

# Memo



**Date:** September 3, 2015  
**To:** Kevin Stewart  
**From:** Markus Ritsch  
**Subject:** August 2015 ALERT Data Analysis

## I. ALERT Data Source

Raw ALERT data records extracted from the Urban Drainage and Flood Control District's NovaStar 5 base station were analyzed for the period August 1 through August 31, 2015.

## II. General System Analysis Summary

In 2015 data will be received at the District through both the legacy ALERT channel and through the ALERT2 (concentrator plus A2 self-reports) channel. The following (Table 1) quantifies the data reports received by each channel.

**Table 1. Reception of Data at Diamond Hill (Legacy, ALERT2 and Concentrator Reports)**

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Legacy	216,461	241,285	268,551	282,306	345,191	348,979	284,647	269,298				
Concentrator	366,229	405,210	443,612	458,979	499,841	511,002	449,469	438,917				
ALERT2	172,927	233,617	286,836	295,399	319,764	302,746	320,675	376,339				
<b>TOTAL</b>	<b>755,617</b>	<b>880,112</b>	<b>998,999</b>	<b>1,036,684</b>	<b>1,164,796</b>	<b>1,162,727</b>	<b>1,054,791</b>	<b>1,084,554</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
Conc+A2	539,156	638,827	730,448	754,378	819,605	813,748	770,144	815,256				
Conc/Leg	1.69	1.68	1.65	1.63	1.45	1.46	1.58	1.63				
DataChron	529,216	564,798	652,811	702,865	777,203	772,052	742,221	755,645				

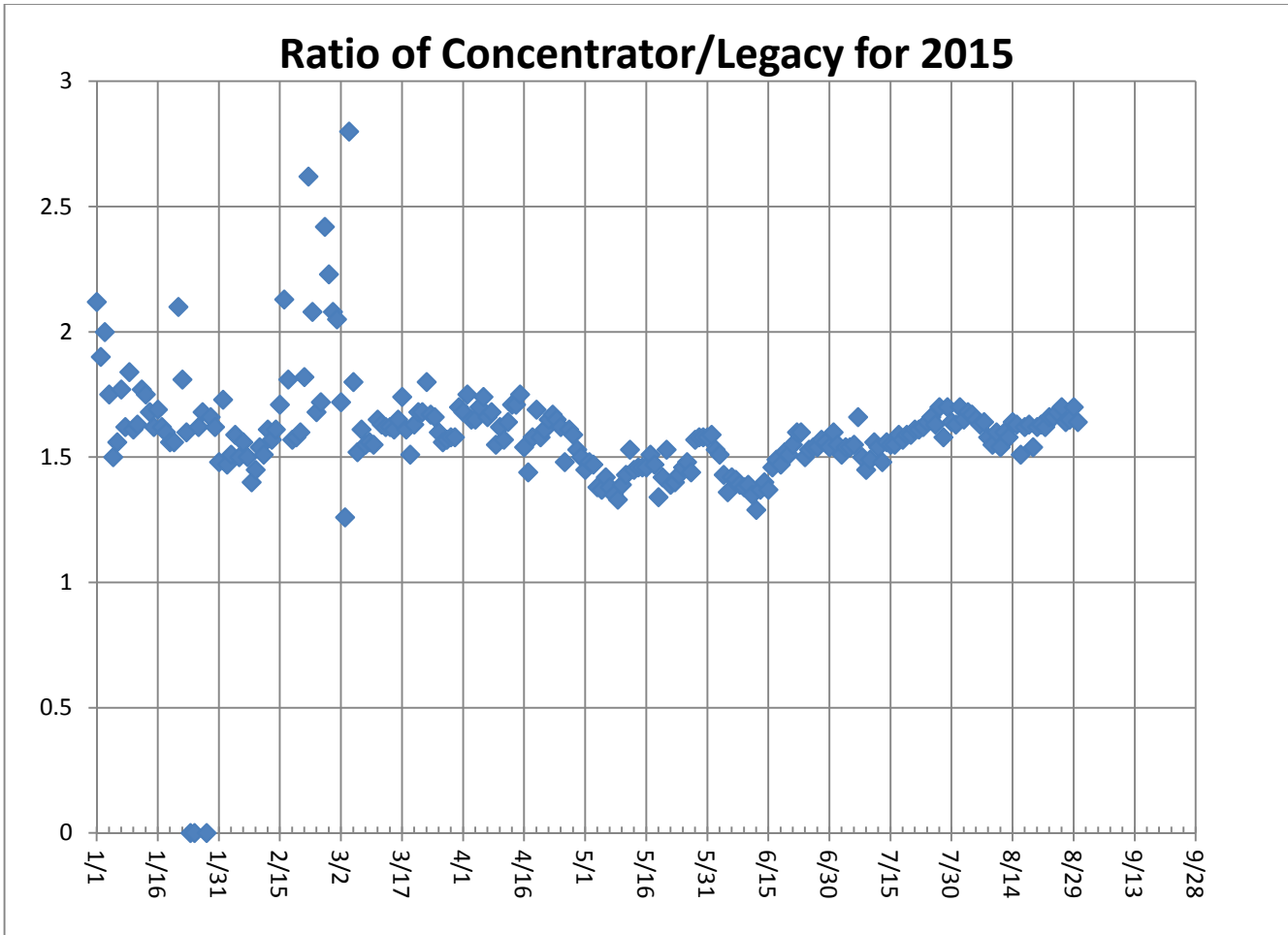
The District operates two redundant NovaStar5 base stations: the primary (ns5a) at Diamond Hill and a redundant base (ns5b) at Greenhouse Data. Additional analyses are conducted on the data received by these two base stations (Table 2). The data received by both base stations for the month are shown below.

**Table 2. Comparison of Data Reception by ns5a and ns5b**

NS5A (Diamond Hill)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
Legacy	216,461	241,285	268,551	282,306	345,191	348,979	284,647	269,298		
Concentrator	366,229	405,210	443,612	458,979	499,841	511,002	449,469	438,917		
ALERT2	172,927	233,617	286,836	295,399	319,764	302,746	320,675	376,339		
NS5B (Greenhouse)										
Legacy	244,232	241,143	268,417	262,549	341,926	341,600	288,199	269,168		
Concentrator	409,951	405,875	444,660	430,407	499,657	502,908	456,087	440,313		
ALERT2	191,784	234,150	289,044	275,955	319,750	299,635	328,435	381,397		
Diff (NS5a-NS5b)										
Legacy (Digi One)	-27,771	142	134	19,757	3,265	7,379	-3,552	130		
Concentrator (B2010)	-43,722	-665	-1,048	28,572	184	8,094	-6,618	-1,396		
ALERT2 (B2010)	-18,857	-533	-2,208	19,444	14	3,111	-7,760	-5,058		
Comments	Failed hard drive on ns5a		Tot A2 diff 1%	Outage on ns5b this month			Ns5a data collection was down on July 1			

Interesting to see the large difference in ALERT2 reports between Diamond Hill and Greenhouse relative to the smaller difference from the legacy feed. The Greenhouse server saw approximately 1 percent more ALERT2 reports.

The daily ratio of total concentrator reports received versus total legacy ALERT reports received is shown (Figure 1).



**Figure 1. Daily Ratio of Concentrator Reports to Legacy Reports**

The ratio is very consistent throughout the month. The ratio seems to fluctuate just above 1.5.

