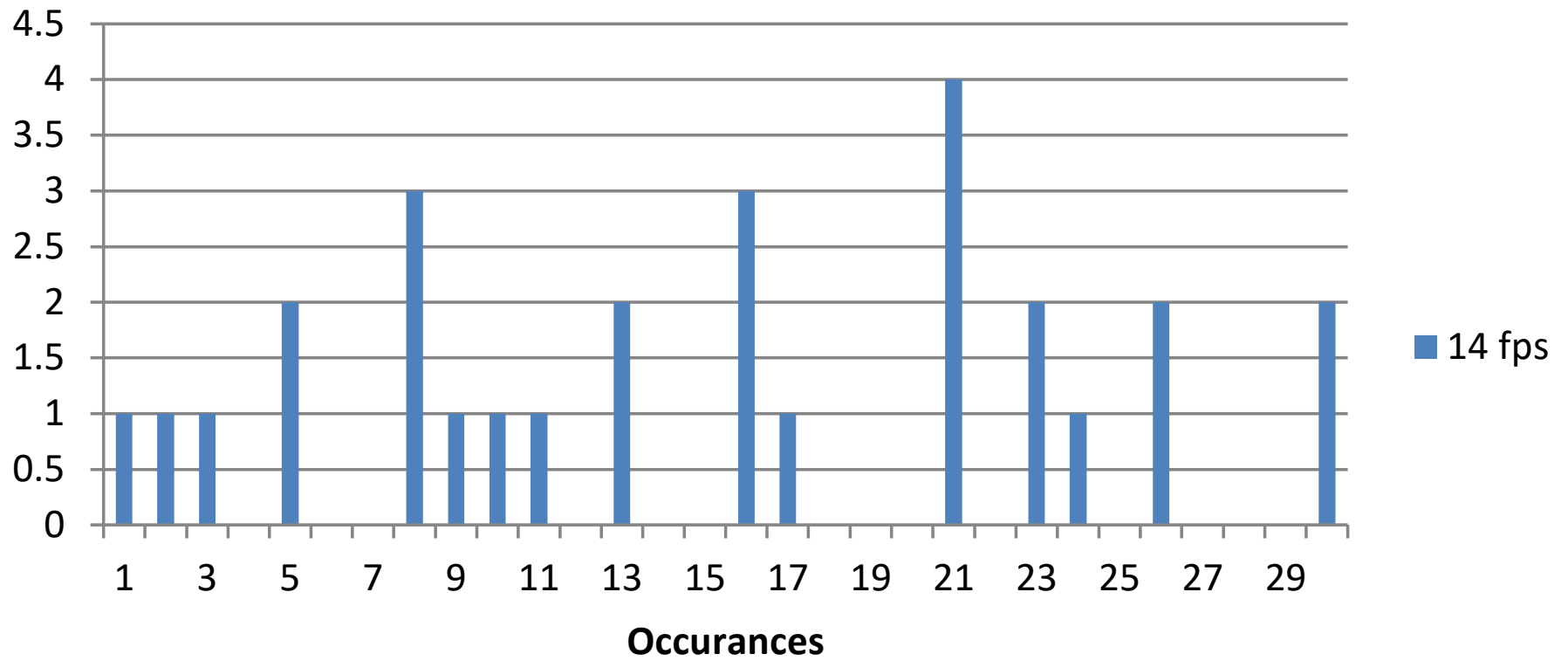
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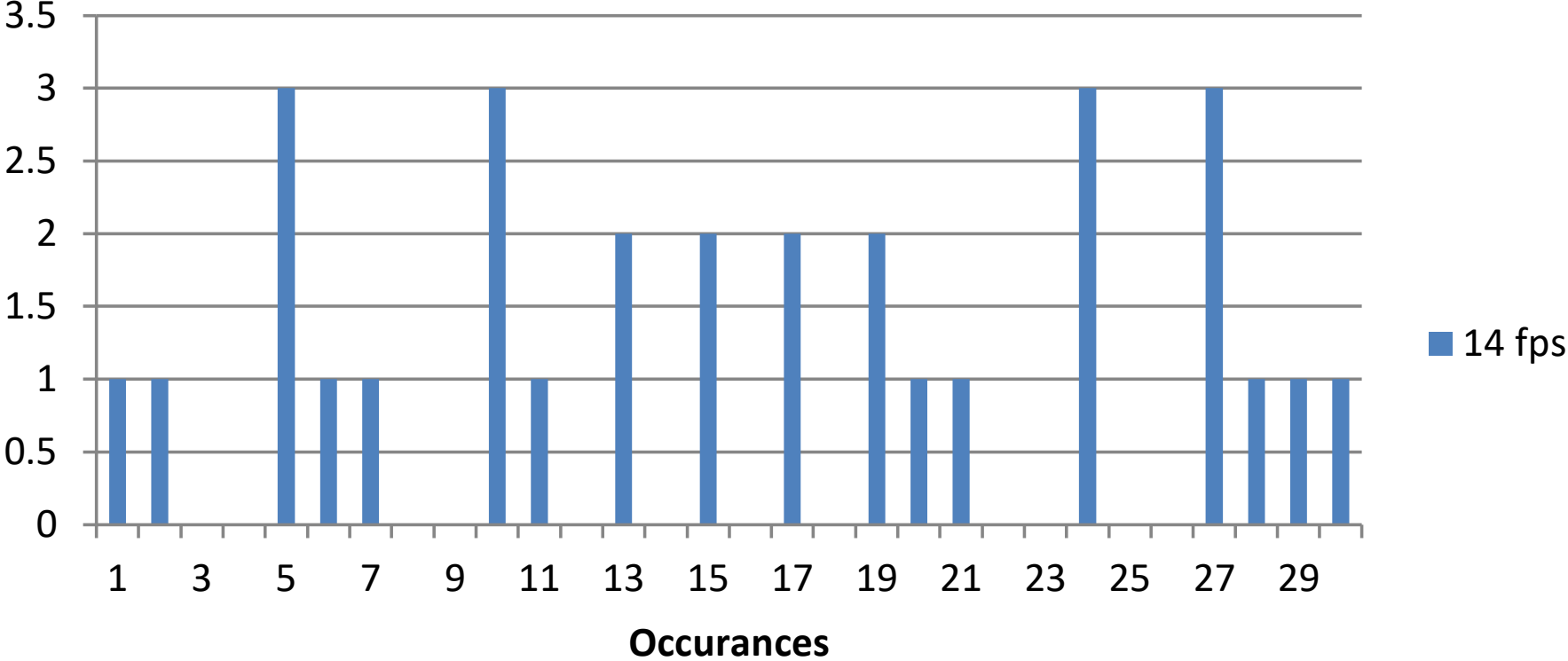
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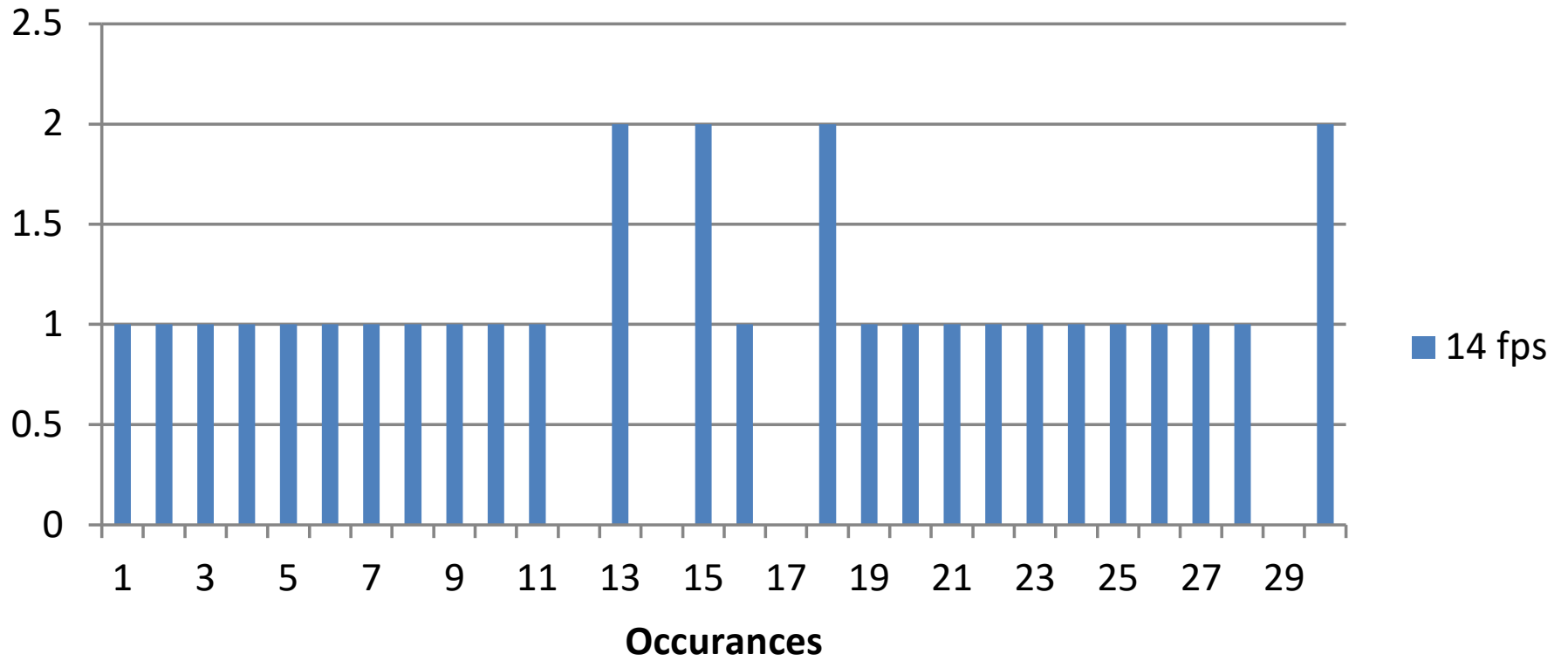
