

**CITY OF SPOKANE,
WASHINGTON**

CSO FLOW MONITORING PROJECT

FLOW, FREQUENCY AND DURATION

SEWER MAINTENANCE

**Monthly Report
March 2009**

May 11, 2009
(Revised: May 15, 2009)
CSOMonthly2009-03a.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 3/9 08:30 to 3/9 08:35
2.	NW Blvd @ Kiernan	6	3	Total	201,457	395	Missing data 3/9 09:10 to 3/9 09:20
				3/1	144,634	235	
				3/22	42,320	100	
				3/31	14,503	60	
3.	Columbia @ Downriver	7	2	Total	28,812	100	Missing data 3/9 11:20 to 3/9 11:25
				3/2	15,022	45	
				3/22	13,790	55	
4.	Nettleton @ York/Buckeye	10	2	Total	10,712	255	Missing data 3/9 10:00 to 3/9 10:05
				3/2	3,126	160	
				3/22	7,586	95	
5.	Nora @ Pettet	12	4	Total	234,516	1,760	Missing data 3/9 10:20 to 3/9 10:25
				3/1	166,226	915	
				3/14	4,433	240	
				3/21	55,751	370	
				3/29	8,106	235	
6.	Sherwood @ Summit	14	5	Total	35,059	2,665	Missing data 3/9 10:30 to 3/9 10:35
				3/1	24,552	1,665	
				3/9	350	50	
				3/15	1,447	235	
				3/21	8,065	665	
				3/30	645	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
7.	Nettleton @ Ohio	15	1	Total	3,357	185	Missing data 3/9 10:40 to 3/9 10:45
				3/2	3,357	185	
8.	A @ Linton	16B	None				Missing data 3/9 14:40 to 3/9 14:45
9.	7 th @ Inland Empire	19	None				
10.	3500 High Drive	20	None				Missing data 3/2 08:40 to 3/2 08:45 Missing data 3/19 08:25 to 3/19 08:30
11.	Main @ Oak	22B	None				Missing data 3/9 14:15 to 3/9 14:20
12.	Cedar @ Ide	23	2	Total	119,453	355	Missing data 3/9 10:55 to 3/9 11:00
				3/1	111,872	230	
				3/21	7,581	125	
13.	Riverside @ Cedar	24A	3	Total	1,224,320	1,845	Missing data 3/9 15:05 to 3/9 15:10
				3/1	1,052,251	1,565	
				3/15	499	70	
				3/21	171,570	210	
14.	Riverside @ Cedar	24B	1	Total	302	35	
				3/3	302	35	
15.	Cedar @ Main	25	2	Total	115,840	125	
				3/1	115,604	105	
				3/21	236	20	
16.	Riverside @ Lincoln	26	3	Total	1,838,333	740	Missing data 3/9 13:25 to 3/9 13:30
				3/1	1,450,811	500	
				3/15	15,268	70	
				3/21	372,254	170	
17.	Arthur @ 5 th	33A	1	Total	2,065	60	Missing data 3/2 10:15 to 3/2 10:20
				3/2	2,065	60	
18.	Perry @ 3 rd	33B	1	Total	832,038	55	Missing data 3/2 10:40 to 3/2 10:45
				3/2	832,038	55	
19.	Arthur @ 3 rd	33C	1	Total	705	15	Missing data 3/2 10:45 to 3/2 10:50
				3/2	705	15	
20.	Arthur @ 1 st	33D	2	Total	26,383	230	
				3/1	25,120	160	
				3/21	1,263	70	

