

**CITY OF SPOKANE,
WASHINGTON**

CSO FLOW MONITORING PROJECT

FLOW, FREQUENCY AND DURATION

SEWER MAINTENANCE

**Monthly Report
January 2009**

March 18, 2009
CSOMonthly2009-01.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 1/5 15:25 to 1/5 15:30
2.	NW Blvd @ Kiernan	6	2	Total	729,206	1,745	
				1/7	680,068	1,525	Includes snowmelt
				1/8	49,138	220	
3.	Columbia @ Downriver	7	None				Missing data 1/5 09:55 to 1/16 13:00 Missing data 1/22 08:20 to 1/22 09:40 Missing data 1/22 14:05 to 1/23 10:50 Missing data 1/26 08:55 to 1/26 09:00 Missing data due to construction of weir modification.
4.	Nettleton @ York/Buckeye	10	None				Missing data 1/5 15:35 to 1/5 15:40 Missing data 1/26 09:45 to 1/26 09:50
5.	Nora @ Pettet	12	1	Total	142,474	2,425	Missing data 1/5 15:40 to 1/5 15:45 Missing data 1/26 09:55 to 1/26 10:00
				1/7	142,474	2,425	Includes snowmelt
6.	Sherwood @ Summit	14	2	Total	43,642	2,865	Missing data 1/26 10:05 to 1/26 10:15
				1/6	39,127	2,595	Includes snowmelt
				1/8	4,515	270	
7.	Nettleton @ Ohio	15	None				Missing data 1/5 15:50 to 1/5 15:55 Missing data 1/26 10:20 to 1/26 10:25

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
8.	A @ Linton	16B	None				Missing data 1/5 12:55 to 1/5 13:05
9.	7 th @ Inland Empire	19	1	Total	1,148	1,845	Missing data 1/5 13:55 to 1/5 14:00 Missing data 1/19 08:55 to 1/19 09:00
				1/6	1,148	1,845	Includes snowmelt
10.	3500 High Drive	20	None				Missing data 1/5 05:00 to 1/5 14:15 Missing data 1/19 09:10 to 1/19 09:15
11.	Main @ Oak	22B	None				Missing data 1/5 14:00 to 1/5 14:10
12.	Cedar @ Ide	23	None				Missing data 1/5 16:00 to 1/5 16:05 Missing data 1/26 10:35 to 1/26 10:40
13.	Riverside @ Cedar	24A	1	Total	2,696,429	2,840	Missing data 1/5 12:50 to 1/5 12:55 Missing data 1/26 14:10 to 1/26 14:15
				1/7	2,696,429	2,840	Includes snowmelt
14.	Riverside @ Cedar	24B	None				Missing data 1/6 08:20 to 1/6 08:30
15.	Cedar @ Main	25	None				Missing data 1/6 08:30 to 1/6 08:50
16.	Riverside @ Lincoln	26	1	Total	5,386,549	2,360	Missing data 1/6 08:50 to 1/6 09:00
				1/7	5,386,549	2,360	Includes snowmelt
17.	Arthur @ 5 th	33A	1	Total	211	710	Missing data 1/5 15:15 to 1/5 15:20 Missing data 1/20 09:35 to 1/20 09:40
				1/7	211	710	Includes snowmelt
18.	Perry @ 3 rd	33B	None				
19.	Arthur @ 3 rd	33C	None				Missing data 1/5 15:05 to 1/5 15:10
20.	Arthur @ 1 st	33D	1	Total	349,792	2,760	Missing data 1/5 15:20 to 1/5 15:25
				1/7	349,792	2,760	Includes snowmelt
21.	Riverside @ Napa/Crestline	34	1	Total	8,465,920	2,310	Missing data 1/5 14:55 to 1/5 15:00
				1/7	8,465,920	2,310	Includes snowmelt
22.	S. Riverton @ Magnolia	38	None				Missing data 1/5 14:30 to 1/5 14:55 Missing data 1/19 14:20 to 1/19 14:25
23.	S. Riverton @ Altamont	39	None				
24.	S. Riverton @ Regal	40	None				Missing data 1/5 13:05 to 1/5 13:10
25.	Rebecca @ Upriver	41	None				Missing data 1/5 14:15 to 1/5 14:20 Missing data 1/19 14:40 to 1/19 14:45

