CITY OF SPOKANE, WASHINGTON

CSO FLOW MONITORING PROJECT

FLOW, FREQUENCY AND DURATION

SEWER MAINTENANCE

Monthly Report
December 2008

February 9, 2009
CSOMonthly2008-12.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 12/1 14:55 to 12/1 15:00
2.	NW Blvd @ Kiernan	6	1	Total	18,107	60	
				12/2	18,107	60	
3.	Columbia @ Downriver	7	None				
4.	Nettleton @ York/Buckeye	10	1	Total	112	25	Missing data 12/1 09:15 to 12/1 09:20
				12/1	112	25	
5.	Nora @ Pettet	12	2	Total	42,514	350	Missing data 12/1 10:00 to 12/1 10:05
				12/1	39,432	95	
				12/12	3,082	255	
6.	Sherwood @ Summit	14	2	Total	1,792	170	Missing data 12/1 10:20 to 12/1 10:25
				12/1	1,559	95	
				12/12	233	75	
7.	Nettleton @ Ohio	15	1	Total	888	30	Missing 12/1 10:30 to 12/1 10:35
				12/1	888	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
8.	A @ Linton	16B	None				
9.	7th @ Inland Empire	19	None				Missing data 12/8 13:30 to 12/8 13:35
10.	3500 High Drive	20	None				Missing data 12/8 13:45 to 12/8 13:50
11.	Main @ Oak	22B	None				Missing data 12/1 14:10 to 12/1 14:15
12.	Cedar @ Ide	23	1	Total	24,222	65	
				12/2	24,222	65	
13.	Riverside @ Cedar	24A	1	Total	37,841	55	
				12/2	37,841	55	
14.	Riverside @ Cedar	24B	None				Missing data 12/1 12:20 to 12/1 12:25
15.	Cedar @ Main	25	1	Total	128	10	
				12/12	128	10	
16.	Riverside @ Lincoln	26	1	Total	208,889	60	
				12/2	208,889	60	
17.	Arthur @ 5th	33A	None				Missing data 12/9 13:55 to 12/9 14:00
18.	Perry @ 3rd	33B	None				
19.	Arthur @ 3rd	33C	None				
20.	Arthur @ 1st	33D	1	Total	12,062	55	Missing data 12/9 14:10 to 12/9 14:15
				12/2	12,062	55	
21.	Riverside @ Napa/Crestline	34	1	Total	174	20	Missing data 12/9 13:35 to 12/9 13:40
				12/2	174	20	
22.	S. Riverton @ Magnolia	38	None				Missing data 12/8 15:20 to 12/8 15:25 Missing data 12/10 10:50 to 12/10 11:20
23.	S. Riverton @ Altamont	39	None				Missing data 12/8 15:15 to 12/8 15:20 Missing data 12/11 10:55 to 12/11 12:10
24.	S. Riverton @ Regal	40	1	Total	2,252	125	Missing data 12/8 15:10 to 12/8 15:15
				12/15	2,252	125	Dry Weather Overflow; DOE letter sent 12/24/08.
25.	Rebecca @ Upriver	41	None				

	Location	CSO#	Freq.	Date of Event[1]	Estimated[2] Total Flow (Gallons)	Event Duration (Minutes)	Comments
26.	Riverton @ Surro	42	1	Total	17,567	110	Missing data 12/3 07:40 to 12/3 07:45 Missing data 12/3 08:20 to 12/3 09:15 Missing data 12/4 14:55 to 12/12 16:25 Construction of CSO control facility resulted in 12/4 – 12/12 data loss.
				12/4	17,567	110	
	Monthly Total		**15**		**366,548**	**1,135**	**1 Dry Weather Overflow**

Table 2 – Rainfall Summary[3]