## **A. Continuous Operation of Base Receiver/Decoder**

The ns5 base stations were NOT in continuous operation for the entire month. Data collection was down due to network issues affecting the collection of legacy and ALERT2 data on ns5a and ns5b on August 16, 2015. This outage was very short-lived.

## **B. Specific Issues Identified this Month**

Performance of the following sensors (Table 3) was questionable this month.

**Table 3. Sensors with Poor Performance Characteristics**

<b>Sensor ID</b>	<b>Description</b>	<b>Comments</b>
2330	Morrison	Poor timer performance and poor event performance
430	Utah Park	Poor timer performance and poor event performance
1660	SPR at Henderson	Poor timer performance and poor event performance
2360	Indian Hills	Poor timer performance and poor event performance
2271, 2272, 2274	Unknown IDs	Cub Creek below Blue (2270)
4130	Swiss Peaks	Reported no rain for the entire month, second month in a row
4470	Little Narrows	Rain tip sequence looks bad
4469	Unknown ID	This unknown ID had over 1,000 reports this month
413	Kelly Dam	This stage sensor has a large number if invalid reports

## C. Performance of New A2 Sites

This section of the report will look at specific reporting characteristics of the new A2 sites by analyzing their APDUID (Application PDU Identifier). The APDUID is a cyclical, incrementing counter from 0 to 6. Tracking skipped values and restarts of the application control byte counter provides useful insight into site performance and general network health. The performance of the cyclical counter is quantified for each A2 self-reporting site and repeater path (Table 4).

**Table 4. APDUID Performance of A2 Sites by Source Address**

Description	ID	W. Creek (6001)	Smoky Hill (6502)	Blue Mt. (6503)	Lee Hill (6505)	Gold Hill (6506)
Carr Street (10012)	100		0.987	0.993	0.926	0.990
Murphy Creek (10019)	870		0.998	0.993	0.994	0.992
Maple Grove (10013)	1000		0.969	0.961	0.969	0.892
Lena @ Nolte Pond (10025)	1020		0.990	0.989	0.995	0.973
Newlin Gulch	3070		0.963	0.076	0.965	0.150
Heritage Regional Park	3090		0.732	0.081	0.709	0.878
Lower Left Hand (10018)	4453		0.993	--	0.982	0.013
Magnolia	6602		0.989	0.933	0.996	0.962
Blackstone**	100100		0.136	0.106	0.108	0.146
ETG @ Hampden**	100110		0.143	0.132	0.145	0.141
Upper Sellers	100140	0.949				
Haystack Road	100150	0.933				
Sand Cr at Colfax	100160		0.987	0.876	0.987	0.986
James Creek	100177		0.260	--	0.998	0.927
S. St. Vrain at Berry Ridge	100210		--	--	0.997	0.036
Arvada/Blunn Reservoir	100227		1.00	0.984	1.00	0.507
Havana Pond	100237		0.990	0.982	0.988	0.987
Westerly Creek Dam	100247		0.979	0.972	0.985	0.983
Trumbull (Hayman)	100260	0.878	--	--	--	--
West Creek (Hayman)	100270	0.914	--	--	--	--

\*\*-the APDUID is disabled for these sites.....these are original HSE A2 transmitters and may not support the APDUID

## D. ALERT2 Repeater Loading

The ALERT2 architecture utilizes 5 repeaters with a single transmit frequency (170.300 MHz) to Diamond Hill. The repeaters utilize a 20 second frame where each repeater is allocated a slot of specific size and an offset within the frame. The slot allocated to each repeater is sized appropriately to accommodate the total number of existing and future remote sites routed through that repeater. Each repeater is shown along with its designated slot (Table 5). Currently there is no pass-listing for the ALERT2 repeaters. Any remote ALERT2 site can be received by all repeaters and re-broadcast to the base except for West Creek which has an input frequency unique to Douglas County.

**Table 5. ALERT2 Repeater Architecture**

Repeater	Slot Size (sec)	Slot Offset (sec)	Source Address	ALERT2 Input Frequency (MHz)	ALERT2 Output Frequency (MHz) – received at Diamond Hill
West Creek	2	0	6001	169.425	170.300
Smoky	3	2	6502	169.525	170.300
Blue Mt.	4	5	6503	169.525	170.300
Lee Hill	3	9	6505	169.525	170.300
Gold Hill	3	12	6506	169.525	170.300
Magnolia	5	15	6507		170.300
Frame Size	20				

The following tables summarize the total number of reports received through each repeater (Table 6) and the distribution of reports by time slot (Table 7). This quantifies repeater loading for the ALERT2 backbone.

**Table 6. ALERT2 Reports Received through Each Repeater**

Month	West Creek (6001)	Smoky (6502)	Blue Mt. (6503)	Lee Hill (6505)	Gold Hill (6506)	TOTAL
Jan	0	44,501	44,636	44,783	39,007	172,927
Feb	0	58,543	56,150	61,160	57,764	233,617
Mar	346	73,198	69,604	77,968	65,323	286,439
Apr	595	73,711	69,568	79,215	72,310	295,399
May	5,259	78,694	72,340	86,297	77,174	319,764
June	11,987	72,449	65,742	82,998	69,570	302,746
July	28,595	75,379	71,394	79,026	74,041	328,435
Aug	28,409	92,299	84,057	84,363	87,211	376,339

**Table 7. Messages Received by Time Slot (Only A2 Self Reports)**

	West Cr. (6001)		Smoky (6502)			Blue Mt. (6503)				Lee Hill (6505)			Gold Hill (6506)			Magnolia (6507)				
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Tot	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Aug	17361	5430	52243	6591	853	51100	3320	616	56	9554	343	20	8313	7	2	0	0	0	0	0
	2384	119	7901	877	7	7996	13555	223	60	10918	2352	258	16094	5300	88	4	0	0	0	0
	0	0	12803	13763	175	6995	236	24	4	57140	3713	24	56829	652	20	10	5	1	0	0
376,339	19,745	5,549	72,947	21,231	1,035	66,091	17,111	863	120	77,612	6,408	302	81,236	5,959	110	14	5	1	0	0

The following tables summarize the system-wide latency of ALERT2 self-reports (Table 8 and Table 9).

**Table 8. System-Wide Latency of ALERT2 Self-Reports (seconds)**

Statistical Parameter	Value	Comments
Mean	71.60	The average time it took a report from the field to reach the base
Minimum	3	The minimum time it took for a report to go from the field to the base
Maximum	261	The maximum time it took for a report to go from the field to the base

**Table 9. Summary of ALERT2 System-Wide Latency (seconds)**

Statistical Parameter	Feb	Mar*	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	340	35.7	44.04	38.14	34.23	59.75	71.60				
Minimum	5	3	3	3	3	4	3				
Maximum	35,209	3,706	43,089	205	245	1,093	261				

## E. Rain Sensor Timer Reporting Summary

The following analysis assumes that each legacy rain sensor has a 12-hour timer-reporting interval and each A2 rain sensor has a 1-hour timer-reporting interval. The worst performing rain sensors for the month are summarized (Table 10).

**Table 10. Monthly Summary of Sensors with Poor Timer Performance (Sensor ID)**

Jan*	Feb*	Mar*	Apr	May	Jun	Jul	Aug	Sep	Oct*	Nov*	Dec*
4470	4470	4470	4850	2330	430	2330	1660				
700	2330	4270	2330	310	2330	2360	430				
2330	4870	2790	430	2360	3010	1570	2330				
4240	3010	4240	5720	430	2360	430	2850				
3010	1660	4870	2970	4470	310	2850	1570				
4870	4240	3010	2360	4870	1660	1660	2360				

\*- Only sensors that operate year-round (weather stations and stations in Boulder County) are included for the analysis in these months.