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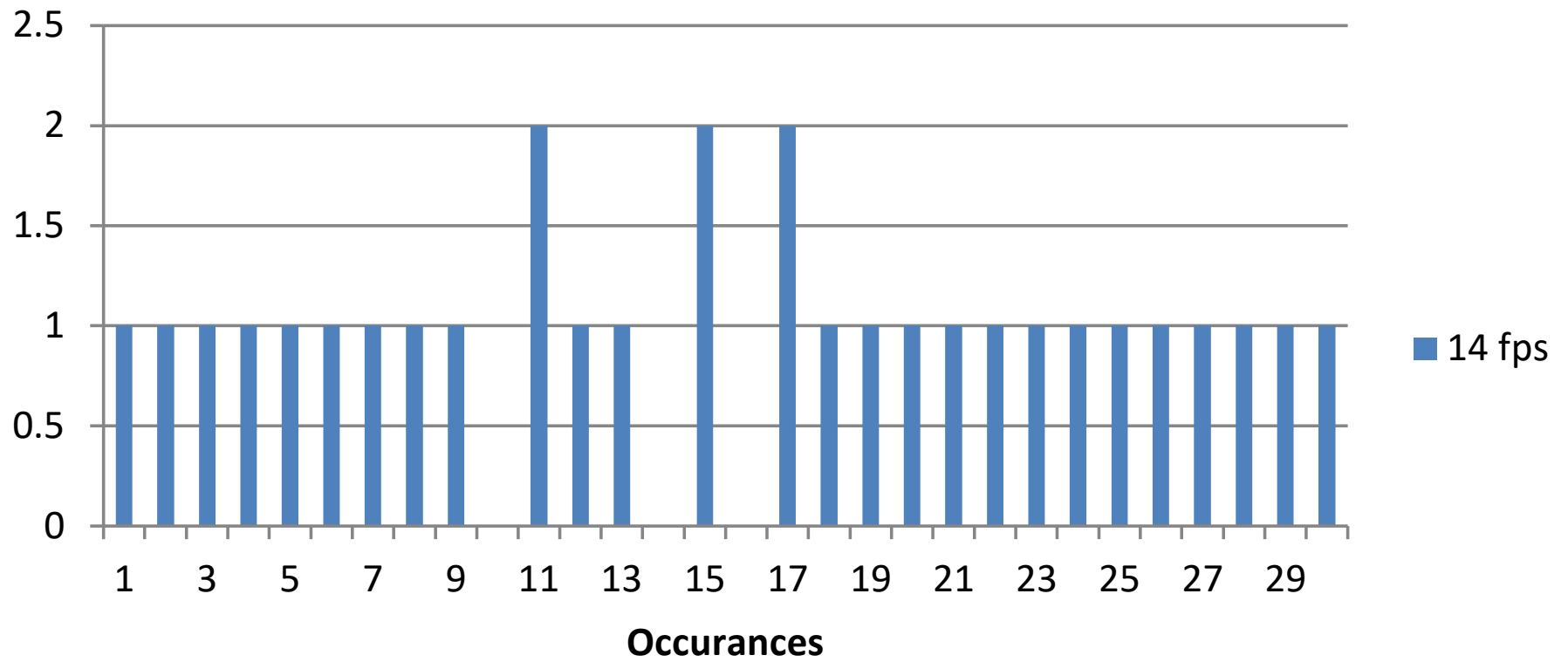
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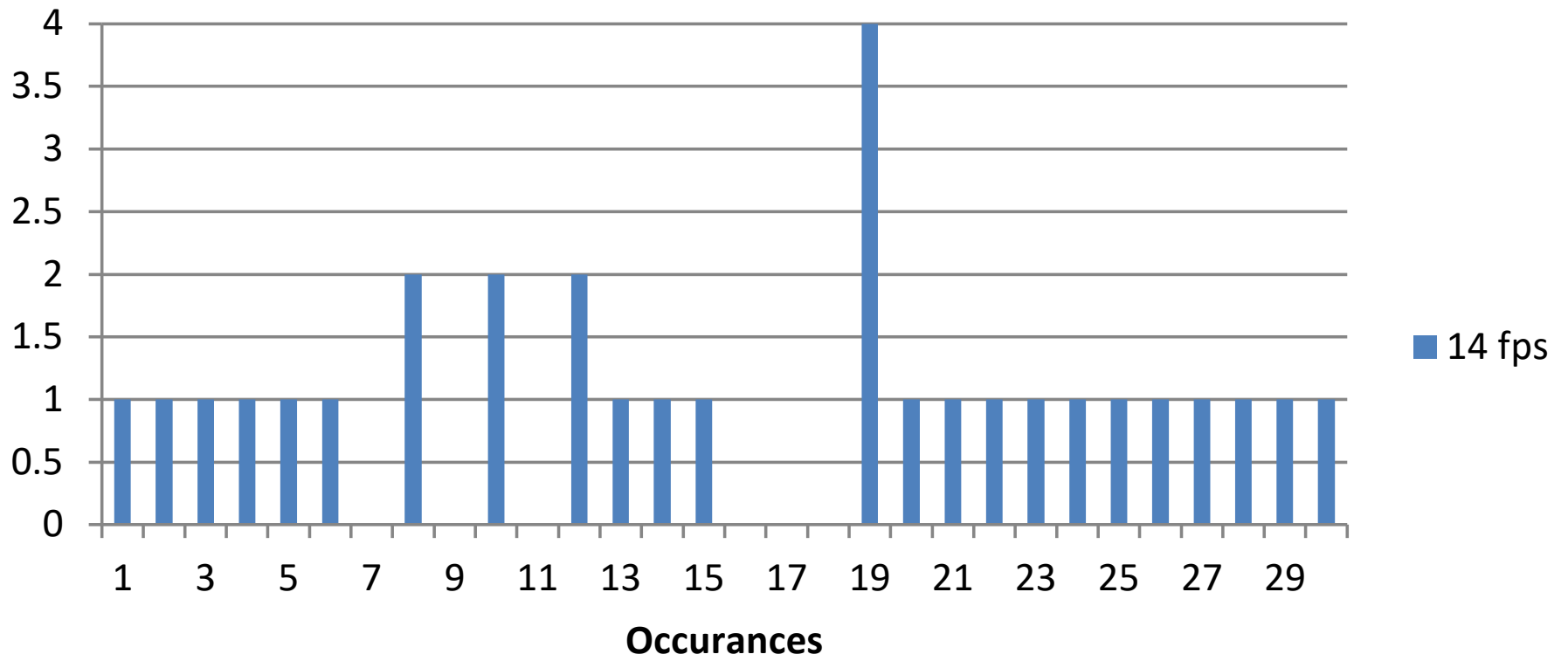
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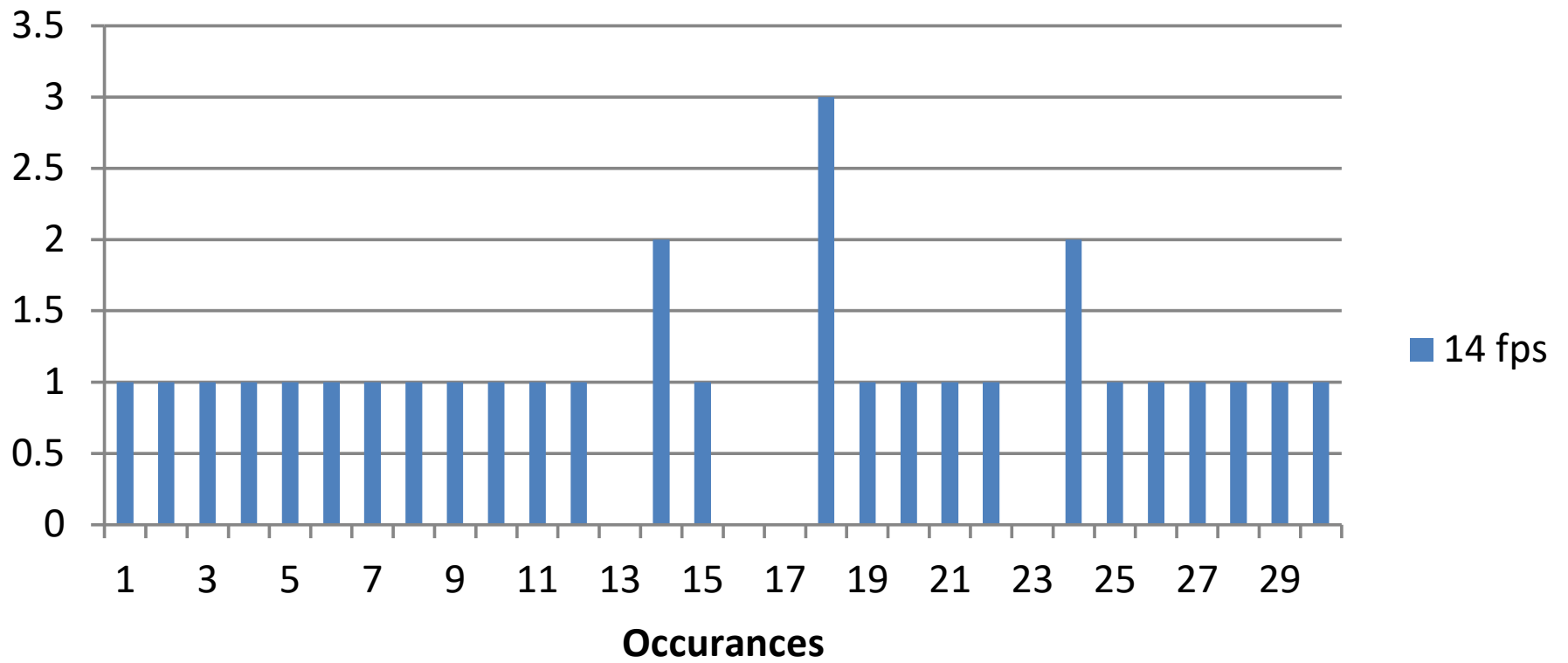