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	GEG Snow	GEG Dpth	NWS Rain	NWS Snow	NWS Dpth
12/01/08	0.03	0.03	0.01	0.02	0.03	0.01	0.01	0.02	0.03	0.04	0.03P	0.05	0	0	0.03	0	0
12/02/08	0.12	0.17	0.07	0.14	0.14	0.15	0.13	0.17	0.28	0.2	0.16	0.14	0	0	0.15	0	0
12/03/08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/04/08	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/05/08	0.02	0.03	0.02	0.04	0.01	0.01	0.03	0.04	0.02	0.01	0.05	0.07	T	0	0.04	T	0
12/06/08	0.07	0.05	0.03	0.04	0.03	0.02	0.03	0.04	0.05	0.06	0.05	0.03	T	0	0.02	T	0
12/07/08	0	0.04	0.01	0.02	0.03	0.02	0.01	0.04	0.04	0.04	0.03	T	0	0	0.04	T	0
12/08/08	0.01	0.01	0	0	0	0	0	0	0	0	0	T	0	0	T	0	0
12/09/08	0.01	0	0	0.01	0	0	0.01	0.01	0	0	0.01	0.01	T	0	0.01	T	0
12/10/08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/11/08	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/12/08	0.15	0.36	0.02	0.21	0.32	0.27	0.28	0.37	0.36	0.5	0.31	0.23	2.7	3	0.23	2.4	2
12/13/08	0	0	0.01	0	0.02	0.03	0.02	0	0.02	0.07	0	0.04	0.6	2	0.01	0.4	2
12/14/08	0	0	0	0	0	0	0	0	0	0	0	T	T	2	T	T	2
12/15/08	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0
12/16/08	0P	0	0	0	0	0	0	0P	0	0	0	0	0	2	0	0	1
12/17/08	0P	0	0	0	0.67	0.78	0.71	X	1.22	1.41	0	0.74	12.5	2	0.66	12.1	1
12/18/08	0	0	0	0	0.87	0.68	0.52	X	1.35	1.31	0	0.61	11.1	16	0.31	7.3	19
12/19/08	0.02	0	0	0	0.02	0	0.02	X	0.02	0.01	0	0.06	1.4	17	0.03	1	19
12/20/08	0	0	0	0	0	0	0	X	0	0	0	T	0.2	15	T	T	18
12/21/08	0	0	0	0	0.19	0.24	0.25	X	0.41	0.43	0	0.24	5.1	16	0.18	4.7	15
12/22/08	0	0	0	0	0.22	0.15	0.22	X	0.39	0.32	0	0.27	3.8	18	0.12	2.2	20
12/23/08	0	0	0	0	0	0	0	X	0	0	0	T	1.6	18	T	1.1	19
12/24/08	0	0	0	0	0.24	0.27	0.34	X	0.29	0.57	0	0.29	6.1	18	0.42	7.6	24
12/25/08	0	0	0	0	0.05	0.02	0.04	X	0.1	0.05	0	0.03	1.2	20	0.04	1.2	22
12/26/08	0	0	0	0	0.11	0.1	0.12	X	0.2	0.14	0	0.09	1.4	18	0.14	1.5	21
12/27/08	0.48	0.82	0.44	0.54	0.33	0.28	0.29	X	0.38	0.66	0.44	0.22	3.7	21	0.29	4.3	19
12/28/08	0.13	0.17	0.22	0.2	0.13	0.1	0.16	X	0.24	0.2	0.52	0.13	T	17	0.16	0	15
12/29/08	0.02	0.03	0	0.05	0.7	0.66	0.67	X	1.4	1.19	0	0.59	8.3	21	0.65	11	15
12/30/08	0.1	0.11	0	0.03	0	0.01	0.01	X	0	0	0.02	0.02	0.3	21	0.01	0.1	22
12/31/08	0.01	0.21	0.14	0.01	0.03	0.03	0.04	X	0.02	0.11	0.49	0.08	1.5	23	0.06	1	22
Total	**1.19**	**2.03**	**0.97**	**1.58**	**4.14**	**3.83**	**3.91**	**0.69**	**6.82**	**7.32**	**2.11**	**3.94**	**61.5**		**3.60**	**57.9**	

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	23rd & 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.**