

**CITY OF SPOKANE,
WASHINGTON**

CSO FLOW MONITORING PROJECT

FLOW, FREQUENCY AND DURATION

SEWER MAINTENANCE

**Monthly Report
November 2009**

January 14, 2010
CSOMonthly2009-11.doc

OVERFLOW EVENTS

Table 1 – Flow-Frequency-Duration, provides a summary of the flow volume calculated for the overflow pipes at each site for each event recorded. The flow calculations are based on flow monitor recorded level and velocity measurements. See Attachment A for a summary of the precipitation volumes.

Table 1 – Flow-Frequency-Duration

	Location	CSO#	Freq.	Date of Event ¹	Estimated ² Total Flow (Gallons)	Event Duration (Minutes)	Comments
1.	AL Parkway Storage (West)	2	None				Missing data 11/2 08:00 to 11/2 08:05
2.	NW Blvd @ Kiernan	6	3	Total	111,989	265	
				11/6	2,034	15	
				11/22	57,062	120	
				11/27	52,893	130	
3.	Columbia @ Downriver	7	None				Missing data 11/2 08:05 to 11/2 08:10
4.	Nettleton @ York/Buckeye	10	1	Total	123	50	Missing data 11/2 08:25 to 11/2 08:30
				11/22	123	50	
5.	Nora @ Pettet	12	4	Total	356,480	725	
				11/6	24,377	50	
				11/19	12,456	165	
				11/22	182,936	195	
				11/26	136,711	315	
6.	Sherwood @ Summit	14	None				Missing data 11/2 08:35 to 11/2 08:40
7.	Nettleton @ Ohio	15	1	Total	588	45	Missing data 11/30 09:45 to 12/11 15:25
				11/22	588	45	
8.	A @ Linton	16B	None				Missing data 11/2 09:15 to 11/2 09:20
9.	7 th @ Inland Empire	19	None				Missing data 11/2 11:25 to 11/2 11:35

¹ Designation as an event means that both a level and velocity reading were recorded concurrently. Not all level and velocity readings that were coincident are included in this report, however. The level and velocity readings that appear to be “background noise” from the electronic equipment are not included in the table.

² The flows presented in this column are calculated from measurements of velocity and depth of flow by electronic devices inserted in the water stream. These measurements are subject to singular and possibly cumulative errors. These errors result from limitations inherent in the measuring devices and from the introduction of a measuring device in to the physical flow stream. Also, error in velocity and depth measurements may be and typically are introduced by the physical conditions of each site. The flow numbers presented in this table are estimates only.

	Location	CSO#	Freq.	Date of Event ¹	Estimated ² Total Flow (Gallons)	Event Duration (Minutes)	Comments
10.	3500 High Drive	20	None				Missing data 11/2 13:00 to 11/2 13:05 Missing data 11/9 08:00 to 11/9 08:05 Missing data 11/23 08:25 to 11/23 08:30
11.	Main @ Oak	22B	None				Missing data 11/2 09:05 to 11/2 09:15
12.	Cedar @ Ide	23	2	Total	618	65	
				11/22	404	45	
				11/27	214	20	
13.	Riverside @ Cedar	24A	1	Total	207,674	270	Missing data 11/2 10:50 to 11/2 10:55
				11/27	207,674	270	
14.	Riverside @ Cedar	24B	None				Missing data 11/2 09:25 to 11/2 09:30
15.	Cedar @ Main	25	2	Total	2,180	225	Missing data 11/16 10:35 to 11/17 14:40
				11/22	166	35	
				11/27	2,014	190	
16.	Riverside @ Lincoln	26	2	Total	654,694	370	Missing data 11/2 08:50 to 11/2 08:55 Missing data 11/2 10:35 to 11/2 10:40
				11/22	134,125	130	
				11/27	520,569	240	
17.	Arthur @ 5 th	33A	None				Missing data 11/2 11:10 to 11/2 11:20 Missing data 11/23 09:20 to 11/23 09:30
18.	Perry @ 3 rd	33B	None				Missing data 11/2 11:30 to 11/2 11:35
19.	Arthur @ 3 rd	33C	None				Missing data 11/2 11:20 to 11/2 11:30 Missing data 11/23 09:15 to 11/23 09:20
20.	Arthur @ 1 st	33D	2	Total	21,153	280	Missing data 11/2 10:45 to 11/2 11:00 Missing data 11/9 08:50 to 11/9 08:55
				11/22	12,538	110	
				11/25	8,615	170	
21.	Riverside @ Napa/Crestline	34	2	Total	14,649	120	Missing data 11/12 14:10 to 11/12 15:40 Missing data 11/13 14:50 to 11/13 15:25
				11/22	140	30	
				11/27	14,509	90	
22.	S. Riverton @ Magnolia	38	None				Missing data 11/2 11:45 to 11/2 11:50 Missing data 11/23 08:55 to 11/23 09:00
23.	S. Riverton @ Altamont	39	None				Missing data 11/2 12:15 to 11/2 12:30 Missing data 11/23 08:50 to 11/23 08:55

