

**CITY OF SPOKANE,
WASHINGTON**

CSO FLOW MONITORING PROJECT

FLOW, FREQUENCY AND DURATION

SEWER MAINTENANCE

**Monthly Report
April 2009**

June 9, 2009
CSOMonthly2009-04.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	None				
3.	Columbia @ Downriver	7	None				Missing data 4/6 08:35 to 4/6 08:40 Missing data 4/8 10:50 to 4/8 15:00 Missing data 4/9 09:15 to 4/9 10:10
4.	Nettleton @ York/Buckeye	10	None				Missing data 4/6 09:45 to 4/6 09:50
5.	Nora @ Pettet	12	2	Total	2,629	205	Missing data 4/6 09:35 to 4/6 09:40
				4/11	439	40	
				4/12	2,190	165	
6.	Sherwood @ Summit	14	None				Missing data 4/6 10:15 to 4/6 10:20
7.	Nettleton @ Ohio	15	None				Missing data 4/6 10:25 to 4/6 10:30
8.	A @ Linton	16B	None				
9.	7 th @ Inland Empire	19	None				
10.	3500 High Drive	20	None				Missing data 4/13 09:25 to 4/13 09:30
11.	Main @ Oak	22B	None				Missing data 4/6 06:00 to 4/6 13:55
12.	Cedar @ Ide	23	None				Missing data 4/6 10:45 to 4/6 10:50

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
13.	Riverside @ Cedar	24A	1	Total	18,104	155	Missing data 4/6 11:05 to 4/6 11:10
				4/2	18,104	155	
14.	Riverside @ Cedar	24B	None				
15.	Cedar @ Main	25	None				
16.	Riverside @ Lincoln	26	3	Total	137,568	170	Missing data 4/6 13:00 to 4/6 13:05
				4/2	56,133	110	
				4/11	10,399	15	
				4/12	71,036	45	
17.	Arthur @ 5 th	33A	1	Total	230	15	Missing data 4/14 10:45 to 4/14 10:50
				4/13	230	15	
18.	Perry @ 3 rd	33B	None				
19.	Arthur @ 3 rd	33C	None				Missing data 4/14 11:00 to 4/14 11:05
20.	Arthur @ 1 st	33D	1	Total	2,220	50	Missing data 4/14 11:05 to 4/14 11:10
				4/13	2,220	50	
21.	Riverside @ Napa/Crestline	34	2	Total	9,676	45	Missing data 4/13 15:25 to 4/13 15:30
				4/11	449	15	
				4/13	9,227	30	
22.	S. Riverton @ Magnolia	38	None				Missing data 4/13 15:00 to 4/13 15:05
23.	S. Riverton @ Altamont	39	None				Missing data 4/8 09:20 to 4/8 09:40
24.	S. Riverton @ Regal	40	None				
25.	Rebecca @ Upriver	41	None				Missing data 4/13 14:20 to 4/13 14:25
26.	Riverton @ Surro	42	None				Missing data 4/9 13:00 to 4/15 14:45 Contractor needed equipment removed to install rungs in manhole.
	Monthly Total		10		170,427	640	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
04/01/09	0.02	0	0.01	0	0.02	0.02	0.02	0.02	0.04	0.06	0.01	0.09	1.4	0	0.11	1.5	1
04/02/09	0.28	0.37	0.17	0.22	0.22	0.27	0.26	0.35	0.49	0.5	0.38	0.25	2.4	4	0.25	2.7	3
04/03/09	0.12	0.12	0.15	0.03	0.05	0.04	0.02	0.08	0.08	0.21	0.05	0.52	0.1	0	0.1	0.1	0
04/04/09	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04/05/09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04/06/09	0	0	0	0	0	0	0	0	0	0	OP	0	0	0	0	0	0
04/07/09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04/08/09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04/09/09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04/10/09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04/11/09	0.05	0.11	0.04	0.06	0.09	0.06	0.06	0.08	0.2	0.09	0.08	0.07	0	0	0.03	0	0
04/12/09	0.26	0.26	0.15	0.2	0.26	0.23	0.26	0.24	0.5	0.43	0.25	0.27	0	0	0.29	0	0
04/13/09	0.04	0.12	0.02	0.02	0.18	0.12	0.06	0.16	0.34	0.13	0.05	0.06	T	T	T	T	0
04/14/09	0.01	0.06	0.01	0.31	0	0.03	0.22	0	0.06	0.06	0.04	T	T	0	0.03	0.8	0
04/15/09	0	0	0	0	0	0	0	0	0.06	0	0	0	0	0	0	0	0
04/16/09	OP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04/17/09	0	0	0	0	0	0	0.01	0	0	0	0	T	0	0	T	0	0
04/18/09	0	0	0	0	0	0	0	0.01	0	0	0	0	0	0	0	0	0
04/19/09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04/20/09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04/21/09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04/22/09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04/23/09	0	0	0	0	0	0	0	0	0	0	0	T	T	0	T	T	0
04/24/09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04/25/09	0	0	0	0	0	0	0	0	0	0	0	T	0	0	T	0	0
04/26/09	0.05	0	0.05	0.02	0	0	0.04	0	0	0.43	0.01	0.02	0	0	0.05	T	0
04/27/09	0	0	0	0	0	0	0	0.02	0	0.04	0	0.01	0	0	T	0	0
04/28/09	0.01	0	0	0	0	0	0	0	0	0	0	T	T	0	T	T	0
04/29/09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04/30/09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0.85	1.04	0.6	0.86	0.82	0.77	0.95	0.96	1.77	1.95	0.87	1.29	3.9		0.86	5.1	

- 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.