

**CITY OF SPOKANE,
WASHINGTON**

CSO FLOW MONITORING PROJECT

FLOW, FREQUENCY AND DURATION

SEWER MAINTENANCE

**Monthly Report
October 2009**

December 9, 2009
CSOMonthly2009-10.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				
2.	NW Blvd @ Kiernan	6	5	Total	1,233,814	1,855	
				10/2	31,612	75	
				10/14	314,009	575	
				10/17	77,710	155	
				10/21	479,150	625	
				10/26	331,333	425	
3.	Columbia @ Downriver	7	2	Total	9,940	70	Missing data 10/5 08:00 to 10/5 08:10 Missing data 10/5 09:20 to 10/5 09:40
				10/23	5,061	40	
				10/26	4,879	30	
4.	Nettleton @ York/Buckeye	10	2	Total	8,995	395	Missing data 10/5 08:25 to 10/5 08:30
				10/23	6,229	205	
				10/26	2,766	190	
5.	Nora @ Pettet	12	5	Total	1,411,465	1,330	Missing data 10/5 08:35 to 10/5 08:40
				10/2	181	105	
				10/14	197,157	265	
				10/17	41,468	90	
				10/23	587,299	400	
				10/26	585,360	470	
6.	Sherwood @ Summit	14	None				Missing data 10/5 08:50 to 10/5 08:55

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
7.	Nettleton @ Ohio	15	2	Total	90,623	1,095	Missing data 10/5 08:55 to 10/5 09:05
				10/14	88,598	1,025	
				10/23	2,025	70	
8.	A @ Linton	16B	None				Missing data 10/5 09:40 to 10/5 09:45
9.	7 th @ Inland Empire	19	None				
10.	3500 High Drive	20	None				
11.	Main @ Oak	22B	None				
12.	Cedar @ Ide	23	2	Total	66,260	255	Missing data 10/5 09:05 to 10/5 09:10 Missing data 10/26 08:05 to 10/26 08:15
				10/14	6,301	40	
				10/26	59,959	215	
13.	Riverside @ Cedar	24A	3	Total	2,004,969	970	
				10/14	1,703	95	
				10/23	1,123,956	360	
				10/26	879,310	515	
14.	Riverside @ Cedar	24B	None				Missing data 10/5 09:45 to 10/5 09:50
15.	Cedar @ Main	25	3	Total	121,842	265	Missing data 10/5 09:25 to 10/5 09:30
				10/14	11,459	30	
				10/23	99,588	130	
				10/26	10,795	105	
16.	Riverside @ Lincoln	26	3	Total	4,092,869	885	Missing data 10/5 09:15 to 10/5 09:20
				10/14	186,902	110	
				10/23	1,933,307	335	
				10/26	1,972,660	440	
17.	Arthur @ 5 th	33A	2	Total	683	160	
				10/23	317	85	
				10/26	366	75	
18.	Perry @ 3 rd	33B	2	Total	458,543	95	
				10/23	222,458	50	
				10/26	236,085	45	
19.	Arthur @ 3 rd	33C	None				
20.	Arthur @ 1 st	33D	3	Total	81,128	660	
				10/14	2,123	55	
				10/23	29,366	240	
				10/26	49,639	365	