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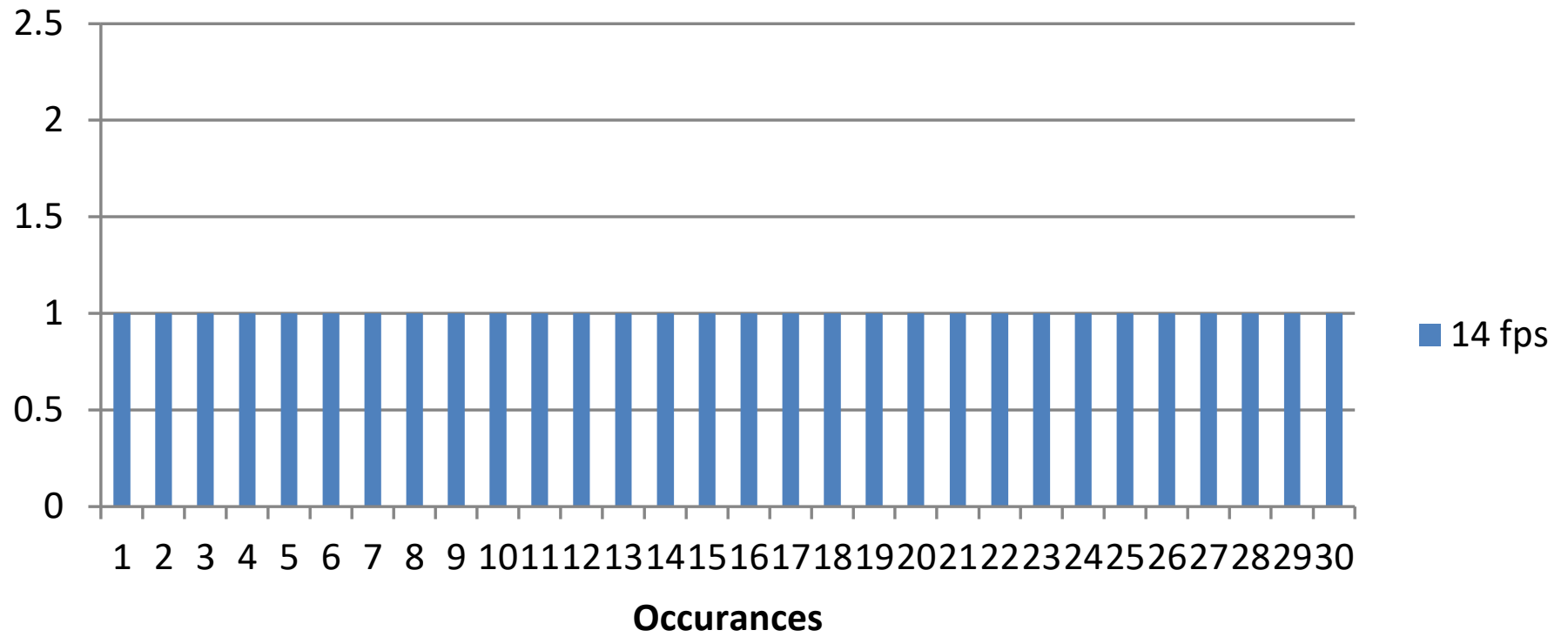
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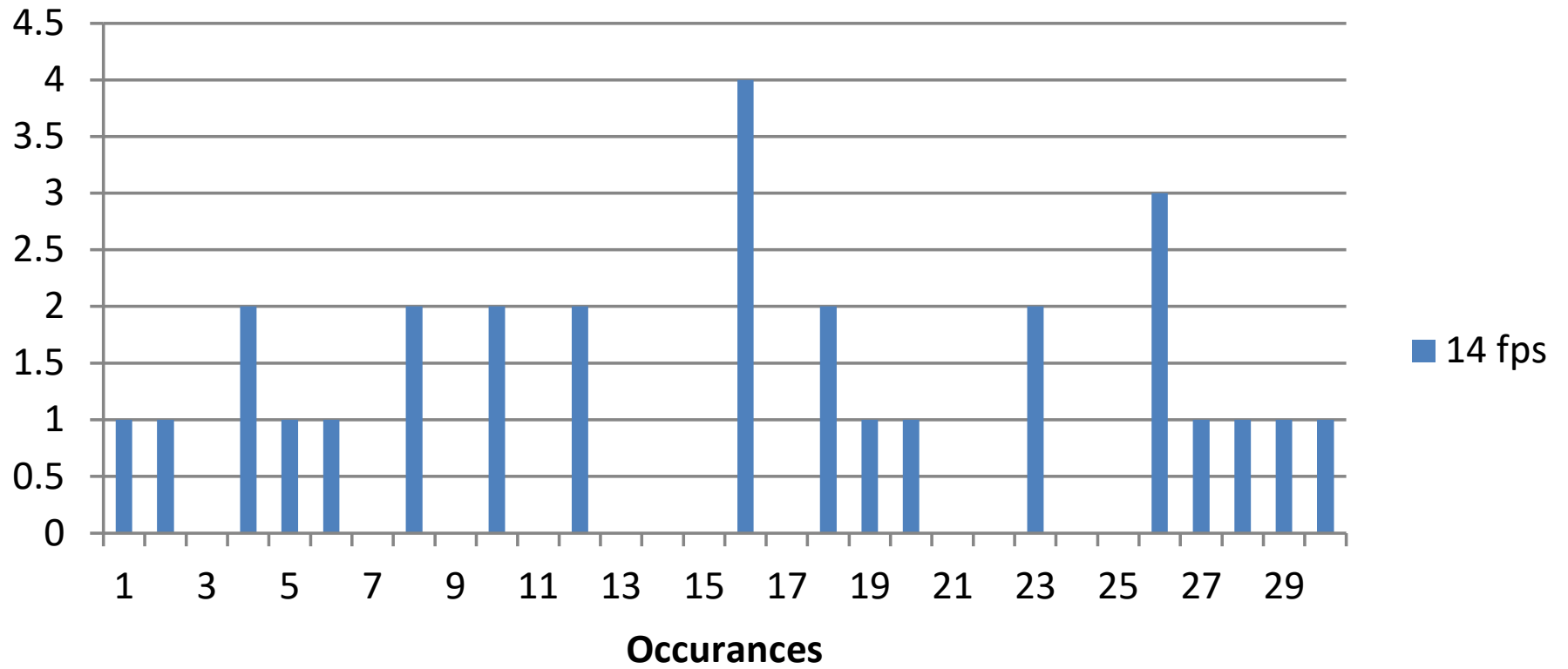
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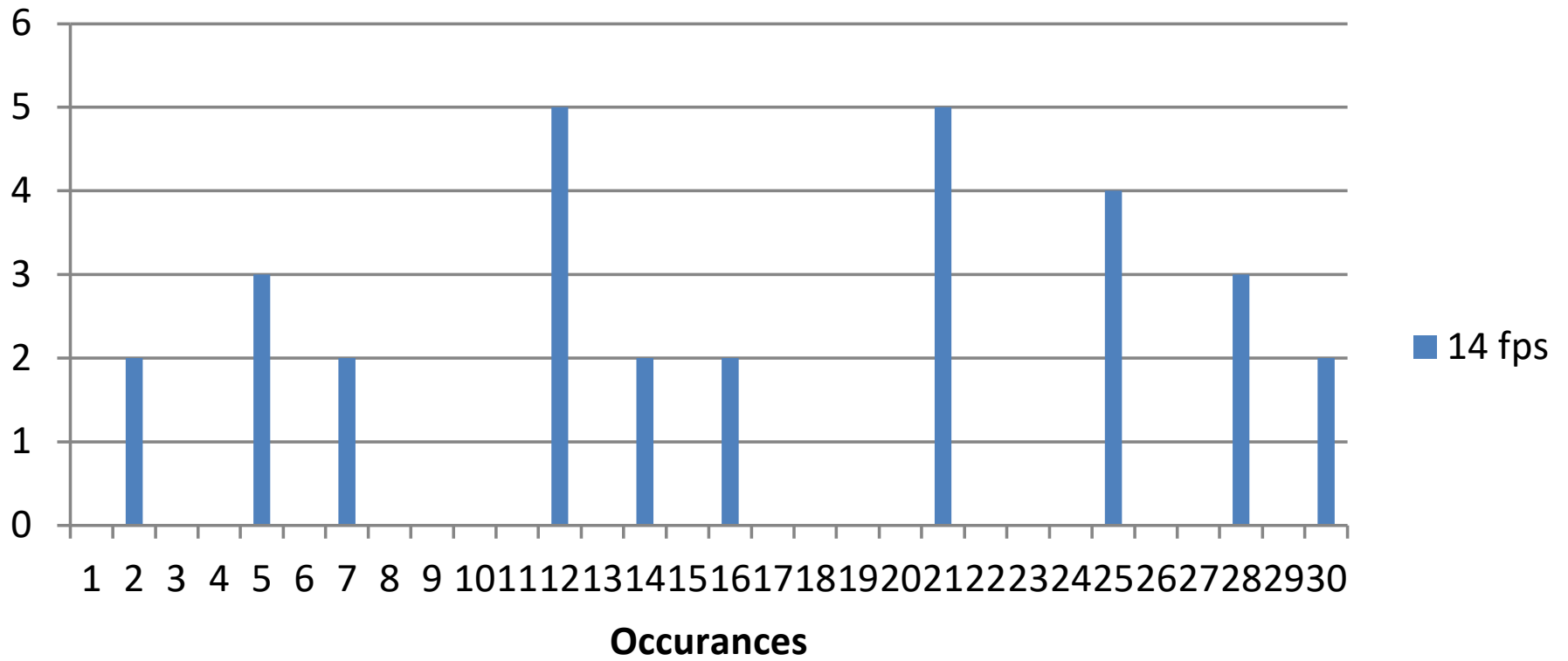
