

CITY OF SPOKANE, WASHINGTON

CSO FLOW MONITORING PROJECT

FLOW, FREQUENCY AND DURATION

SEWER MAINTENANCE

**Monthly Report
January 2010**

March 15, 2010
(Revised June 15, 2011)
CSOMonthly2010-01c.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	3	Total	995,966	995	Missing data 1/8 10:25 to 1/8 10:50
				1/1	295,453	350	
				1/4	432,933	450	
				1/12	267,580	195	
3.	Columbia @ Downriver	7	2	Total	20,355	135	Missing data 1/8 12:50 to 1/8 14:55
				1/1	16,626	110	
				1/12	3,729	25	
4.	Nettleton @ York/Buckeye	10	3	Total	8,668	590	
				1/1	4,187	165	
				1/4	2,817	340	
				1/12	1,664	85	
5.	Nora @ Pettet	12	4	Total	1,164,443	1,365	Missing data 1/8 15:05 to 1/8 15:25
				1/1	279,523	315	
				1/4	549,430	665	
				1/12	261,684	195	
				1/16	73,806	190	
6.	Sherwood @ Summit	14	None				Missing data 1/8 09:30 to 1/8 10:00
7.	Nettleton @ Ohio	15	None				
8.	A @ Linton	16B	None				

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
9.	7 th @ Inland Empire	19	None				
10.	3500 High Drive	20	None				Missing data 1/4 09:10 to 1/4 09:15
11.	Main @ Oak	22B	None				
12.	Cedar @ Ide	23	3	Total	136,055	480	Missing data 1/4 11:15 to 1/4 11:20
				1/1	21,429	75	
				1/4	79,816	310	
				1/12	34,810	95	
13.	Riverside @ Cedar	24A	4	Total	2,293,489	1,565	Missing data 1/4 08:35 to 1/4 08:40 Missing data 1/6 10:10 to 1/6 11:15
				1/1	577,830	315	
				1/4	1,485,965	815	
				1/12	214,431	245	
				1/16	15,263	190	
14.	Riverside @ Cedar	24B	None				Missing data 1/4 08:25 to 1/4 08:30
15.	Cedar @ Main	25	1	Total	737	20	Missing data 1/29 14:35 to 1/29 14:50
				1/4	737	20	
16.	Riverside @ Lincoln	26	4	Total	2,070,798	795	
				1/1	260,406	125	
				1/4	1,341,894	470	
				1/12	466,619	175	
				1/16	1,879	25	
17.	Arthur @ 5 th	33A	2	Total	863	80	Missing data 1/4 10:35 to 1/4 10:40
				1/1	713	50	
				1/12	150	30	
18.	Perry @ 3 rd	33B	3	Total	703,137	90	
				1/1	134,983	25	
				1/4	48,425	15	
				1/12	519,729	50	
19.	Arthur @ 3 rd	33C	None				Missing data 1/4 10:30 to 1/4 10:35
20.	Arthur @ 1 st	33D	3	Total	12,551	260	Missing data 1/4 10:40 to 1/4 10:45
				1/1	1,125	25	
				1/4	5,948	170	
				1/12	5,478	65	