	Location	CSO#	Freq.	Date of Event ¹	Estimated ² Total Flow (Gallons)	Event Duration (Minutes)	Comments
21.	Riverside @ Napa/Crestline	34	3	Total	1,900,119	690	Missing data 10/20 10:30 to 10/20 11:15 Missing data 10/26 13:20 to 10/27 10:15
				10/14	119	30	
				10/23	1,000,000	260	Estimated based on previous storms due to monitoring equipment malfunction
				10/26	900,000	400	Estimated based on previous storms due to monitoring equipment malfunction
22.	S. Riverton @ Magnolia	38	2	Total	288	425	
				10/23	143	175	
				10/26	145	250	
23.	S. Riverton @ Altamont	39	None				
24.	S. Riverton @ Regal	40	None				
25.	Rebecca @ Upriver	41	2	Total	20,398	345	Missing data 10/31 13:35 to 11/2 12:45
				10/23	13,787	230	
				10/26	6,611	115	
26.	Riverton @ Surro	42	None				
	Monthly Total		41		11,501,936	9,495	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
10/01/09	0	0	0	X	0	0	0	0	0	0	X	0	0	0	0	0	0
10/02/09	0.13	0.09	0.03	X	0.11	0.13	0.1	0.11	0.14	0.2	X	0.09	0	0	0.11	0	0
10/03/09	0	0	0	X	0	0	0	0	0	0	X	0	0	0	0	0	0
10/04/09	0	0	0	X	0	0	0	0	0	0	X	0	0	0	0	0	0
10/05/09	0	0	0	X	0	0	0	0	0	0	X	0	0	0	0	0	0
10/06/09	0	0	0	X	0	0	0	0	0	0	X	0	0	0	0	0	0
10/07/09	0	0	0	X	0	0	0	0	0	0	X	0	0	0	0	0	0
10/08/09	0	0	0	X	0	0	0	0	0	0	X	T	0	0	T	0	0
10/09/09	0	0	0	X	0	0	0	0	0	0	X	0	0	0	0	0	0
10/10/09	0	0	0	X	0	0	0	0	0	0	X	0	0	0	0	0	0
10/11/09	0	0	0	X	0	0	0	0	0	0	X	0	0	0	0	0	0
10/12/09	0	0	0	X	0	0	0	0	0	0	X	0	0	0	0	0	0
10/13/09	0.05	0.05	0.03	X	0.02	0.05	0.05	0.04	0.06	0.05	X	0.08	0	0	0.15	0	0
10/14/09	0.48	0.52	0.24	X	0.46	0.53	0.54	0.5	0.83	0.92	X	0.49	0	0	0.6	0	0
10/15/09	0	0	0	X	0	0	0	0	0	0	X	0	0	0	0	0	0
10/16/09	0	0	0	X	0	0	0	0	0	0	X	0	0	0	T	0	0
10/17/09	0.16	0.14	0.11	X	0.14	0.12	0.17	0.13	0.15	0.24	X	0.15	0	0	0.17	0	0
10/18/09	0.01	0	0	X	0	0	0	0	0	0.01	X	0	0	0	0	0	0
10/19/09	0	0	0	X	0	0	0	0	0	0	X	0	0	0	0	0	0
10/20/09	0.01	0	0	X	0	0	0	0	0	0	X	0	0	0	0.01	0	0
10/21/09	0.07	0.09	0.03	X	0.06	0.05	0.05	0.05	0.12	0.12	X	0.07	0	0	0.05	0	0
10/22/09	0.01P	0	0	X	0	0	0	0	0	0	X	T	0	0	0	0	0
10/23/09	0.6	0.69	0.33	0.7	0.65	0.63	0.73	0.67	1.25	1.2	X	0.63	0	0	0.67	0	0
10/24/09	0	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0
10/25/09	0.02	0.01	0.01	0.02	0.02	0.01	0.01	0.02	0.01	0.01	X	0.04	0	0	0.05	0	0
10/26/09	0.71	0.8	0.35	0.6	0.7	0.69	0.69	0.71	1.3	1.25	X	0.7	0	0	0.73	0	0
10/27/09	0	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0
10/28/09	0	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0
10/29/09	0.05	0.09	0.04	0.05	0.04	0.04	0.03	0.09	0.02	0.06	X	0.04	T	0	0.1	T	0
10/30/09	0.01	0	0.01	0.01	0	0.01	0.01	0	0.01	0	X	0.01	0	0	0.02	0	0
10/31/09	0.02	0.04	0.01	0.01	0.03	0.01	0.02	0.03	0.04	0.05	X	0.01	0	0	0.01	0	0
Total	2.33	2.52	1.19	1.39	2.23	2.27	2.4	2.35	3.93	4.11	0	2.31	0.0		2.67	0.0	

- 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.