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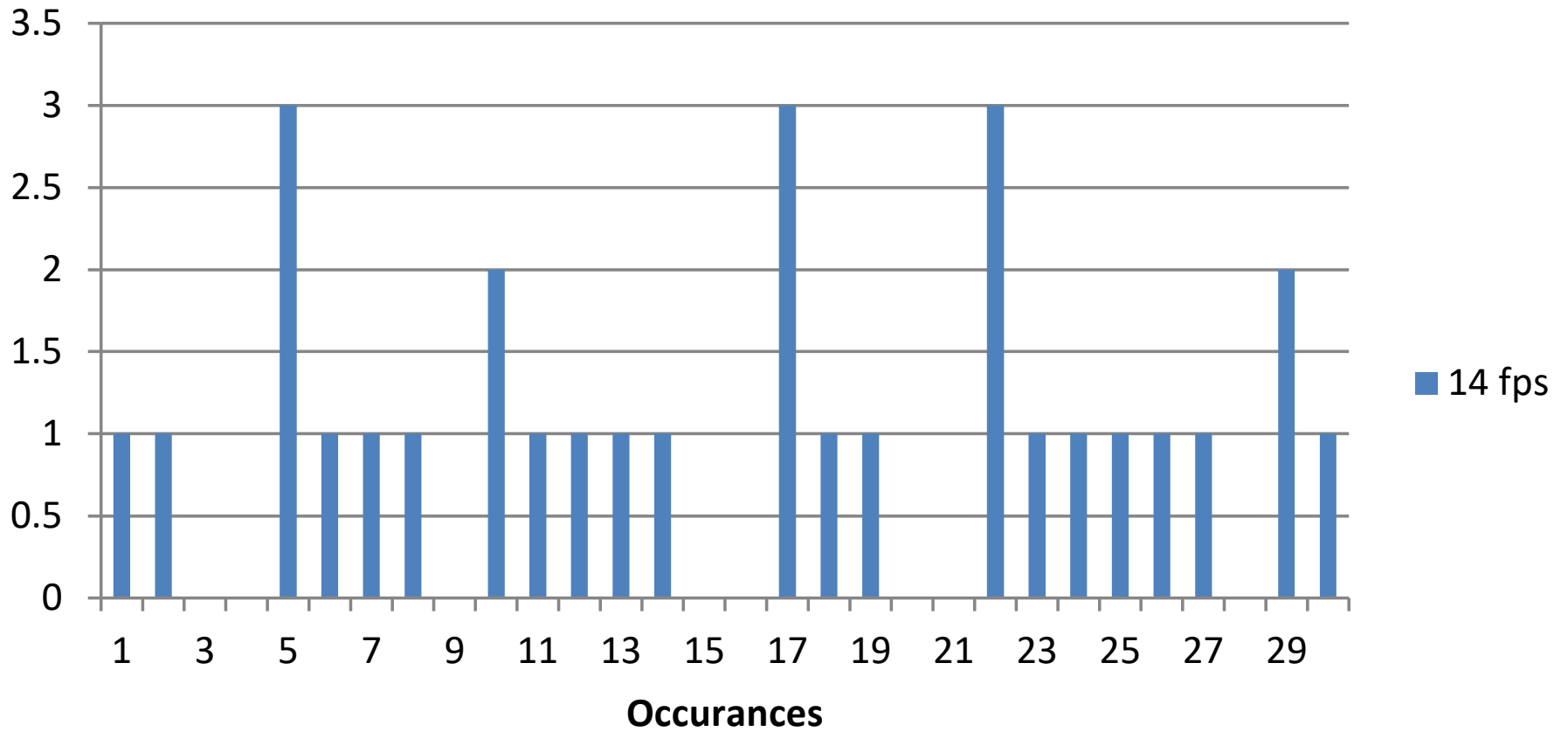
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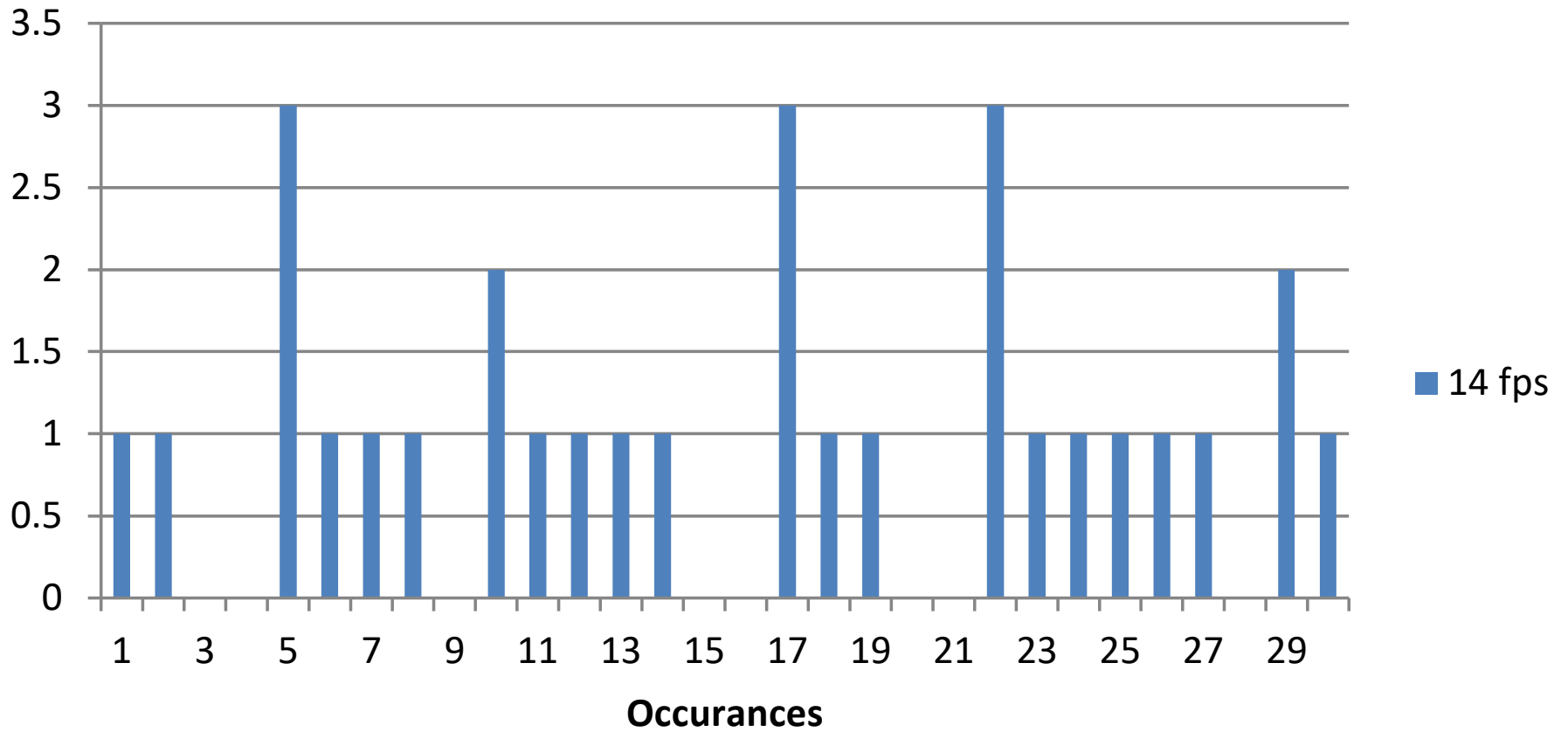
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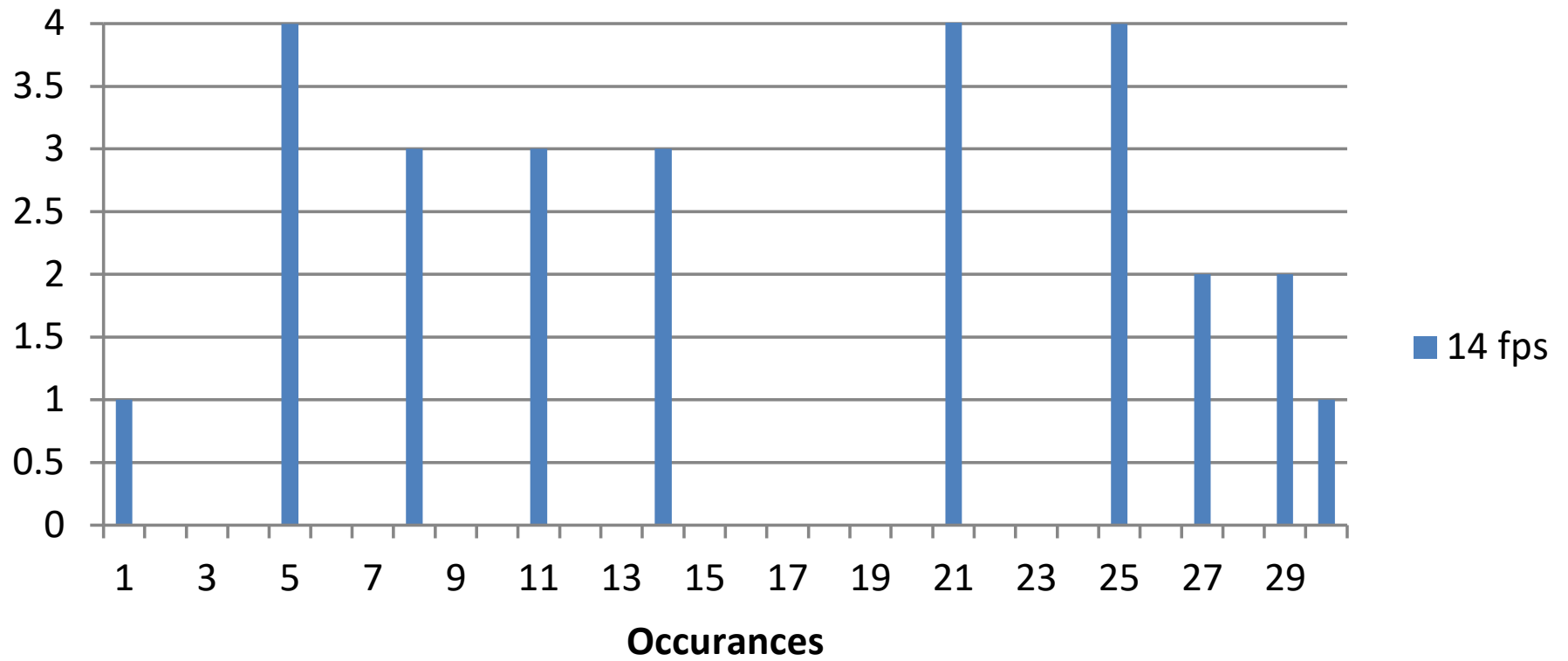