	Location	CSO#	Freq.	Date of Event ¹	Estimated ² Total Flow (Gallons)	Event Duration (Minutes)	Comments
21.	Riverside @ Napa/Crestline	34	4	Total	1,253,130	785	Missing data 3/2 14:15 to 3/2 14:25 Missing data 3/18 09:00 to 3/18 09:05
				3/1	721,872	450	
				3/15	2,525	65	
				3/21	522,035	205	
				3/30	6,698	65	
22.	S. Riverton @ Magnolia	38	1	Total	269	190	Missing data 3/2 14:05 to 3/2 14:10
				3/1	269	190	
23.	S. Riverton @ Altamont	39	None				
24.	S. Riverton @ Regal	40	None				Missing data 3/2 13:55 to 3/2 14:00 Missing data 3/18 08:45 to 3/18 08:50
25.	Rebecca @ Upriver	41	1	Total	6,975	230	Missing data 3/2 13:35 to 3/2 13:40 Missing data 3/17 15:10 to 3/17 15:15
				3/21	6,975	230	
26.	Riverton @ Surro	42	None				Missing data 3/17 14:55 to 3/17 15:00
	Monthly Total		39		5,933,726	10,025	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
03/01/09	0.29	0.28	0.14	0.25	0.2	0.24	0.26	0.29	0.45	0.26	0.3	0.29	T	T	0.3	T	T
03/02/09	0.26	0.3	0.16	0.28	0.25	0.24	0.29	0.27	0.49	0.58	0.36	0.36	T	0	0.26	0	T
03/03/09	0.25	0.26	0.09	0.25	0.2	0.22	0.29	0.3	0.28	0.46	0.29	0.34	0.3	0	0.38	0.5	T
03/04/09	0.15	0.11	0.04	0.07	0.09	0.06	0.06	0.1	0.14	0.17	0.12	0.05	0.6	1	0.05	0.3	1
03/05/09	0.04	0.12	0.04	0.03	0.07	0.05	0.14	0.05	0.14	0.09	0.09	0.03	0.4	0	0.08	1	0
03/06/09	0	0	0	0	0	0	0	0	0	0	0	T	T	0	T	T	0
03/07/09	0	0	0	0	0	0	0	0	0	0	0	T	0.2	T	T	0.1	0
03/08/09	0.01	0	0.01	0.01	0	0.02	0	0	0.08	0.01	0.04	0.01	0.6	T	0.02	0.6	0
03/09/09	0.05	0.02	0	0.01	0.12	0.13	0.24	0.02	0.3	0.3	0.01P	0.17	2.1	2	0.28	5.1	3
03/10/09	0.04	0.09	0	0	0	0	0	0	0	0	0	T	0.4	2	0.01	0.3	3
03/11/09	0.01	0.02	0.01	0.03	0	0	0	0.03	0	0	0.02	0	0	1	0	0	2
03/12/09	0.01	0	0	0.05	0	0	0	0.05	0	0	0.01	0	0	1	0	0	2
03/13/09	0	0	0.01	0	0	0	0	0.01	0	0	0.02	0	0	1	0	0	1
03/14/09	0.05	0.08	0.03	0.02	0.08	0.05	0.01	0.09	0.12	0.09	0.05	0.03	T	0	0.03	T	0
03/15/09	0.18	0.21	0.09	0.09	0.24	0.18	0.18	0.23	0.29	0.32	0.21	0.22	0.1	0	0.28	T	0
03/16/09	0.03	0.02	0	0.04	0.14	0.06	0.05	0.12	0.21	0.05	0.05	0.06	0.4	0	0.04	0.3	0
03/17/09	0.05	0.11	0.1	0.01	0.04	0.01	0	0.07	0.02	0.05	0.12	0.02	T	0	0.02	T	T
03/18/09	OP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03/19/09	0	0	0	0	0	0	0	0	0	0	0	T	0	0	T	0	0
03/20/09	0.03	0	0	0.02	0.01	0.01	0.01	0	0.02	0.05	0.05	0.04	0	0	T	0	0
03/21/09	0.1	0.26	0.12	0.13	0.24	0.19	0.12	0.22	0.49	0.28	0.19	0.12	0	0	0.03	0	0
03/22/09	0.32	0.36	0.13	0.27	0.25	0.2	0.44	0.19	0.7	0.56	0.44	0.25	0	0	0.44	0	0
03/23/09	0	0.01	0	0	0.01	0.01	0.01	0.01	0	0.02	0.02	0	0	0	0	0	0
03/24/09	0.1	0.17	0.06	0.03	0.08	0.05	0.07	0.11	0.2	0.15	0.13	0.11	0.1	0	0.08	0.1	0
03/25/09	0	0	0	0	0	0	0	0	0	0	0	T	T	0	T	T	0
03/26/09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03/27/09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03/28/09	0.08	0.17	0.07	0.11	0.11	0.09	0.09	0.14	0.22	0.17	0.16	0.1	0.1	0	0.13	0.2	T
03/29/09	0.13	0.27	0.11	0.1	0.1	0.13	0.18	0.13	0.22	0.23	0.2	0.12	3.9	T	0.21	5.3	0
03/30/09	0.02	0.03	0.02	0	0.03	0.02	0	0.03	0.08	0.01	0.03	0.01	0.1	0	T	T	0
03/31/09	0.1	0.03	0.01	0.04	0.04	0.01	0.03	0.02	0.09	0.02	0.02	0.1	0.2	0	0.08	0.1	T
Total	2.3	2.92	1.24	1.84	2.3	1.97	2.47	2.48	4.54	3.87	2.93	2.43	9.5		2.72	13.9	

- 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.