Sensors identified as having poor timer performance in multiple months are shaded with unique colors. A developing trend can thus be identified from the color shading as the year progresses.

## III. Rain Sensor Event Reporting Summary

### A. District-Wide Total Tip/Count Statistics

The incrementing reports from all 1-mm rain sensors were analyzed to quantify the District-wide statistical total monthly tip summary (Table 11). For the months of January, February, March, October, November and December only the stations that operate year-round are included in the rain event analysis. These stations include all weather stations and the stations in Boulder County.

**Table 11. District-Wide Total Tip/Count Statistical Summary**

Statistical Parameter	Value	Comments
Mean	29.95	Only the 1-mm rain sensors were included in the analysis
Median	23	Only the 1-mm rain sensors were included in the analysis
Standard deviation	23.12	Only the 1-mm rain sensors were included in the analysis
Mean plus three standard deviations	99.33	Only the 1-mm rain sensors were included in the analysis
Mean minus two standard deviations	0	Only the 1-mm rain sensors were included in the analysis
Minimum total count	3	Geer Canyon (4250)
Maximum total count	179	Utah Park (430) – influenced by irrigation
Sensors showing <b>NO</b> rain for the month	1	Swiss Peaks (4130)
Sensors greater than 3 SD (over reporting)	2	Utah Park, Aurora Town Hall
Sensors less than 2 SD (under reporting)	2	Swiss Peaks (4130) and Geer Canyon (4250)

## B. Monthly Average Tip/Count Summary

A monthly summary of the District-wide mean total tip/count is presented (Table 12).

**Table 12. Monthly Summary of District-Wide Mean Total 1-mm Tip/Count**

Year	Jan*	Feb*	Mar*	Apr	May	Jun	Jul	Aug	Sep	Oct*	Nov*	Dec*	Ave
2006	4.62	5.92	18.39	20.47	19.44	13.75	74.03	46.89	24.17	41.13	5.04	16.45	24.19
2007	11.56	5.40	29.75	65.03	68.30	15.87	36.20	46.38	22.13	29.50	6.54	11.29	29.00
2008	4.05	7.38	12.26	20.57	54.82	26.06	16.43	90.20	37.54	19.59	2.82	9.24	25.08
2009	6.33	3.11	11.37	59.26	63.45	68.00	65.00	20.00	27.29	30.24	11.00	5.60	30.89
2010	5.97	11.90	32.54	70.57	39.63	56.04	50.23	31.01	4.18	18.31	8.30	3.31	27.67
2011	6.78	7.45	7.54	33.94	92.68	39.42	90.87	18.25	37.67	25.73	10.41	13.59	32.03
2012	4.89	13.57	2.35	30.17	38.97	19.35	73.03	11.31	48.81	22.32	2.98	4.18	22.66
2013	2.96	14.31	21.86	35.96	45.87	16.39	52.33	50.63	229.74	29.64	5.86	4.00	42.46
2014	6.88	11.86	25.91	29.30	77.30	29.16	99.73	43.59	50.96	29.26	13.36	8.11	35.45
2015	9.88	24.42	20.78	69.75	143.07	86.93	54.59	29.95					

\*- Only sensors that operate year-round (weather stations and stations in Boulder County) are included for the analysis in these months.

## C. Sensors with a Jump of Six or More in the Sequential Count

Several sensors experienced a large jump in the sequential tip count (Table 13).

**Table 13. Sensors with a Jump of 6 or More in Sequential Count**

Sensor Description	Sensor ID	Comment
Utah Park	430	Three separate jumps of more than 6 counts
Slaughterhouse Gulch	1620	One large jump
Tomah Road – Douglas County	2990	One large jump

## D. Sensor-by-Sensor Incrementing Count Summary

The system-wide reception rate of incrementing, 1-mm tip reports for the month was approximately 93 percent. A total of 5,082 incrementing reports were received and a total of 5,450 reports were expected. The total loss of incrementing reports for the month was approximately 7 percent. Those sensors with the worst event transmission performance are summarized (Table 14).

**Table 14. Monthly Summary of Sensors with the Worst Performance**

Jan*	Feb*	Mar*	Apr	May	Jun	Jul	Aug	Sep	Oct*	Nov*	Dec*
4470	2330	100150	100150	310	430	2790	2330				
700	4470	4470	4240	1620	4470	430	430				
4750	700	2340	430	2330	2330	2360	4330				
4330	2320	100140	100140	430	2970	4870	4270				
2790	4330	1520	2330	2230	2230	2850	4470				
4870	4870	1100	1620	4470	2360	2330	1660				

\*-Only sensors that are operational year-round (weather stations and stations in Boulder County) are included for the analysis in these months.

Sensors identified as having poor event performance in multiple months are shaded with unique colors. A developing trend can thus be identified from the color shading as the year progresses.

## IV. Unknown Device Analysis – Received Data Log

The ALERT IDs present in the audio signal received by the decoder are compared against a list of “active” device IDs that are defined within NovaStar. Those IDs received by the decoder that are not defined within NovaStar are considered to be “unknown” and may be the result of radio noise or problems with the telemetry system. The reception of “unknown” device reports for the month is summarized (Table 15).

**Table 15. Summary of Unknown IDs**

Description	Concentrator	Legacy	A2
Total number of unknown IDs (IDs without a device definition)	226	218	0
Total reports from unknown IDs	1,860	1,747	0
Unknown IDs with only a single received report (potential noise)	147	174	0
Total reports from all IDs – RecData Log entire month	438,917	269,298	376,339
Unknown reports as a fraction of total reports	0.42%	0.65%	0%

The total number of reports from unknown sensors is very small relative to the total reports received for the month. Shown below (Table 16) are the total reports received from unknown sensor IDs for each month of the year.

**Table 16. Monthly Summary of Total Reports from Unknown IDs (Concentrator)**

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2010	1,220	1,474	1,276	1,174	721	5,707	610	1,738	442	533	2,857	6,396
2011	1,231	2,165	3,065	1,254	2,051	439	489	456	191	683	747	861
2012	692	750	1,575	977	5,469	11,016	453	683	774	2,657	3,854	5,466
2013	4,265	994	1,100	2,589	3,623	6,973	5,230	1,070	4,429	781	13,459	1,213
2014	870	4,284	2,399	2,104	25,746	1,832	3,983	268	369	448	470	1,099
2015	542	9,137	1,524	1,007	946	699	1,179	1,860				

The fraction of reports from unknown sensors relative to the total number of reports is shown below (Table 17).

**Table 17. Monthly Percent of Unknown Sensor Reports (Concentrator)**

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2010	0.42%	0.56%	0.38%	0.32%	0.20%	1.61%	0.17%	0.49%	0.13%	0.16%	0.93%	1.88%
2011	0.39%	0.73%	0.90%	0.37%	0.58%	0.12%	0.12%	0.05%	0.12%	0.18%	0.22%	0.26%
2012	0.30%	0.25%	0.43%	0.26%	1.37%	2.74%	0.11%	0.18%	0.20%	0.72%	1.15%	1.62%
2013	1.40%	0.31%	0.29%	0.60%	0.37%	0.61%	0.82%	0.21%	0.96%	0.31%	5.37%	0.23%
2014	0.14%	0.94%	0.40%	0.34%	3.95%	0.34%	0.66%	0.03%	0.03%	0.07%	0.11%	0.26%
2015	0.15%	2.25%	0.34%	0.22%	0.19%	0.14%	0.26%	0.42%				

Any month shaded in yellow has an excessive number of reports from unknown sensors.

