

CITY OF SPOKANE, WASHINGTON

CSO FLOW MONITORING PROJECT

FLOW, FREQUENCY AND DURATION

SEWER MAINTENANCE

**Monthly Report
September 2010**

November 17, 2010
(Revised June 15, 2011)
CSOMonthly2010-09

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 Total Flow (Gallons) ²	Duration Event (Minutes)	Comments
1	AL Parkway Storage (West)	2	None				
2	NW Blvd @ Kiernan	6	1	Total	635,702	115	Missing Data 09/03 09:25 to 09/03 09:55 Missing Data 09/05 01:00 to 09/05 01:05 Missing Data 09/07 15:00 to 09/07 15:05 Missing Data 09/10 06:00 to 09/10 06:05 Missing Data 09/12 20:00 to 09/12 20:05 Missing Data 09/15 11:00 to 09/15 11:05 Missing Data 09/20 16:00 to 09/20 16:05 Missing Data 09/23 07:00 to 09/23 07:05 Missing Data 09/25 22:00 to 09/25 22:05 Missing Data 09/28 13:00 to 09/28 13:05 Missing Data 09/29 09:55 to 09/29 10:15
				09/19	635,702	115	
3	Columbia @ Downriver	7	1	Total	85,603	45	
				09/19	85,603	45	
4	Nettleton @ York/Buckeye	10	None				Missing Data 09/13 13:55 to 09/13 14:00 Missing Data 09/26 03:00 to 09/27 10:20
5	Nora @ Pettet	12	2	Total	829,585	130	
				09/09	99,585	35	
				09/19	730,000	95	Partially estimated based on flow modeling due to monitoring equipment malfunction.
6	Sherwood @ Summit	14	1	Total	32,443	40	
				09/19	32,443	40	
7	Nettleton @ Ohio	15	1	Total	2,540	15	
				09/19	2,540	15	
8	A @ Linton	16B	None				
9	7th @ Inland Empire	19	None				Missing Data 09/13 05:35 to 09/13 09:45
10	3500 High Drive	20	None				Missing Data 09/13 06:05 to 09/13 10:15