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	Location	CSO#	Freq.	Date of Event ¹	Estimated ² Total Flow (Gallons)	Event Duration (Minutes)	Comments
26.	Riverton @ Surro	42	None				Missing data 1/5 13:15 to 1/5 13:20
	Monthly Total		11		17,815,371	19,860	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
01/01/09	0.07	0.25	0.08	0.02	0.19	0.13	0.19	X	0.28	0.34	0.19	0.17	2.8	19	0.19	2.4	21
01/02/09	0.04	0.08	0.03	0	0.37	0.39	0.37	X	0.69	0.51	0.08	0.34	4.1	19	0.4	5.2	24
01/03/09	0	0	0	0	0	0	0	X	0	0	0	0	0	21	0	0	24
01/04/09	0.02	0	0	0	0.07	0.07	0.11	X	0.11	0.14	0	0.09	1.5	21	0.13	1.7	23
01/05/09	0	0	0	0	0.16	0.15	0.65	X	0.26	0.33	OP	0.27	7.5	27	0.21	6	28
01/06/09	0.37	0.72	0.32	0.43	0.4	0.27	0.27	X	0.41	0.32	1.04	0.22	0.4	22	0.25	0.2	28
01/07/09	0	0	0.01	0	0	0	0	X	0	0	0	T	0	18	T	0	21
01/08/09	0.01	0	0	0	0	0	0	X	0	0	0	0.01	0	8	T	0	9
01/09/09	0	0	0	0	0	0	0	X	0	0	0	0	0	4	0	0	6
01/10/09	0.01	0.05	0	0.02	0.08	0.06	0.09	X	0.09	0.08	0.08	0.06	0.7	4	0.08	1	6
01/11/09	0.07	0.14	0.06	0.07	0.02	0.02	0.01	X	0.02	0.04	0.05	0.02	0.3	4	0.01	0.2	6
01/12/09	0.01	0	0	0	0	0	0	X	0	0	0.01	0	0	3	0.01	0	6
01/13/09	0.01	0	0.01	0	0	0	0	X	0	0	0	0	0	3	T	0	5
01/14/09	0	0	0	0	0	0	0	X	0	0	0	0	0	3	0	0	5
01/15/09	0	0	0	0	0	0	0	X	0	0	0	0	0	3	0	0	3
01/16/09	0.01	0	0	0	0	0	0	X	0	0	0	T	T	2	0	0	3
01/17/09	0	0	0	0.01	0	0	0	X	0	0	0	T	T	2	0	0	3
01/18/09	0	0	0	0	0	0	0	X	0	0	0	0	0	2	0	0	3
01/19/09	0	0	0	0	0	0	0	X	0	0	0	T	T	2	0	0	3
01/20/09	0	0	0	0	0	0	0	X	0	0	0	T	0.1	2	T	T	3
01/21/09	OP	0	0	0	0	0	0	X	0	0	0	T	T	2	T	T	3
01/22/09	0	0	0	0	0	0	0	X	0.03	0	0	0.01	0.2	2	T	T	3
01/23/09	0	0	0	0	0	0	0	X	0	0	0	0	0	2	0	0	3
01/24/09	0	0	0	0	0	0	0	X	0	0	0	0	0	2	0	0	3
01/25/09	0	0	0	0	0	0	0	X	0	0	0	0	0	2	T	T	3
01/26/09	0.01	0	0	0	0	0	0	X	0	0	OP	T	T	2	T	T	3
01/27/09	0	0	0	0	0	0	0	X	0	0	0	T	T	2	T	T	3
01/28/09	0	0	0	0	0	0	0	X	0	0	0	0	0	2	0	0	3
01/29/09	0	0	0	0	0	0	0	X	0	0	0	0	0	2	0	0	3
01/30/09	0.01	0	0	0	0	0	0	X	0	0	0	0	0	2	0	0	3
01/31/09	0	0	0	0	0	0	0	X	0	0	0	0	0	2	0	0	3
Total	0.64	1.24	0.51	0.55	1.29	1.09	1.69	0	1.89	1.76	1.45	1.19	17.6		1.28	16.7	

- 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.