A number of “unknown” sensors had multiple reports, which may indicate the existence of a transmitter that is sending information on an ID that is not currently defined within NovaStar. The unknown IDs with multiple reports including the number of reports received by each are shown (Table 18).

**Table 18. Reports Received by Unknown IDs**

Concentrator		Legacy ALERT		Comment
Unknown ID	Reports	Unknown ID	Reports	
4469	1,188	4469	1,168	
1430	57	1430	42	
623	56	623	55	
2283	49	2283	50	Kinney Peak
2274	49	2271	48	Cub Creek below Blue
2271	47	2274	48	Cub Creek below Blue
2272	46	2272	46	Cub Creek below Blue



## V. Sensors with Invalid Reports

The sensors below (Table 19 and Table 20) have the largest number of invalid decodes as determined by the validation process defined at the District NovaStar5 base station. These invalid reports may indicate poor radio paths (bit flip/contention errors/random decode) or validation criteria that do not match the physical installation at the site.

**Table 19. Rain Sensors with the Most Invalid Reports**

Sensor ID	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Temple Pond at DTC (630)	0	0	0	0	0	0	113	0				
Bear Creek @ Lowell (1530)	5	6	2	1	15	9	0	0				
Pine Cliff Road (2810)	4	5	6	4	2	7	5	5				
Porphory Mtn (4850)	0	0	0	0	0	7	5	2				
East/West Trailhead (3050)	0	0	0	0	0	5	4	1				
Haskins Gulch (2820)	0	0	0	0	64	0	0	0				
Wx-West Creek (3020)	0	0	10	4	13	1	0	2				
Wx-Castle Rock (2750)	0	0	5	2	30	0	0	0				
A2-Newlin Gulch (3070)	0	0	0	6	35	2	0	0				
CC at Stroh Road (2860)	0	0	0	0	0	0	0	10				
Cannon Mt (4270)	0	0	0	0	0	0	0	8				

**Table 20. Level Sensors with the Most Invalid Reports**

Sensor ID	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Van Bibber @ Hwy 93 (333)	0	0	0	0	0	0	43	5				
Horseshoe Park Drop (713)	0	0	0	0	0	0	198	0				
Louisville Rec Ctr (1103)	0	0	0	0	0	0	94	4				
Pine Cliff Road (2813)	0	0	0	0	0	0	41	17				
Ferril Lake (1383)	666	667	725	720	261	0	0	0				
Kelly Dam (413)	0	0	0	0	61	70	47	42				
A2-Lena @ Nolte Pond (1023)	na	545	745	738	0	0	0	1				
Piney at Liverpool (953)	0	0	228	232	26	0	0	0				
Flying J (853)	0	0	52	60	60	58	61	62				
Sanderson at Xavier (1343)	0	0	31	7	15	26	6	1				
SPR at Henderson (1663)	0	0	0	0	0	0	18	10				
Little Narrows (4473)	33	208	2	8	11	24	7	1				
SPR at Dartmouth (1629)				49	58	3	0	51				
Murphy Creek GC (873)	0	0	0	0	36	1	0	0				
Marston Lake North (1523)	0	0	0	0	20	10	0	4				
Bridge (4423)	0	0	0	0	0	32	3	0				
SBC @ San Souci (4833)	0	0	0	0	0	26	1	1				
Sand Creek Park (1803)	0	0	0	0	0	23	1	0				
Newlin Gulch (3073)	0	0	0	0	0	0	0	34				
A2-Havana Pond (100237)	0	0	0	0	0	0	0	13				

## VI. Rainfall Alarms and Intensity Analysis

The following rainfall rate alarms from the Urban Drainage and Flood Control District NovaStar 5.0 Web Server were identified this month. A total of 79 alarms were triggered this month and 42 total tweets went out.

ID	Description	Rainfall Alarm Trigger	Date
750	Quincy Reservoir Precipitation	Plains 10 minute rainfall	8/2/2015 15:15
720	Confluence Pond Precipitation-AR	Plains 10 minute rainfall	8/9/2015 0:05
5810	Stump Bump Precipitation-TL	Hayman 30 minute rainfall	8/9/2015 23:17
5810	Stump Bump Precipitation-TL	Hayman 30 minute rainfall	8/9/2015 23:28
5810	Stump Bump Precipitation-TL	Hayman 1 hour rainfall	8/9/2015 23:31
5810	Stump Bump Precipitation-TL	Hayman 30 minute rainfall	8/9/2015 23:38
5810	Stump Bump Precipitation-TL	Hayman 90 minute rainfall	8/9/2015 23:42
5730	West Creek Precipitation-TL	Hayman 30 minute rainfall	8/10/2015 0:12
610	Harvard Gulch @ Jackson Precipitation-DN	Plains 10 minute rainfall	8/10/2015 0:32
2270	Cub Creek below Blue Creek Precipitation-JF	Jefferson County 10 minute rainfall	8/10/2015 13:05
2970	Rampart Range Road Precipitation-DG	2970 Rampart Range Road 0.2" in 30 Minutes Rainfall	8/10/2015 14:00
2710	Highlands Ranch WTP Precipitation-DG	Douglas County 10 minute rainfall	8/10/2015 14:07
2710	Highlands Ranch WTP Precipitation-DG	Douglas County 1 hour-1 Inch rainfall	8/10/2015 14:12
2870	Cherry Creek at Cottonwood Park Precipitation-DG	Douglas County 10 minute rainfall	8/10/2015 14:14
950	Piney at Liverpool Precipitation-AR	Plains 10 minute rainfall	8/10/2015 14:16
2710	Highlands Ranch WTP Precipitation-DG	Douglas County 10 minute rainfall	8/10/2015 14:17
2870	Cherry Creek at Cottonwood Park Precipitation-DG	Douglas County 1 hour-1 Inch rainfall	8/10/2015 14:33
1600	Englewood Dam Precipitation-AR	Plains 1 hour rainfall	8/10/2015 14:37
950	Piney at Liverpool Precipitation-AR	Plains 1 hour rainfall	8/10/2015 14:56
2790	West Cherry Creek Precipitation-DG	Douglas County 10 minute rainfall	8/10/2015 17:06
5720	Four Mile Creek Precipitation-DG	Hayman 30 minute rainfall	8/11/2015 15:46
5720	Four Mile Creek Precipitation-DG	Hayman 30 minute rainfall	8/11/2015 15:58
920	Aurora Town Hall Precipitation-AR	Plains 10 minute rainfall	8/11/2015 16:02
3090	Big Dry Creek at Heritage Regional Park Precipitation-DG	Douglas County 10 minute rainfall	8/11/2015 16:18
920	Aurora Town Hall Precipitation-AR	Plains 1 hour rainfall	8/11/2015 16:22
3090	Big Dry Creek at Heritage Regional Park Precipitation-DG	Douglas County 1 hour-1 Inch rainfall	8/11/2015 16:26
440	Fire Station #7 Precipitation-AR	Plains 10 minute rainfall	8/11/2015 16:32
440	Fire Station #7 Precipitation-AR	Plains 1 hour rainfall	8/11/2015 16:37
710	Horseshoe Park Drop Precipitation-AR	Plains 10 minute rainfall	8/11/2015 16:37
710	Horseshoe Park Drop Precipitation-AR	Plains 1 hour rainfall	8/11/2015 16:38
2270	Cub Creek below Blue Creek Precipitation-JF	Jefferson County 10 minute rainfall	8/13/2015 17:11
2270	Cub Creek below Blue Creek Precipitation-JF	Jefferson County 1 hour rainfall	8/13/2015 17:20
5740	Trail Creek Precipitation-TL	Hayman 30 minute rainfall	8/14/2015 16:59
5740	Trail Creek Precipitation-TL	Hayman 1 hour rainfall	8/14/2015 17:02
5740	Trail Creek Precipitation-TL	Hayman 90 minute rainfall	8/14/2015 17:05
5810	Stump Bump Precipitation-TL	Hayman 30 minute rainfall	8/14/2015 17:07
5810	Stump Bump Precipitation-TL	Hayman 1 hour rainfall	8/14/2015 17:11
5740	Trail Creek Precipitation-TL	Hayman 30 minute rainfall	8/14/2015 17:12
5720	Four Mile Creek Precipitation-DG	Hayman 30 minute rainfall	8/14/2015 17:13
100270	Westcreek Fire Station Wx Precipitation	Douglas County 10 minute rainfall	8/14/2015 17:16
5810	Stump Bump Precipitation-TL	Hayman 30 minute rainfall	8/14/2015 17:17
5810	Stump Bump Precipitation-TL	Hayman 90 minute rainfall	8/14/2015 17:19
5730	West Creek Precipitation-TL	Hayman 30 minute rainfall	8/14/2015 17:22

