

**CITY OF SPOKANE,
WASHINGTON**

CSO FLOW MONITORING PROJECT

FLOW, FREQUENCY AND DURATION

SEWER MAINTENANCE

**Monthly Report
December 2009**

February 2, 2010
CSOMonthly2009-12.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 12/14 07:50 to 12/14 07:55 Missing data 12/21 09:15 to 12/21 09:20
2.	NW Blvd @ Kiernan	6	2	Total	830,953	1,565	Missing data 12/14 08:10 to 12/14 08:15
				12/16	559,586	1,170	
				12/20	271,367	395	
3.	Columbia @ Downriver	7	2	Total	45,328	260	Missing data 12/14 07:55 to 12/14 08:00 Missing data 12/28 08:15 to 12/28 08:20
				12/16	16,272	150	
				12/21	29,056	110	
4.	Nettleton @ York/Buckeye	10	2	Total	13,896	555	Missing data 12/14 08:15 to 12/14 08:25 Missing data 12/21 09:50 to 12/21 09:55
				12/16	2,881	295	
				12/20	11,015	260	
5.	Nora @ Pettet	12	2	Total	1,638,386	1,775	Missing data 12/14 08:25 to 12/14 08:30 Missing data 12/21 09:55 to 12/21 10:00 Missing data 12/24 11:45 to 12/24 13:10 Missing data 12/28 13:45 to 12/28 15:20
				12/16	767,129	1,135	
				12/19	871,257	640	
6.	Sherwood @ Summit	14	1	Total	1,320	30	Missing data 12/11 09:20 to 12/11 09:40 Missing data 12/21 13:35 to 12/21 13:40
				12/21	1,320	30	

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	432,682	620	Missing data 12/22 14:00 to 12/22 15:40
				12/16	124,917	385	
				12/21	307,765	235	
8.	A @ Linton	16B	None				Missing data 12/14 10:00 to 12/14 10:05
9.	7 th @ Inland Empire	19	None				Missing data 12/7 09:15 to 12/7 09:20 Missing data 12/21 08:05 to 12/21 08:10
10.	3500 High Drive	20	None				Missing data 12/7 09:20 to 12/7 09:25 Missing data 12/21 08:10 to 12/21 08:15
11.	Main @ Oak	22B	None				Missing data 12/14 09:45 to 12/14 10:00
12.	Cedar @ Ide	23	2	Total	348,905	640	Missing data 12/14 09:10 to 12/14 09:15
				12/16	129,732	310	
				12/20	219,173	330	
13.	Riverside @ Cedar	24A	2	Total	3,703,946	2,090	Missing data 12/14 10:40 to 12/14 10:50 Missing data 12/21 14:15 to 12/21 14:20
				12/16	1,535,615	1,250	
				12/19	2,168,331	840	
14.	Riverside @ Cedar	24B	1	Total	266	20	Missing data 12/14 10:35 to 12/14 10:40
				12/21	266	20	
15.	Cedar @ Main	25	3	Total	148,077	15,710	Missing data 12/14 09:40 to 12/14 09:45 Missing data 12/21 14:15 to 12/21 14:20
				12/1	23,224	14,740	Dry Weather Overflow; DOE letter sent 12/22.
				12/14	6,651	795	
				12/20	118,202	175	
16.	Riverside @ Lincoln	26	2	Total	3,807,756	1,560	Missing data 12/14 09:15 to 12/14 09:25
				12/16	1,253,227	940	
				12/20	2,554,529	620	
17.	Arthur @ 5 th	33A	1	Total	7,092	180	Missing data 12/7 10:55 to 12/7 11:00 Missing data 12/21 09:05 to 12/21 09:10
				12/20	7,092	180	
18.	Perry @ 3 rd	33B	1	Total	1,819,196	125	Missing data 12/7 10:45 to 12/7 10:50
				12/21	1,819,196	125	
19.	Arthur @ 3 rd	33C	1	Total	3,606	115	Missing data 12/7 10:50 to 12/7 10:55 Missing data 12/21 09:00 to 12/21 09:05
				12/20	3,606	115	