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 Total Flow (Gallons) ²	Duration Event (Minutes)	Comments
11	Main @ Oak	22B	None				Missing Data 09/13 06:35 to 09/13 09:20
12	Cedar @ Ide	23	2	Total	170,472	140	
				09/09	33,460	40	
				09/19	137,012	100	
13	Riverside @ Cedar	24A	2	Total	300,025	165	Missing Data 09/13 07:35 to 09/13 09:30
				09/09	312	5	
				09/19	299,713	160	
14	Riverside @ Cedar	24B	1	Total	923	225	Missing Data 09/13 08:05 to 09/13 09:25
				09/19	923	225	
15	Cedar @ Main	25	2	Total	67,171	100	
				09/09	25,214	25	
				09/19	41,957	75	
16	Riverside @ Lincoln	26	2	Total	1,130,671	140	Missing Data 09/13 13:25 to 09/13 13:30
				09/09	159,905	30	
				09/19	970,766	110	
17	Arthur @ 5th	33A	1	Total	2,283	40	Missing Data 09/13 13:35 to 09/13 13:40
				09/19	2,283	40	
18	Perry @ 3rd	33B	1	Total	611,066	40	
				09/19	611,066	40	
19	Arthur @ 3rd	33C	2	Total	1,363	180	
				09/09	264	160	
				09/19	1,099	20	
20	Arthur @ 1st	33D	2	Total	47,991	215	Missing Data 09/13 13:40 to 09/13 13:45
				09/09	14,059	55	
				09/19	33,932	160	
21	Riverside @ Napa/Crestline	34	1	Total	835,652	105	Missing Data 09/13 13:20 to 09/13 13:25 Missing Data 09/14 14:15 to 09/04 14:25 Missing Data 09/15 13:55 to 09/15 14:40 Missing Data 09/16 09:50 to 09/16 10:55 Missing Data 09/16 11:35 to 09/16 13:00
				09/19	835,652	105	
22	S. Riverton @ Magnolia	38	1	Total	16,592	80	Missing Data 09/13 13:05 to 09/13 13:10
				09/19	16,592	80	
23	S. Riverton @ Altamont	39	2	Total	65,225	650	Missing Data 09/03 13:15 to 09/03 13:20
				09/19	52,099	350	
				09/24	13,126	300	
24	S. Riverton @ Regal	40	2	Total	22,468	50	Missing Data 09/22 10:40 to 09/22 10:45 Missing Data 09/24 13:10 to 09/28 13:10
				09/02	100	5	
				09/19	22,368	45	
25	Rebecca @ Upriver	41	1	Total	60,715	80	Missing Data 09/12 13:35 to 09/13 09:40
				09/19	60,715	80	
26	Riverton @ Surro	42	None				Missing Data 09/13/11:10 to 09/13 11:15
	Monthly Total		28		4,932,637	2,555	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
09/01/10	0.03	OM	0	0	0	0	0	0	0	0	0.01	0	0	0	T	0	0
09/02/10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09/03/10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09/04/10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09/05/10	0	0	0	0	0	0	0	0	0	0	0	T	0	0	0.02	0	0
09/06/10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	T	0	0
09/07/10	0	0.02	0.02	0	0.01	0.01	0	0.02	0	0	0	0.01	0	0	T	0	0
09/08/10	0	0	0	0	0	0	0	0	0	0	0	T	0	0	0.01	0	0
09/09/10	0.02	0.05	0.04	0.01	0.12	0.18	0.03	0.07	0.01	0.07	0.17	0.06	0	0	0.11	0	0
09/10/10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09/11/10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09/12/10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09/13/10	0	0	0	0	0	0	0	0	0	0	OM	0	0	0	0	0	0
09/14/10	0	0	0	0	0	0	0	0	0	0	OM	0.02	0	0	0	0	0
09/15/10	0	0	0	0	0	0	0	0	0	0	OM	T	0	0	T	0	0
09/16/10	0.05	0.05	0.06	0.02	0.06	0.04	0.04	0.05	0.04	0.03	OM	0.06	0	0	0.06	0	0
09/17/10	0.03	0.05	0.06	0.02	0	0.02	0.02	0.01	0.03	0.01	OM	T	0	0	0.03	0	0
09/18/10	0.02	0.06	0.03	0.06	0.06	0.05	0.04	0.05	0.06	0.04	OM	0.05	0	0	0.1	0	0
09/19/10	0.32	0.4	0.42	0.52	0.51	0.44	0.84	0.43	0.69	0.56	OM	0.49	0	0	0.46	0	0
09/20/10	0	0	0	0	0	0	0	0	0	0	OM	T	0	0	0.01	0	0
09/21/10	0	0	0.02	0	0	0	0	0	0	0	OM	T	0	0	T	0	0
09/22/10	0	0	0	0	0	0	0	0	0	0	OM	0	0	0	0	0	0
09/23/10	0.01	0.01	0	0	0.01	0	0	0	0.01	0	OM	T	0	0	0.01	0	0
09/24/10	0	0	0	0	0	0	0	0	0	0	OM	0	0	0	0	0	0
09/25/10	0	0	0	0	0	0	0	0	0	0	OM	0	0	0	0	0	0
09/26/10	0	0	0	0	0	0	0	0	0	0	OM	0	0	0	0	0	0
09/27/10	0	0	0	0	0	0	0	0	0	0	OM	0	0	0	0	0	0
09/28/10	0	0	0	0	0	0	0	0	0	0	OM	0	0	0	0	0	0
09/29/10	0	0	0	0	0	0	0	0	0	0	OM	0	0	0	0	0	0
09/30/10	0	0	0	0	0	0	0	0	0	0	OM	0	0	0	0	0	0
Total	0.48	0.64	0.65	0.63	0.77	0.74	0.97	0.63	0.84	0.71	0.18M	0.69	0.0		0.81	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.