5740	Trail Creek Precipitation-TL	Hayman 30 minute rainfall	8/14/2015 17:24
5720	Four Mile Creek Precipitation-DG	Hayman 1 hour rainfall	8/14/2015 17:24
5720	Four Mile Creek Precipitation-DG	Hayman 30 minute rainfall	8/14/2015 17:24
5810	Stump Bump Precipitation-TL	Hayman 30 minute rainfall	8/14/2015 17:34
100270	Westcreek Fire Station Wx Precipitation	Douglas County 1 hour-1 Inch rainfall	8/14/2015 17:38
5730	West Creek Precipitation-TL	Hayman 30 minute rainfall	8/14/2015 17:39
4290	Red Hill Precipitation-BO	Boulder County 10 minute rainfall	8/14/2015 19:08
4290	Red Hill Precipitation-BO	Boulder County 1 hour rainfall	8/14/2015 19:20
4290	Red Hill Precipitation-BO	Boulder County 10 minute rainfall	8/14/2015 19:20
4330	Hansen Precipitation-BO	Boulder County 10 minute rainfall	8/14/2015 19:34
2920	West Cherry Head Precipitation-DG	Douglas County 10 minute rainfall	8/15/2015 17:41
2920	West Cherry Head Precipitation-DG	Douglas County 1 hour-1 Inch rainfall	8/15/2015 17:49
2920	West Cherry Head Precipitation-DG	Douglas County 10 minute rainfall	8/15/2015 17:53
2920	West Cherry Head Precipitation-DG	Douglas County 10 minute rainfall	8/15/2015 18:03
2330	Bear Creek at Morrison Precipitation-JF	Jefferson County 1 hour rainfall	8/16/2015 0:50
4320	Lee Hill Rain Precipitation-BO	FMC-BA 0.25" in 10 Min Rainfall	8/16/2015 16:01
4570	St. Antons Precipitation-BO	Boulder County 10 minute rainfall	8/16/2015 16:25
4080	Twin Sisters Precipitation-BO	FMC-BA 0.50" in 30 Min Rainfall	8/16/2015 16:32
150	Nott Creek Precipitation-GL	Jefferson County 10 minute rainfall	8/16/2015 16:54
1440	Elbert Precipitation	Douglas County 10 minute rainfall	8/17/2015 15:41
5940	Log Jumper Precipitation-DG	Hayman 30 minute rainfall	8/17/2015 15:47
<b>ID</b>	<b>Tweets</b>	<b>Tweets</b>	<b>Date</b>
750	Quincy Reservoir Precipitation	Tweet Aurora Heavy Rain 0.5"-10min	8/2/2015 15:15
720	Confluence Pond Precipitation-AR	Tweet Arapahoe County Heavy Rain 0.5"-10min	8/9/2015 0:05
720	Confluence Pond Precipitation-AR	Tweet Aurora Heavy Rain 0.5"-10min	8/9/2015 0:05
610	Harvard Gulch @ Jackson Precipitation-DN	Tweet Denver Heavy Rain 0.5"-10min	8/10/2015 0:32
2270	Cub Creek below Blue Creek Precipitation-JF	Tweet Jefferson County Heavy Rain 0.5"-10min	8/10/2015 13:05
2710	Highlands Ranch WTP Precipitation-DG	Tweet Douglas County Heavy Rain 0.5"-10min	8/10/2015 14:07
2710	Highlands Ranch WTP Precipitation-DG	Tweet Douglas County Heavy Rain 1"-1hour	8/10/2015 14:12
2870	Cherry Creek at Cottonwood Park Precipitation-DG	Tweet Douglas County Heavy Rain 0.5"-10min	8/10/2015 14:14
2870	Cherry Creek at Cottonwood Park Precipitation-DG	Tweet Parker Heavy Rain 0.5"-10min	8/10/2015 14:14
950	Piney at Liverpool Precipitation-AR	Tweet Arapahoe County Heavy Rain 0.5"-10min	8/10/2015 14:16
950	Piney at Liverpool Precipitation-AR	Tweet Aurora Heavy Rain 0.5"-10min	8/10/2015 14:16
2710	Highlands Ranch WTP Precipitation-DG	Tweet Douglas County Heavy Rain 0.5"-10min	8/10/2015 14:17
2870	Cherry Creek at Cottonwood Park Precipitation-DG	Tweet Douglas County Heavy Rain 1"-1hour	8/10/2015 14:33
2870	Cherry Creek at Cottonwood Park Precipitation-DG	Tweet Parker Heavy Rain 1"-1hour	8/10/2015 14:33
950	Piney at Liverpool Precipitation-AR	Tweet Arapahoe County Heavy Rain 1"-1hour	8/10/2015 14:56
950	Piney at Liverpool Precipitation-AR	Tweet Aurora Heavy Rain 1"-1hour	8/10/2015 14:56
2790	West Cherry Creek Precipitation-DG	Tweet Douglas County Heavy Rain 0.5"-10min	8/10/2015 17:06
920	Aurora Town Hall Precipitation-AR	Tweet Arapahoe County Heavy Rain 0.5"-10min	8/11/2015 16:02
920	Aurora Town Hall Precipitation-AR	Tweet Aurora Heavy Rain 0.5"-10min	8/11/2015 16:02
3090	Big Dry Creek at Heritage Regional Park Precipitation-DG	Tweet Douglas County Heavy Rain 0.5"-10min	8/11/2015 16:18
920	Aurora Town Hall Precipitation-AR	Tweet Arapahoe County Heavy Rain 1"-1hour	8/11/2015 16:22
920	Aurora Town Hall Precipitation-AR	Tweet Aurora Heavy Rain 1"-1hour	8/11/2015 16:22
3090	Big Dry Creek at Heritage Regional Park Precipitation-DG	Tweet Douglas County Heavy Rain 1"-1hour	8/11/2015 16:26
440	Fire Station #7 Precipitation-AR	Tweet Aurora Heavy Rain 0.5"-10min	8/11/2015 16:32
440	Fire Station #7 Precipitation-AR	Tweet Aurora Heavy Rain 1"-1hour	8/11/2015 16:37
710	Horseshoe Park Drop Precipitation-AR	Tweet Aurora Heavy Rain 0.5"-10min	8/11/2015 16:37
710	Horseshoe Park Drop Precipitation-AR	Tweet Aurora Heavy Rain 1"-1hour	8/11/2015 16:38
2270	Cub Creek below Blue Creek Precipitation-JF	Tweet Jefferson County Heavy Rain 0.5"-10min	8/13/2015 17:11