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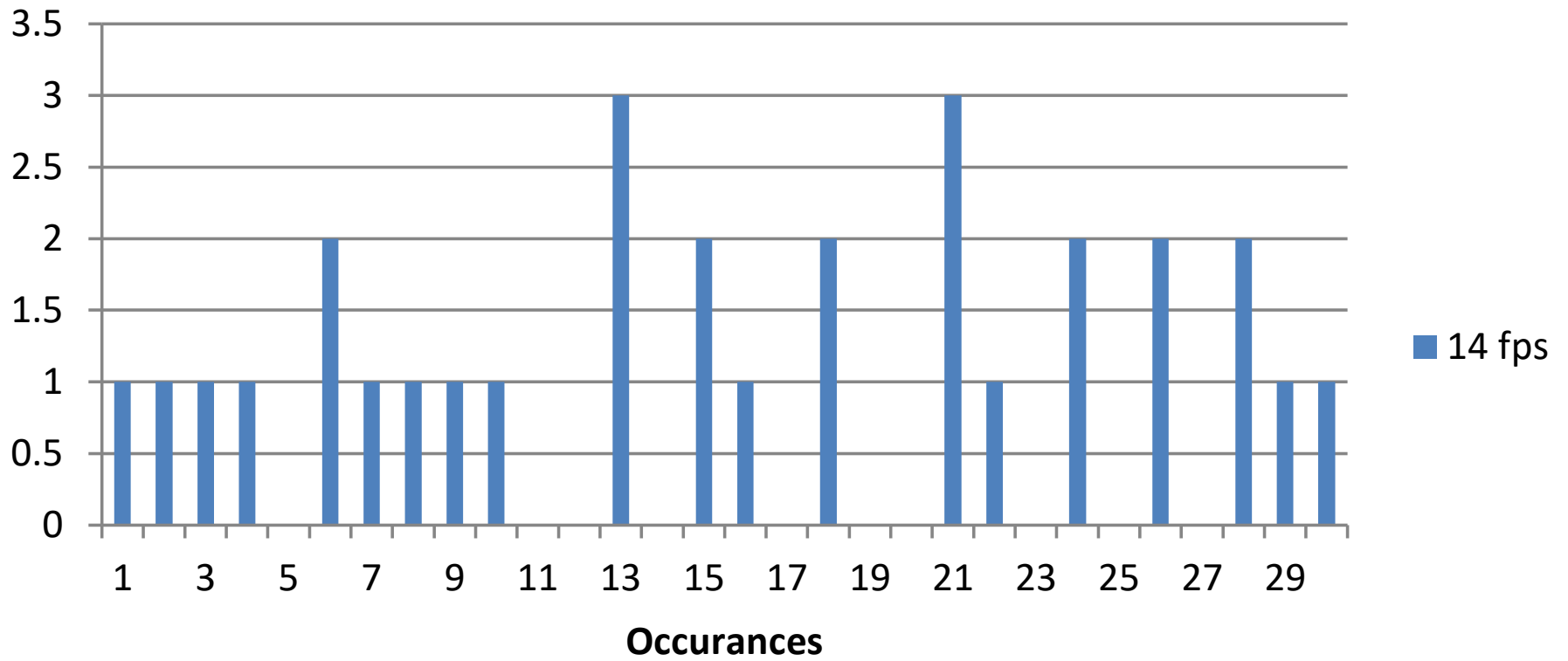
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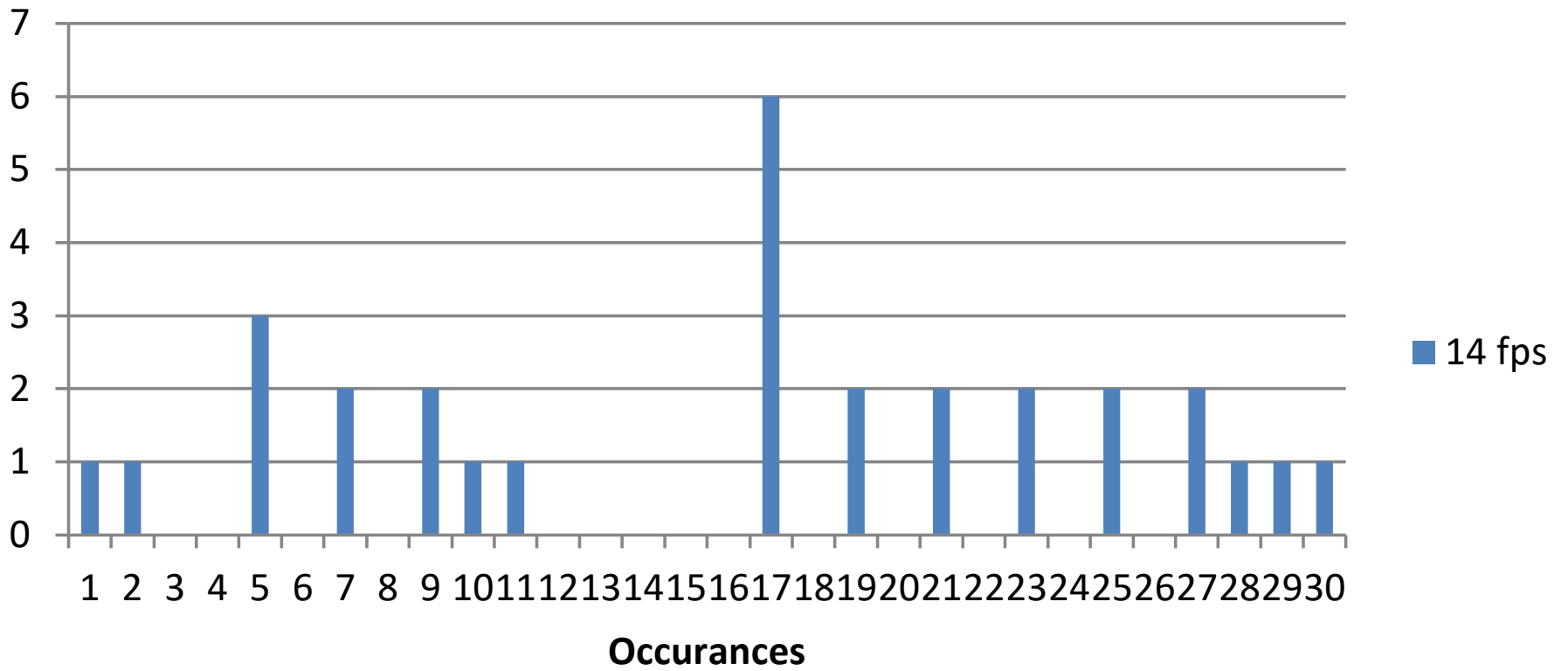
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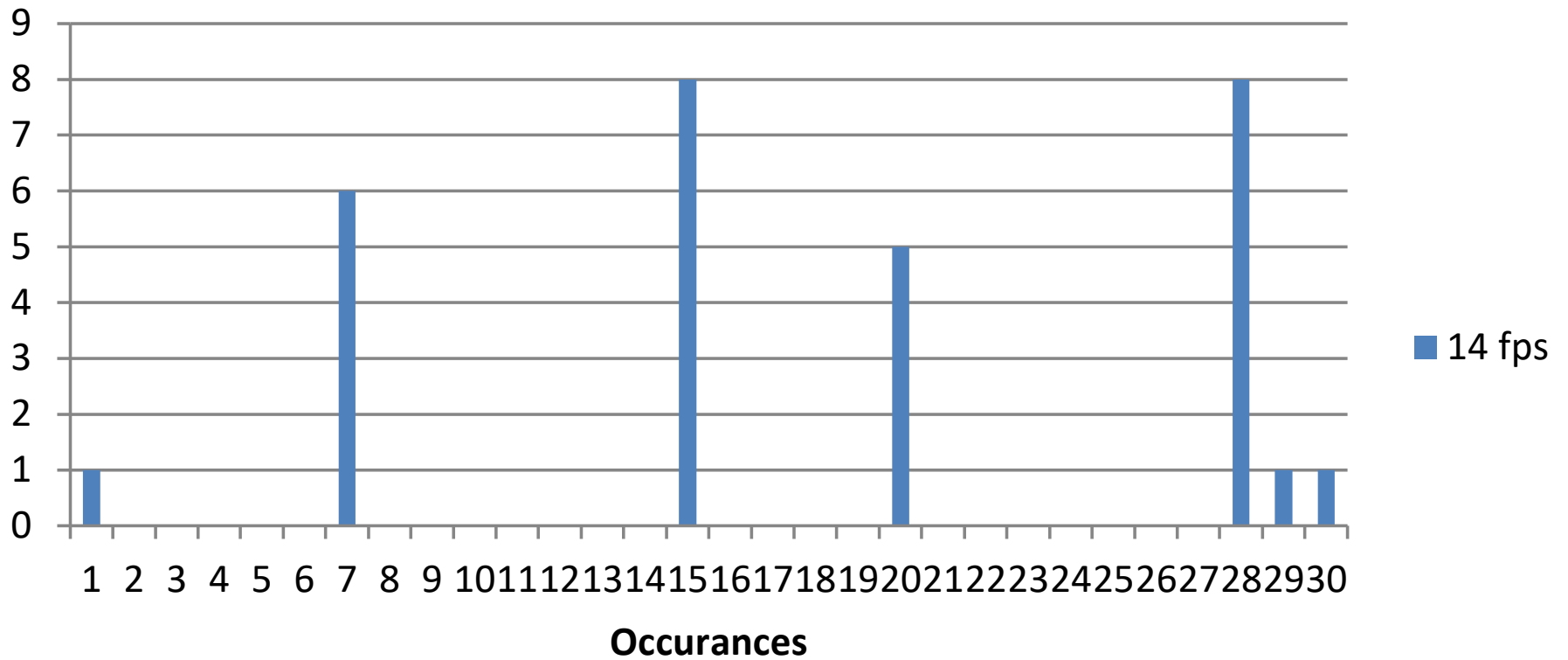