	Location	CSO#	Freq.	Date of Event ¹	Estimated ² Total Flow (Gallons)	Event Duration (Minutes)	Comments
24.	S. Riverton @ Regal	40	None				Missing data 11/2 12:50 to 11/2 12:55 Missing data 11/23 08:40 to 11/23 08:45
25.	Rebecca @ Upriver	41	None				Missing data 11/2 12:35 to 11/2 13:15 Missing data 11/23 08:35 to 11/23 08:40
26.	Riverton @ Surro	42	None				Missing data 11/2 13:05 to 11/2 13:10 Missing data 11/9 08:10 to 11/9 08:15 Missing data 11/23 08:30 to 11/23 08:35
	Monthly Total		20		1,370,148	2,415	No Dry Weather Overflows

Table 2 – Rainfall Summary³

Date	1004 Rain	343 Rain	344 Rain	Shadle Rain	Hartson Rain	CityHall Rain	Joe_Albi Rain	RkwdVsta Rain	Station8 Rain	W_Drive Rain	Nora&Pet Rain	GEG Rain	Snow	Dpth	NWS Rain	Snow	Dpth
11/01/09	0	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0
11/02/09	0	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0
11/03/09	0	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0
11/04/09	0	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0
11/05/09	0.08	0.06	0.04	0.05	0.06	0.06	0.09	0.06	0.09	0.13	X	0.07	0	0	0.09	0	0
11/06/09	0.09	0.07	0.04	0.07	0.07	0.1	0.09	0.07	0.14	0.22	X	0.1	0	0	0.08	0	0
11/07/09	0	0	0	0	0	0	0	0	0	0	X	T	0	0	T	0	0
11/08/09	0.03	0.05	0.02	0.03	0.03	0.02	0.03	0.06	0.02	0.06	X	0.03	T	0	0.04	0	0
11/09/09	0.04	0.03	0.02	0.02	0.03	0.01	0.02	0.02	0.03	0.06	X	0.03	0	0	0.04	0	0
11/10/09	0.01	0.01	0.01	0.01	0.01	0.01	0	0.01	0.01	0.02	X	0.01	0	0	0.01	0	0
11/11/09	0	0	0	0	0	0	0	0	0	0	X	T	0	0	0	0	0
11/12/09	0.01	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0
11/13/09	0	0	0	0.04	0.1	0.07	0.08	0.12	0.12	0.18	X	0.1	1.4	0	0.13	1.5	1
11/14/09	0	0	0	0	0	0	0	0	0	0	X	T	T	1	T	T	1
11/15/09	0.01	0.14	0.05	0	0	0	0	0	0	0	X	T	T	1	T	T	1
11/16/09	0.03	0	0	0	0	0	0	0	0	0	X	T	T	0	T	T	T
11/17/09	0.01	0	0	0	0	0	0	0	0	0	X	0.01	0	0	0	0	0
11/18/09	0	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0
11/19/09	0.14	0.14	0.06	0.09	0.11	0.11	0.12	0.16	0.11	0.24	X	0.16	0.1	0	0.21	0.2	0
11/20/09	0.01	0.04	0.02	0.01	0.03	0.01	0	0.02	0.04	0.04	X	0.02	0	0	0.02	0	0
11/21/09	0.01	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0
11/22/09	0.14	0.34	0.1	0.13	0.28	0.28	0.23	0.39	0.3	0.61	X	0.27	3.2	0	0.28	2	0
11/23/09	0	0	0	0	0	0	0	0	0	0	X	0	0	1	0	0	1
11/24/09	0.02	0.04	0.02	0.02	0.01	0	0	0.02	0	0.04	X	0.04	T	1	T	T	T
11/25/09	0.01	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0
11/26/09	0.14	0.22	0.11	0.13	0.18	0.11	0.1	0.2	0.2	0.24	X	0.15	0	0	0.1	0	0
11/27/09	0.28	0.42	0.18	0.3	0.37	0.29	0.31	0.39	0.58	0.55	X	0.32	0	0	0.37	0	0
11/28/09	0	0	0	0	0	0	0	0	0	0	X	T	0	0	T	0	0
11/29/09	0	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0
11/30/09	0.01P	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0
Total	1.07	1.56	0.67	0.9	1.28	1.07	1.07	1.52	1.64	2.39	0	1.31	4.7		1.37	3.7	

- E - Erroneous data
- M - Missing data
- P - Partial missing data
- T - Trace of rain/snow
- X - Out of Service

Table 3 – Rain Gauges

1004	Airway Heights
343	23 rd & Ray
344	Division & Manito
Shadle	Shadle Water Tower (was 345)
Hartson	Ray & Hartson (was 346)
CityHall	City Hall (was 347)
Joe_Albi	Joe Albi Stadium
RkwdVsta	Rockwood Vista
Station8	Fire Station 8, Rebecca & Mission
W_Drive	West Drive Reservoir
Nora&Pet	Nora & Pettet
GEG	Spokane Airport
NWS	National Weather Service – Spokane

³ Some rain gauges are heated. Consequently they will tend to record snow melt immediately as rain. The rain gauges that are not heated will typically register snow melt when it actually melts.