2270	Cub Creek below Blue Creek Precipitation-JF	Tweet Jefferson County Heavy Rain 1"-1hour	8/13/2015 17:20
100270	Westcreek Fire Station Wx Precipitation	Tweet Douglas County Heavy Rain 0.5"-10min	8/14/2015 17:16
100270	Westcreek Fire Station Wx Precipitation	Tweet Douglas County Heavy Rain 1"-1hour	8/14/2015 17:38
4290	Red Hill Precipitation-BO	Tweet Boulder County Heavy Rain 0.5"-10min	8/14/2015 19:08
4290	Red Hill Precipitation-BO	Tweet Boulder County Heavy Rain 1"-1hour	8/14/2015 19:20
4290	Red Hill Precipitation-BO	Tweet Boulder County Heavy Rain 0.5"-10min	8/14/2015 19:20
4330	Hansen Precipitation-BO	Tweet Boulder County Heavy Rain 0.5"-10min	8/14/2015 19:34
2920	West Cherry Head Precipitation-DG	Tweet Douglas County Heavy Rain 0.5"-10min	8/15/2015 17:41
2920	West Cherry Head Precipitation-DG	Tweet Douglas County Heavy Rain 1"-1hour	8/15/2015 17:49
2920	West Cherry Head Precipitation-DG	Tweet Douglas County Heavy Rain 0.5"-10min	8/15/2015 17:53
2920	West Cherry Head Precipitation-DG	Tweet Douglas County Heavy Rain 0.5"-10min	8/15/2015 18:03
2330	Bear Creek at Morrison Precipitation-JF	Tweet Jefferson County Heavy Rain 1"-1hour	8/16/2015 0:50
2330	Bear Creek at Morrison Precipitation-JF	Tweet Lakewood/Wheat Ridge Heavy Rain 1"-1hour	8/16/2015 0:50
4570	St. Antons Precipitation-BO	Tweet Boulder County Heavy Rain 0.5"-10min	8/16/2015 16:25
150	Nott Creek Precipitation-GL	Tweet Arvada Heavy Rain 0.5"-10min	8/16/2015 16:54
150	Nott Creek Precipitation-GL	Tweet Jefferson County Heavy Rain 0.5"-10min	8/16/2015 16:54
1440	Elbert Precipitation	Tweet Douglas County Heavy Rain 0.5"-10min	8/17/2015 15:41

# General System Analysis

**Database Name**

P:\A207-UDFCD-Data-Analysis\2015\08-2015\Novastar\_extract\_2015Aug.mdb

**First Date in Database**

7/31/15 11:59 PM

**Total Days**

31.0

**Last Date in Database**

8/31/15 11:59 PM

**Total Hours**

744.0

Summarize

**Total Records Analyzed**

438,917

Records by Group	Concentrator	Percent	Legacy	Percent	ALERT2	Percent
Wind Data	160,801	36.64%	87,724	32.58%	104,737	27.83%
Temperature	73,203	16.68%	38,173	14.18%	48,401	12.86%
Relative Humidity	64,266	14.64%	37,252	13.83%	46,183	12.27%
Barometric Pressure	35,563	8.10%	21,225	7.88%	1,072	0.28%
Battery Voltage	27,059	6.16%	15,084	5.60%	38,322	10.18%
Water Level	25,973	5.92%	24,224	9.00%	31,624	8.40%
Precipitation	16,858	3.84%	13,518	5.02%	24,329	6.46%
Solar Radiation	10,455	2.38%	10,642	3.95%	0	0.00%
Fuel Temperature	5,941	1.35%	5,904	2.19%	0	0.00%
Fuel Moisture	5,938	1.35%	5,888	2.19%	0	0.00%
Wind Direction	4,034	0.92%	0	0.00%	10,645	2.83%
Soil Moisture	2,927	0.67%	2,933	1.09%	0	0.00%
Unknown	1,860	0.42%	1,747	0.65%	0	0.00%
Repeater Status Report	1,750	0.40%	2,928	1.09%	0	0.00%
ET-Hourly	741	0.17%	735	0.27%	0	0.00%
Hayman Battery	627	0.14%	0	0.00%	0	0.00%
12Hr Status Report	390	0.09%	401	0.15%	2,946	0.78%
Not Used	282	0.06%	273	0.10%	771	0.20%
GPS Lock	125	0.03%	0	0.00%	11,656	3.10%
Handar 585 ALARM Status	56	0.01%	63	0.02%	0	0.00%
Repeater Pass List	37	0.01%	552	0.20%	0	0.00%
ET-Daily	31	0.01%	31	0.01%	0	0.00%
Wind Gust	0	0.00%	0	0.00%	35,722	9.49%
Dew Point Temperature	0	0.00%	0	0.00%	8,787	2.33%
Wind Chill	0	0.00%	0	0.00%	8,787	2.33%
Flasher Status	0	0.00%	0	0.00%	2,357	0.63%
<b>Total</b>	<b>438,917</b>	<b>100.00%</b>	<b>269,297</b>	<b>100.00%</b>	<b>376,339</b>	<b>100.00%</b>

**Traffic Loading Summary**

	Concentrator		Legacy		ALERT2	
Alert Reports	438,917		269,297		376,339	
Average Daily Traffic	13,716		8,687		12,136	
Average Hourly Traffic	572		362		506	
Median Hourly Traffic	576	hour beginning	353	hour beginning	505	hour beginning
Peak Hourly Traffic	1,069	Aug 10, 2:00 PM	743	Aug 11, 4:00 PM	656	Aug 16, 4:00 PM
2nd Max	1,020	Aug 10, 3:00 PM	695	Aug 10, 3:00 PM	643	Aug 11, 4:00 PM
3rd Max	1,006	Aug 11, 4:00 PM	658	Aug 10, 2:00 PM	583	Aug 17, 3:00 PM
4th Max	1,000	Aug 2, 3:00 PM	633	Aug 2, 3:00 PM	582	Aug 9, 12:00 AM
5th Max	967	Aug 16, 5:00 PM	629	Aug 11, 5:00 PM	572	Aug 13, 5:00 PM