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Seametrics 90 DS - 14 fps

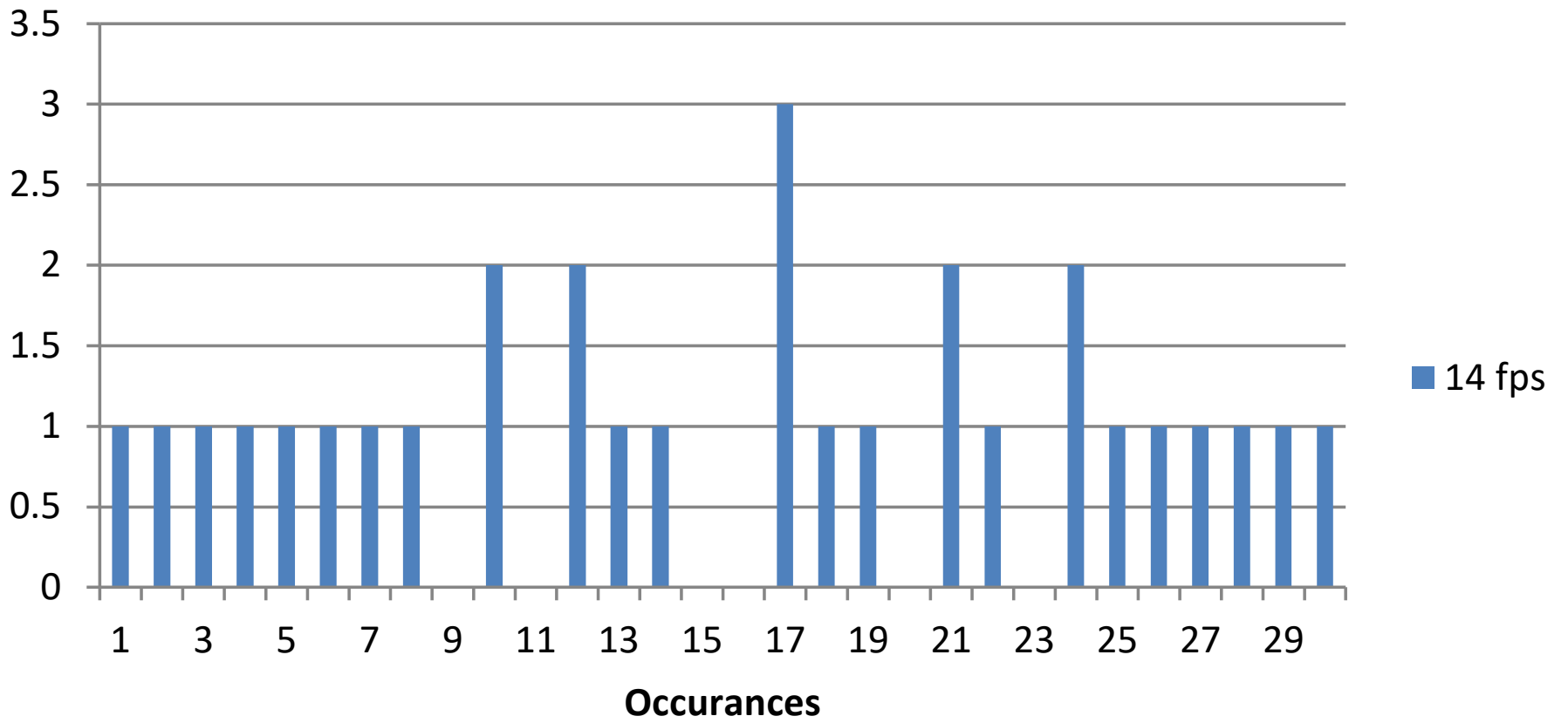


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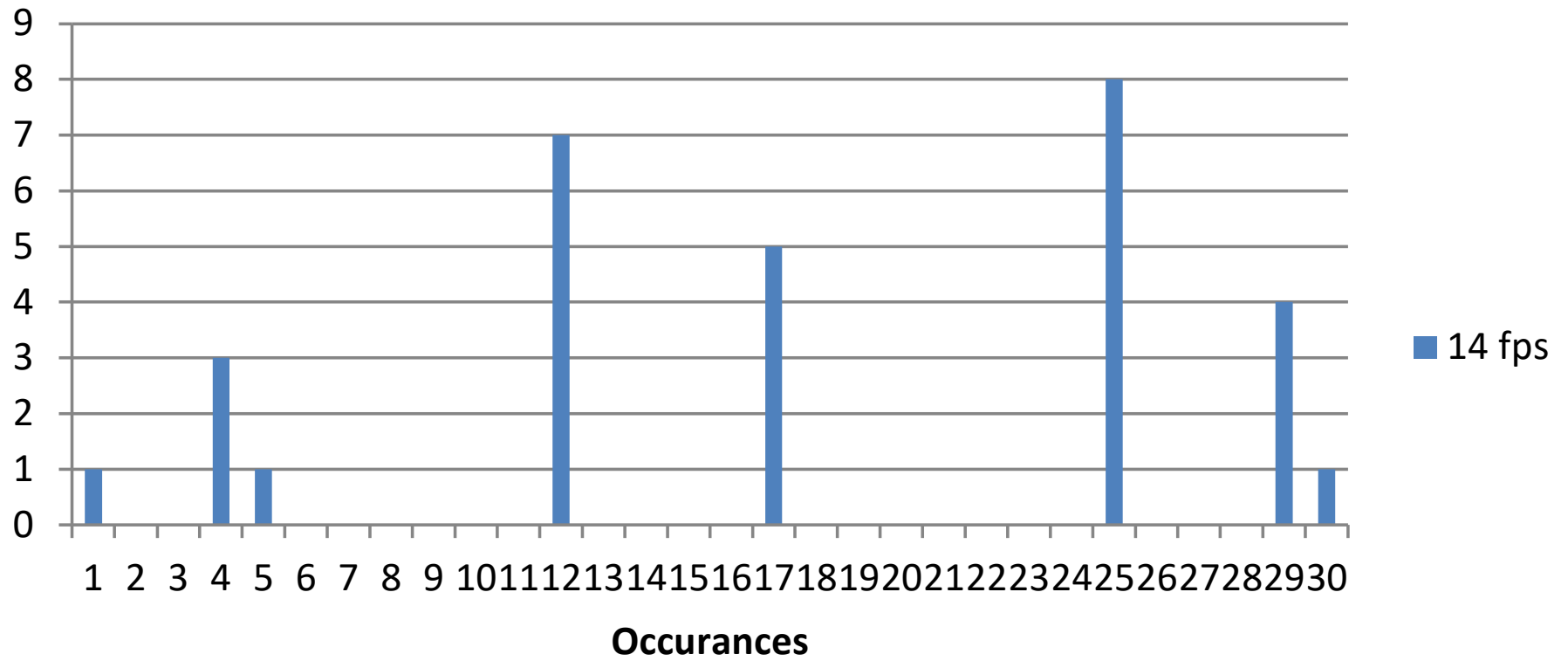


Occurrences