	Location	CSO#	Freq.	Date of Event ¹	Estimated ² Total Flow (Gallons)	Event Duration (Minutes)	Comments
20.	Arthur @ 1 st	33D	2	Total	91,359	575	Missing data 12/7 11:00 to 12/7 11:05 Missing data 12/21 09:10 to 12/21 09:15
				12/16	8,435	145	
				12/18	82,924	430	
21.	Riverside @ Napa/Crestline	34	2	Total	3,212,001	360	Missing data 12/7 10:35 to 12/7 10:40
				12/16	848,541	180	
				12/20	2,363,460	180	
22.	S. Riverton @ Magnolia	38	2	Total	2,998	825	
				12/16	2,656	550	
				12/21	342	275	
23.	S. Riverton @ Altamont	39	2	Total	37,709	1,340	Missing data 12/30 12:35 to 12/30 15:25
				12/15	37,360	1,310	
				12/21	349	30	
24.	S. Riverton @ Regal	40	2	Total	2,998	200	Missing data 12/7 09:50 to 12/7 09:55 Missing data 12/21 08:30 to 12/21 08:35
				12/16	2,827	140	
				12/21	171	60	
25.	Rebecca @ Upriver	41	2	Total	94,005	420	Missing data 12/7 09:35 to 12/7 09:40 Missing data 12/21 08:20 to 12/21 08:25
				12/16	76,523	260	
				12/19	17,482	160	
26.	Riverton @ Surro	42	None				Missing data 12/21 08:15 to 12/21 08:20
	Monthly Total		36		16,242,479	29,965	1 Dry Weather Overflow

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
12/01/09	0.01	0	0	0	0	0	0	0	0	0	X	T	T	0	0	0	0
12/02/09	0	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0
12/03/09	0	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0
12/04/09	0	0	0	0	0	0	0	0	0	0	X	T	T	0	T	T	T
12/05/09	0	0	0	0	0	0	0	0	0	0	X	T	T	0	T	T	T
12/06/09	0	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0
12/07/09	OP	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0
12/08/09	0	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0
12/09/09	0	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0
12/10/09	0	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0
12/11/09	0	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0
12/12/09	0	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0
12/13/09	0	0	0	0	0	0	0	0	0	0	X	T	T	0	T	T	0
12/14/09	0	0	0	0	0.02	0.05	0.07	0	0.05	0.1	X	0.05	0.8	0	0.08	0.9	0
12/15/09	0.4	0.44	0.32	0.26	0.45	0.59	0.56	0.55	0.86	1.16	X	0.61	3.3	3	0.6	3.2	3
12/16/09	0.23	0.53	0.16	0.4	0.19	0.13	0.18	0.41	0.25	0.28	X	0.15	0	2	0.15	0	3
12/17/09	0	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	T
12/18/09	0.01	0	0	0	0	0	0	0	0	0	X	T	0	0	T	0	0
12/19/09	0.16	0.28	0.12	0.2	0.19	0.15	0.16	0.25	0.3	0.31	X	0.17	0	0	0.18	0	0
12/20/09	0.2	0.34	0.15	0.22	0.37	0.26	0.22	0.39	0.49	0.49	X	0.24	0	0	0.24	0	0
12/21/09	0.47	0.72	0.3	0.46	0.81	0.58	0.48	0.75	1.1	1.08	X	0.52	T	0	0.53	0	0
12/22/09	0	0	0	0	0	0	0	0	0	0	X	T	T	0	0	0	0
12/23/09	0	0	0	0	0	OE	0	0	0	0	X	0	0	0	0	0	0
12/24/09	0	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0
12/25/09	0	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0
12/26/09	0	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0
12/27/09	0	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0
12/28/09	0	0	0	0	0	0	0	0	0	0	X	0	0	0	T	T	0
12/29/09	0.01	0	0	0	0	0	0	0	0	0	X	0.01	0.4	0	0.01	0.1	0
12/30/09	0	0	0	0	0	0	0	0	0	0	X	0.02	0.3	T	T	0.2	T
12/31/09	0.02	0.01	0.01	0.01	0.08	0.08	0.1	0.13	0.1	0.16	X	0.11	1.9	1	0.12	1.8	T
Total	1.51	2.32	1.06	1.55	2.11	1.84	1.77	2.48	3.15	3.58	0	1.88	6.7		1.91	6.2	

- 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.