# Rain Timer Performance

Analyze Rain Sensors

Rain Sensors	Description	Rcv	Timer	Exp	Performance
1660	SPR at Henderson	18	22:55	64	28%
430	Utah Park	19	4:40	64	30%
2330	Morrison	34	19:02	64	53%
2850	Cherry Cr bl Bayou Glch	35	18:05	64	55%
1570	Wx-Brighton Ditch	38	10:53	64	59%
2360	Indian Hills	40	16:11	64	63%
4270	Cannon Mountain	40	17:55	64	63%
2230	Bear Cr below Cub	43	15:10	64	67%
4850	Porphory Mtn	44	13:56	64	69%
310	Guy Hill Ranch	45	13:15	64	70%
4330	Hansen Rain	45	15:33	64	70%
4870	SBC @ SB Road	45	15:25	64	70%
3070	A2-Newlin Gulch Precip	537		744	72%
2270	Cub Cr below Blue	51	13:21	64	80%
100150	A2-Sellers Gulch at Haystack Precip	595		744	80%
100140	A2-Upper Sellers Gulch Precip	599		744	81%
1710	Shop Creek	52	14:34	64	81%
2280	Kinney Peak	52	13:19	64	81%
2350	Idledale	53	13:25	64	83%
4510	Pinewood Springs	53	12:41	64	83%
4520	Eagle Ridge	53	14:00	64	83%
540	Parker/Mississippi	54	13:18	64	84%
2320	Choke Cherry Resvr	55	13:15	64	86%
4790	Wx-Button Rock	55	12:30	64	86%
620	Quincy/Highline	56	12:28	64	88%
650	Iliff Pond	56	13:20	64	88%
2310	Genesee Village	56	12:27	64	88%
2790	Wx-W. Cherry Creek	56	12:34	64	88%
2950	DC Public Works	56	12:29	64	88%
3080	Tallman Gulch	56	12:45	64	88%
4490	Apple Valley	56	12:25	64	88%
3090	A2-Highland Heritage Park	438		496	88%
1300	Hidden Lake	57	12:42	64	89%
1460	Wx-Urban Farm	57	12:15	64	89%
1480	Third Creek at DIA	57	12:39	64	89%
1530	Bear Creek @ Lowell	57	12:26	64	89%
1620	Slaughterhouse Glch	57	12:46	64	89%
2860	CC at Stroh Rd	57	12:30	64	89%
2890	Spruce Mt - Douglas	57	12:28	64	89%
2960	Indian Creek	57	12:31	64	89%
4220	Fling's	57	12:26	64	89%
720	Confluence Pond	58	12:12	64	91%
830	Side Creek Park	58	12:13	64	91%
900	Wx-Aurora Reservoir	58	12:41	64	91%
1030	NREL/S. Table Mtn.	58	12:24	64	91%
1340	Sanderson at Xavier	58	12:40	64	91%
2820	Haskins Gulch Conf	58	12:28	64	91%
2900	Russelville Gulch-Douglas	58	12:30	64	91%
4190	Slaughterhouse	58	12:41	64	91%
4200	Lazy Acres	58	12:11	64	91%
4260	Taylor Mountain	58	12:25	64	91%
4360	Justice Center	58	12:36	64	91%
4770	Wx-Cal-Wood Ranch	58	12:28	64	91%
110	Ralston Reservoir	59	12:11	64	92%

150	Nott Creek	59	12:27	64	92%
510	Virginia Court	59	12:34	64	92%
530	Fire Station #19	59	12:11	64	92%
610	Harvard @ Jackson	59	12:11	64	92%
700	Toll Gate @ 6th	59	12:00	64	92%
810	Granby Ditch @ 6th	59	11:57	64	92%
1010	Denver West	59	12:23	64	92%
1050	Jeffco Fairgrounds	59	12:24	64	92%
1350	Chatfield COE	59	12:14	64	92%
1360	Denver Zoo	59	12:28	64	92%
1500	Powers Park	59	11:57	64	92%
1520	Wx-Marston Lake North	59	12:14	64	92%
1640	SPR at Union Ave.	59	12:11	64	92%
1900	Niver Detention	59	12:11	64	92%
2210	Wx-Hiwan G.C.	59	12:28	64	92%
2240	Cold Sprg Glch conf	59	11:58	64	92%
2370	Red Rocks Park	59	12:24	64	92%
2840	Sulphur Gulch	59	12:33	64	92%
2870	Cottonwood (Apache)	59	12:28	64	92%
2880	Happy Canyon at N Surrey Dr	59	12:29	64	92%
2980	Dakan Rd	59	12:13	64	92%
3030	WX-Bingham Lake Park	59	12:06	64	92%
3060	Fire Sta 47	59	12:15	64	92%
4010	Crescent	59	11:57	64	92%
4040	Martin Gulch	59	12:10	64	92%
4070	Bear Peak	59	12:24	64	92%
4080	Twin Sisters	59	12:11	64	92%
4160	Sunshine	59	12:23	64	92%
4300	Big Elk Park	59	12:24	64	92%
4350	Conifer Hill	59	12:40	64	92%
4530	Winiger Ridge	59	12:26	64	92%
4830	SBC @ San Souci	59	12:36	64	92%
120	West Woods	60	12:24	64	94%
220	Upper Leyden	60	12:10	64	94%
410	Kelly Dam	60	12:11	64	94%
500	Havana Park	60	11:57	64	94%
520	Jewell Detention	60	12:11	64	94%
600	Harvard Gulch Park	60	11:58	64	94%
630	Temple Pond at DTC	60	12:20	64	94%
840	Fire Station 12	60	12:13	64	94%
940	Aurora Regional Pond	60	11:57	64	94%
970	Pump Sta 3	60	12:00	64	94%
1040	Lena @ U.S. Hwy 6	60	11:57	64	94%
1060	Heritage Square	60	12:11	64	94%
1100	Louisville Rec Ctr	60	12:13	64	94%
1370	West Metro FS13	60	12:11	64	94%
1400	Upper Sloan Det.	60	12:10	64	94%
1550	Lakewood CC	60	12:10	64	94%
1600	Englewood Dam	60	11:57	64	94%
1700	Cherry Cr @ Champa	60	12:10	64	94%
1800	Sand Creek Park	60	12:11	64	94%
2250	Rosedale	60	11:57	64	94%
2260	Brook Forest	60	12:11	64	94%
2940	Willow Creek - DougCnty	60	12:13	64	94%
4020	Rio Grande	60	12:10	64	94%
4050	Walker Ranch	60	12:10	64	94%
4060	Lakeshore	60	12:09	64	94%
4110	Betasso	60	12:10	64	94%
4310	Johnny Park	60	12:10	64	94%
4320	Lee Hill Rain 2012	60	12:10	64	94%