	Location	CSO#	Freq.	Date of Event ¹	Estimated ² Total Flow (Gallons)	Event Duration (Minutes)	Comments
21.	Riverside @ Napa/Crestline	34	3	Total	1,583,044	575	Missing data 1/4 09:50 to 1/4 09:55
				1/1	54,368	135	
				1/4	1,254,697	335	
				1/12	273,979	105	
22.	S. Riverton @ Magnolia	38	3	Total	471	610	
				1/1	131	150	
				1/4	194	330	
				1/12	146	130	
23.	S. Riverton @ Altamont	39	3	Total	9,813	785	
				1/1	2,338	210	
				1/4	6,314	330	
				1/12	1,161	245	
24.	S. Riverton @ Regal	40	1	Total	358	35	Missing data 1/4 09:20 to 1/4 09:30
				1/1	358	35	
25.	Rebecca @ Upriver	41	3	Total	15,288	520	Missing data 1/4 08:55 to 1/4 09:00
				1/1	2,473	75	
				1/3	10,135	320	
				1/10	2,680	125	
26.	Riverton @ Surro	42	None				Missing data 1/4 09:15 to 1/4 09:20
	Monthly Total		45		9,014,284	8,505	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
01/01/10	0.24	0.35	0.08	0.24	0.18	0.16	0.17	0.22	0.34	0.29	X	0.16	0	1	0.15	T	1
01/02/10	0	0	0	0	0	0	0	0	0	0	X	T	0	0	T	0	0
01/03/10	0.01	0	0	0.01	0	0	0	0	0	0	X	0	0	0	0	0	0
01/04/10	0.4	0.5	0.23	0.51	0.38	0.41	0.49	0.5	0.81	0.75	X	0.44	0.1	0	0.51	0.8	1
01/05/10	0.2	0.24	0.1	0.15	0.2	0.15	0.12	0.22	0.36	0.27	X	0.17	0.2	T	0.09	0.2	1
01/06/10	0	0	0	0	0	0	0	0	0	0	X	0	0	T	0	0	1
01/07/10	0	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	T
01/08/10	0	0	0	0	0	0	0	0	0	0	X	0	0	T	T	T	T
01/09/10	0	0	0	0	0	0	0	0	0	0	X	0.03	0.2	T	0.03	0.3	T
01/10/10	0.04	0.07	0.02	0.03	0	0	0	0.03	0	0	X	T	0	T	T	0	T
01/11/10	0.01	0	0.01	0.01	0	0	0.01	0.01	0	0	X	0.01	T	0	T	0	T
01/12/10	0.13	0.16	0.09	0.13	0.2	0.12	0.13	0.17	0.25	0.23	X	0.11	0	0	0.14	0	T
01/13/10	0.13	0.14	0.07	0.14	0.14	0.11	0.12	0.14	0.24	0.23	X	0.14	0	0	0.18	0	0
01/14/10	0	0.02	0	0	0	0	0	0	0	0	X	T	0	0	T	0	0
01/15/10	0.03	0.07	0.03	0.02	0.05	0.01	0.02	0.03	0.05	0.04	X	0.01	0	0	0.05	0	0
01/16/10	0.18	0.37	0.14	0.22	0.26	0.22	0.15	0.3	0.49	0.4	X	0.19	0	0	0.09	0	0
01/17/10	0.14	0.1	0.05	0.12	0.08	0.07	0.11	0.12	0.16	0.17	X	0.11	T	0	0.17	0	0
01/18/10	0	0	0.01	0	0	0	0	0	0	0	X	T	0	0	0.01	0	0
01/19/10	0.03	0.03	0.01	0.03	0.01	0.01	0.02	0.03	0.04	0.02	X	0.02	T	0	0.03	0	0
01/20/10	0	0	0	0	0	0	0	0	0	0	X	T	T	0	T	0	0
01/21/10	0	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0
01/22/10	0	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0
01/23/10	0	0	0	0	0	0	0	0	0	0	X	T	T	0	T	T	0
01/24/10	0	0	0.01	0.01	0.01	0.01	0.01	0	0.02	0.01	X	T	T	0	T	T	0
01/25/10	0.13	0.15	0.07	0.11	0.07	0.12	0.12	0.15	0.16	0.19	X	0.14	0.9	0	0.13	1.4	T
01/26/10	0.01	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0
01/27/10	0	0	0.01	0	0	0	0	0	0	0	X	0	0	0	0	0	0
01/28/10	0.01	0	0	0.01	0	0	0	0	0	0	X	0	0	0	0	0	0
01/29/10	0	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0
01/30/10	0	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0
01/31/10	0.02	0.08	0.03	0.05	0.03	0.02	0.02	0.07	0.04	0.05	X	0.01	T	T	T	T	0
Total	1.71	2.28	0.96	1.79	1.61	1.41	1.49	1.99	2.96	2.65	0	0.00	0.0		0.00	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.