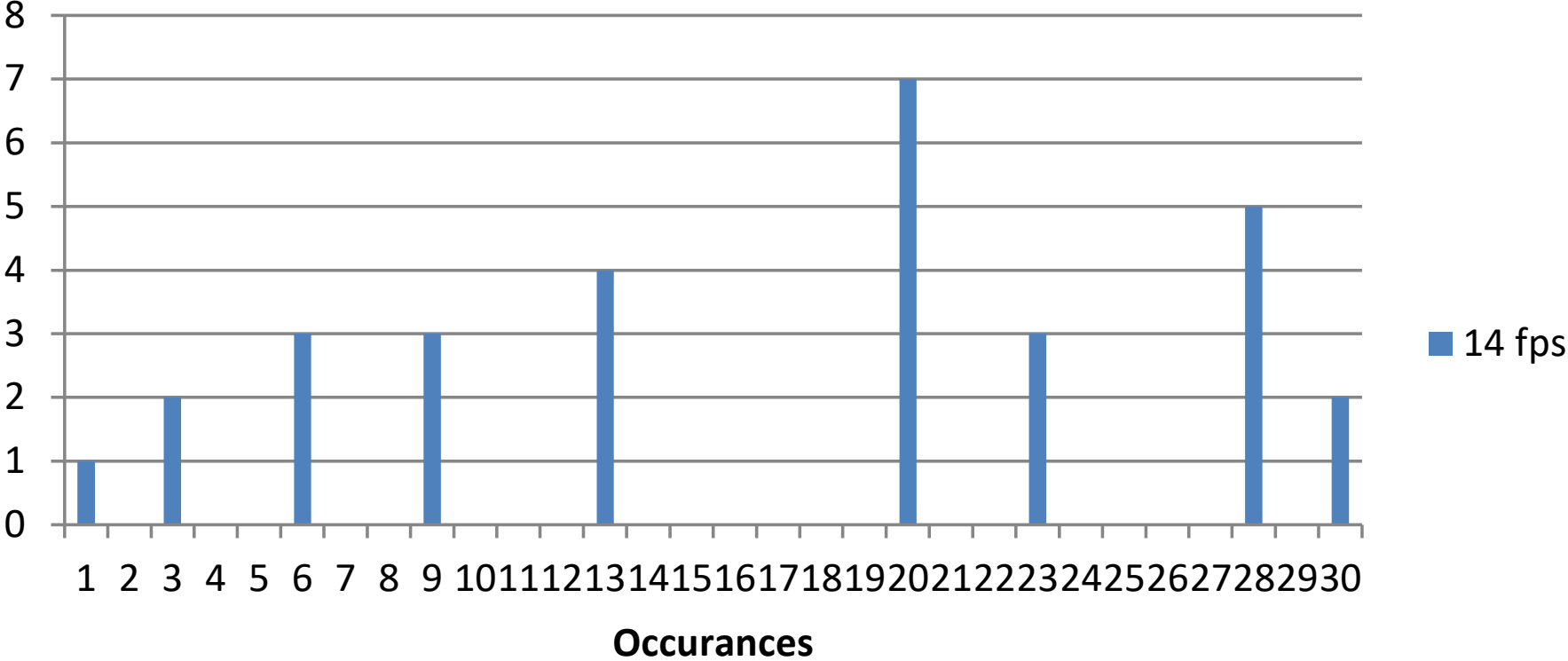
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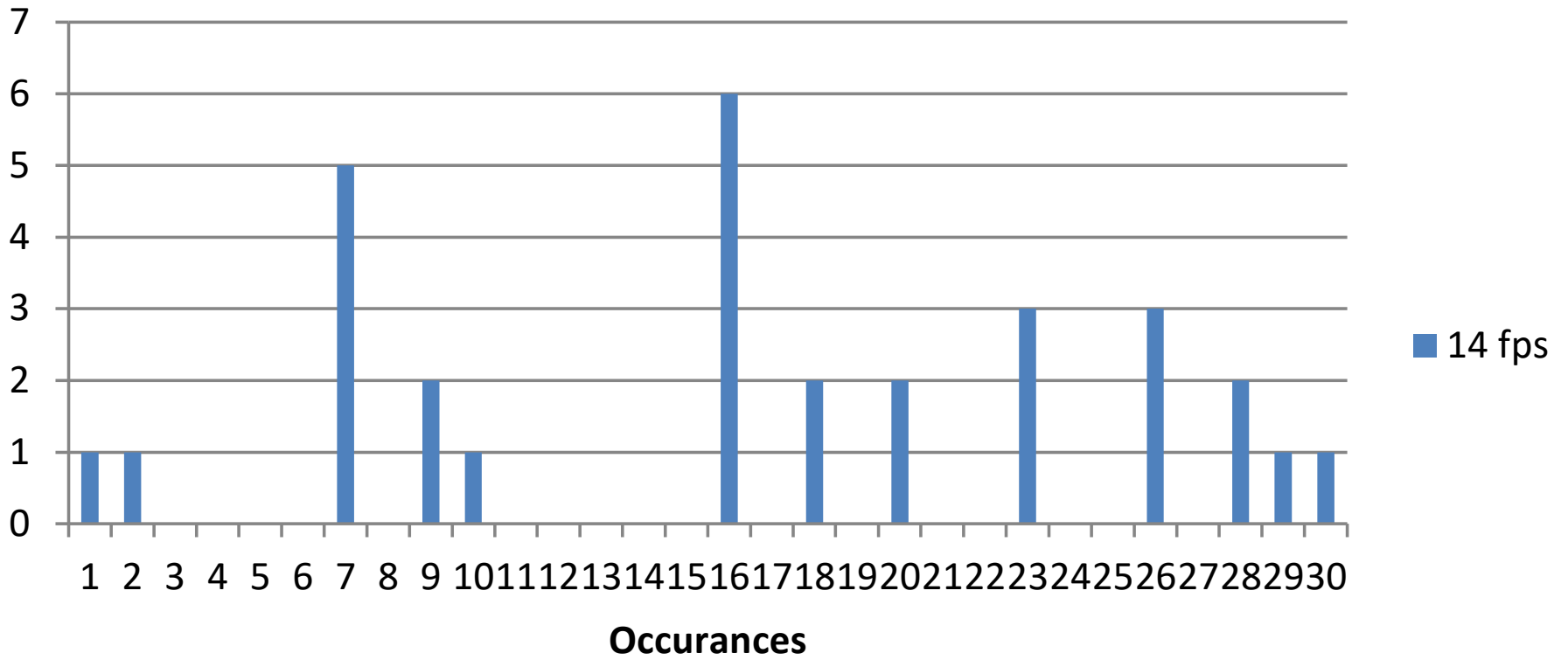
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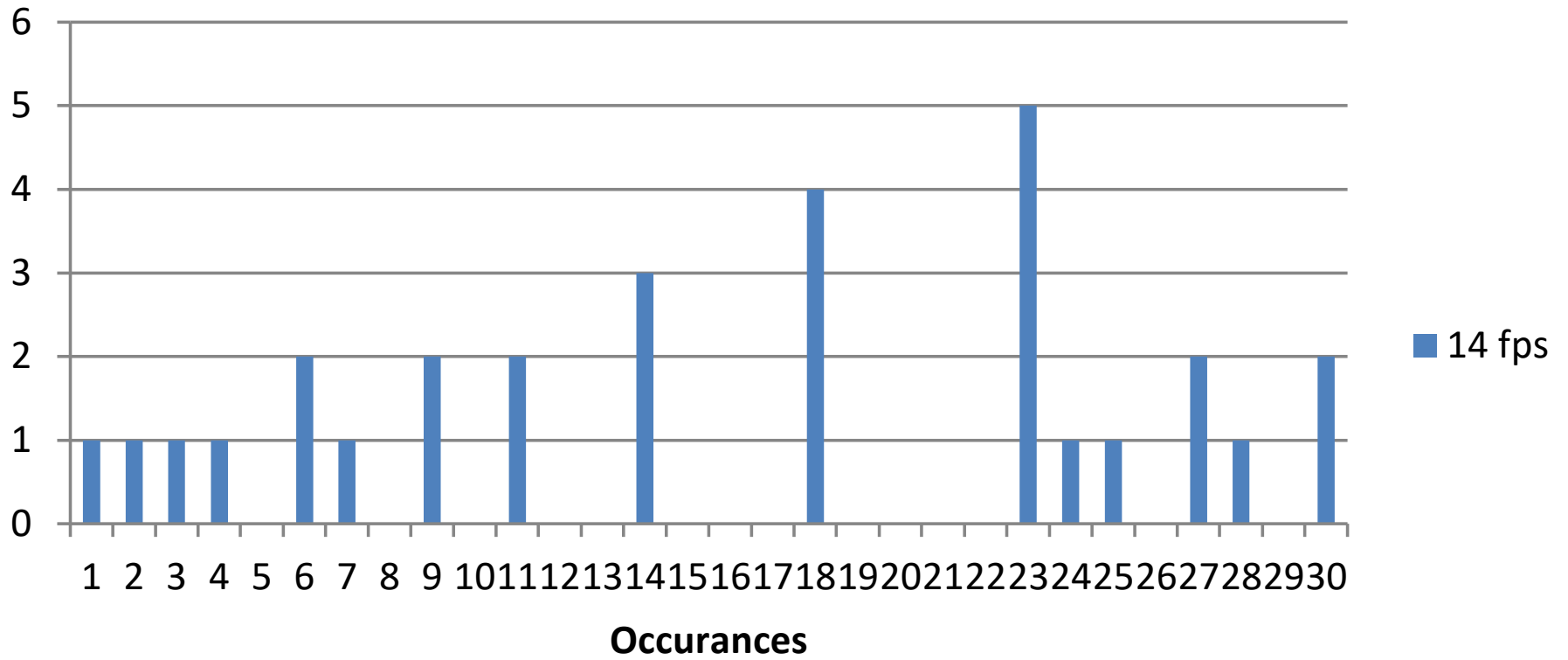
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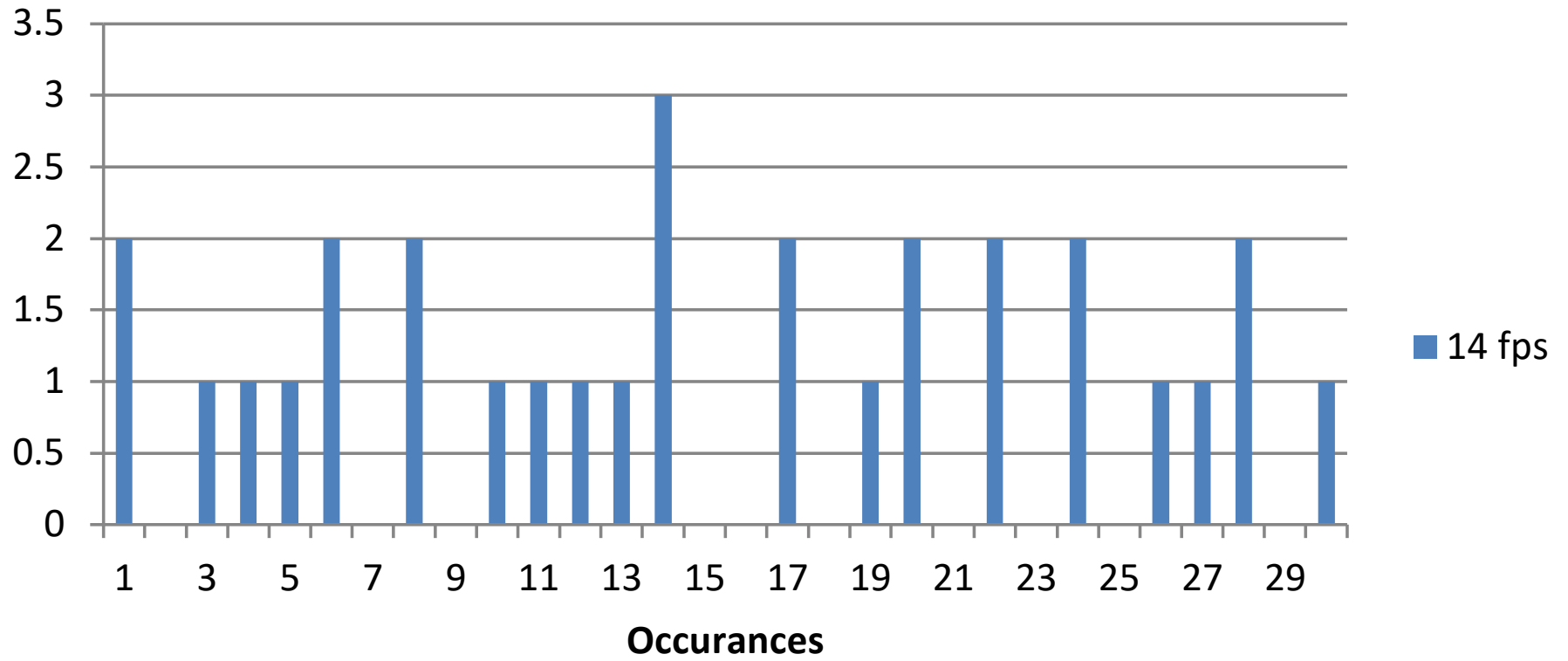
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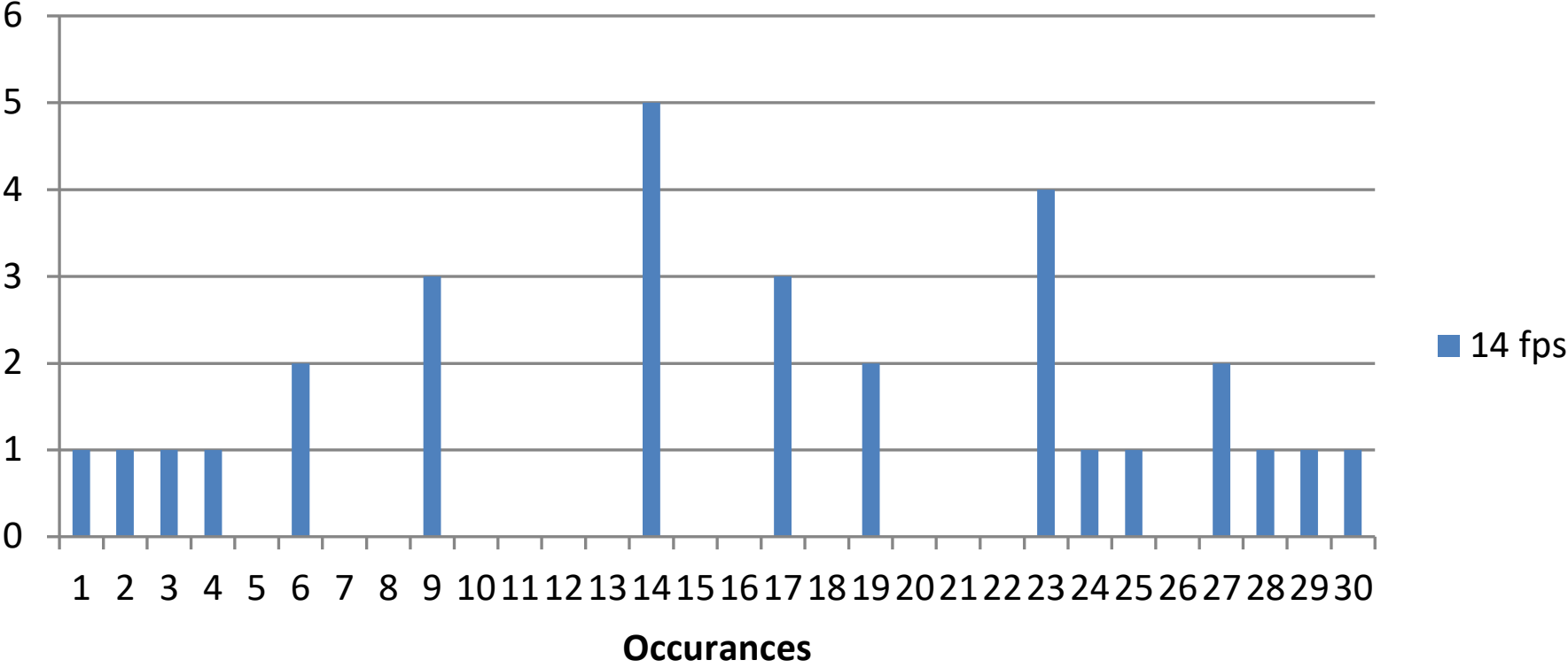
Technoflo 90 US - 14 fps



Technoflo Chk V DS - 14 fps



Technoflo Chk V US - 14 fps



Technoflo Pump - 14 fps