4570	St. Antons	60	11:59	64	94%
4750	Wx-Louisville Lake	60	12:12	64	94%
4840	SBC@S Boulder Ditch	60	11:57	64	94%
4860	Fairview Peak	60	12:00	64	94%
100100	A2-Blackstone Precip	60	12:00	64	94%
140	Wx-Blue Mountain	61	12:00	64	95%
200	Leyden Reservoir	61	11:57	64	95%
210	Leyden Confluence	61	12:10	64	95%
300	Van Bibber Park	61	12:10	64	95%
320	Sports Complex	61	12:10	64	95%
420	Expo Park	61	11:57	64	95%
640	Goldsmith @ Eastman	61	11:57	64	95%
710	Horseshoe Park Drop	61	11:57	64	95%
750	Wx-Quincy Reservoir	61	11:56	64	95%
760	Mission Viejo Park	61	11:57	64	95%
820	ETG @ Buckley	61	11:57	64	95%
850	Flying J	61	12:00	64	95%
920	Wx-Aurora Town Hall	61	11:44	64	95%
950	Piney at Liverpool	61	11:57	64	95%
1110	Gunbarrel	61	11:56	64	95%
1200	Broomfield 3207	61	11:58	64	95%
1310	LDC at 64th	61	11:58	64	95%
1320	SPR at 3rd Ave	61	11:58	64	95%
1420	Wx-Diamond Hill	61	12:00	64	95%
1440	Wx-Elbert	61	12:00	64	95%
1720	Cherry Cr @ Steele	61	11:57	64	95%
2340	El Rancho	61	11:57	64	95%
2730	Wx-Salisbury Park	61	12:00	64	95%
2750	Wx-Castle Rock	61	12:00	64	95%
2910	East Cherry Cr-Douglas	61	12:00	64	95%
2930	Wx-Spring Valley Rd-DougCnty	61	11:58	64	95%
3010	WX-EPC at Hwy 105	61	12:00	64	95%
3020	Wx-West Creek WX	61	12:00	64	95%
3050	East/West Trailhead	61	12:00	64	95%
4030	Red Garden	61	11:59	64	95%
4100	Filter Plant	61	11:57	64	95%
4150	Gold Hill	61	11:58	64	95%
4170	Pine Brook	61	11:57	64	95%
4180	Gold Lake	61	12:11	64	95%
4240	Sunset	61	11:57	64	95%
4340	Riverside	61	11:57	64	95%
4550	Boulder Jail	61	11:56	64	95%
4710	Wx-Ward C-1	61	12:00	64	95%
4730	Wx-Sugarloaf	61	12:00	64	95%
4810	Shanahan Ridge	61	11:57	64	95%
4820	Doudy Draw	61	11:57	64	95%
4880	Whispering Pines	61	11:57	64	95%
100110	A2-ETG @ Hampden Precip	61	12:00	64	95%
330	Van Bibber @ Hwy 93	62	11:58	64	97%
440	Fire Station #7	62	11:57	64	97%
730	No Name @ Quincy	62	11:58	64	97%
800	Sable Ditch @ 18th	62	11:57	64	97%
2710	Wx-Highlands Ranch WTP	62	12:16	64	97%
2920	West Cherry Head-Douglas Cnty	62	12:00	64	97%
3040	CC @ Russelville Road Precip	62	11:54	64	97%
4090	Magnolia	62	11:58	64	97%
4130	Swiss Peaks	62	11:57	64	97%
4140	Logan Mill	62	11:57	64	97%
4230	Golden Age	62	11:57	64	97%
4250	Geer Canyon	62	11:44	64	97%

4290	Red Hill	62	11:52	64	97%
1920	Wx-Brighton	63	11:42	64	98%
2810	Pine Cliff Road	63	11:32	64	98%
2990	Wx-Tomah Rd-DougCnty	63	12:00	64	98%
100	A2-Carr Street	740		744	99%
100160	A2-Sand Creek at Colfax Precip	742		744	100%
100230	A2-Havana Pond Precip	742		744	100%
870	A2-Murphy Creek GC	743		744	100%
1000	A2-Maple Grove Resv.	743		744	100%
100240	A2-Westerly Cr Dam Precip	743		744	100%
2970	Rampart Range Rd-Satellite	224		224	100%
6601	A2-Magnolia WX-Precip	92	8:00	64	144%
4470	Little Narrows	1289		64	2014%

5720	Four Mile Creek	46	15:28	64	72%
5730	West Creek	61	12:00	64	95%
5740	Trail Creek	59	12:14	64	92%
5810	Stump Bump	59	12:00	64	92%
5860	Cedar Mountain	60	12:14	64	94%
5880	Hackett Mountain	57	12:00	64	89%
5900	Horse Creek-Satellite	967		967	100%
5940	Log Jumper	54	12:16	64	84%
100260	A2-Trumbull (Hayman) - Precip	383		744	51%
100270	A2-WestCreek (Hayman) - Precip	679		744	91%

Rain Event Performance																
	Reports Received	Reports Received	5,082													
	Reports Expected	Total Tips	5,450													
	93.25%	Data Loss	6.75%													
Description	Sensor	Performance	1-tips	2-tips	3-tips	4-tips	5-tips	6-tips	>6-tips	Rcv	Exp	Miss	Hold	Bucket		
Morrison	2330	49%	10	6	1	2	2	0	0	21	43	22	0	0.03937		
Utah Park	430	55%	69	21	5	2	1	0	3	98	179	81	0	0.03937	Mean	29.94505
Hansen Rain	4330	60%	19	3	1	1	1	1	0	26	43	17	0	0.03937	Median	23
Cannon Mountain	4270	61%	14	2	3	0	0	1	0	20	33	13	0	0.03937	St. Dev	23.12797
Little Narrows	4470	71%	16	4	1	1	0	0	0	22	31	9	0	0.03937	Mean plus 3 SD	99.32897
SPR at Henderson	1660	75%	2	1	0	0	0	0	0	3	4	1	0	0.03937	Min	3
Indian Hills	2360	77%	16	2	2	0	0	0	0	20	26	6	0	0.03937	Max	179
Cherry Cr bl Bayou Glch	2850	79%	27	5	0	0	1	0	0	33	42	9	0	0.03937		
A2-Upper Sellers Gulch Precip	100140	80%	15	0	0	0	1	0	0	16	20	4	0	0.03937		
Wx-W. Cherry Creek	2790	81%	32	5	2	0	0	0	0	39	48	9	0	0.03937		
Choke Cherry Resvr	2320	84%	23	3	1	0	0	0	0	27	32	5	0	0.03937		
Rampart Range Rd-Satellite	2970	84%	24	2	0	1	0	0	0	27	32	5	0	0.03937		
Pinewood Springs	4510	86%	20	4	0	0	0	0	0	24	28	4	0	0.03937		
Boulder Jail	4550	86%	5	1	0	0	0	0	0	6	7	1	0	0.03937		
A2-Maple Grove Resv.	1000	87%	12	0	1	0	0	0	0	13	15	2	0	0.03937		
Granby Ditch @ 6th	810	87%	24	2	1	0	0	0	0	27	31	4	0	0.03937		
Guy Hill Ranch	310	88%	12	2	0	0	0	0	0	14	16	2	0	0.03937		
Red Hill	4290	88%	39	6	0	0	0	0	0	45	51	6	0	0.03937		
Fire Station 12	840	88%	21	1	1	0	0	0	0	23	26	3	0	0.03937		
Wx-Highlands Ranch WTP	2710	89%	55	6	1	0	0	0	0	62	70	8	1	0.03937		
Denver Zoo	1360	89%	14	2	0	0	0	0	0	16	18	2	0	0.03937		
Idledale	2350	89%	7	1	0	0	0	0	0	8	9	1	0	0.03937		
Pine Brook	4170	89%	7	1	0	0	0	0	0	8	9	1	0	0.03937		
Kinney Peak	2280	89%	51	5	1	0	0	0	0	57	64	7	0	0.03937		
A2-Highland Heritage Park	3090	89%	59	0	0	0	0	0	1	59	66	7	0	0.03937		
Sanderson at Xavier	1340	89%	16	0	1	0	0	0	0	17	19	2	0	0.03937		
Spruce Mt - Douglas	2890	89%	15	2	0	0	0	0	0	17	19	2	0	0.03937		
Van Bibber @ Hwy 93	330	90%	16	2	0	0	0	0	0	18	20	2	0	0.03937		
Shanahan Ridge	4810	90%	8	1	0	0	0	0	0	9	10	1	0	0.03937		
Third Creek at DIA	1480	90%	17	2	0	0	0	0	0	19	21	2	0	0.03937		
Wx-Brighton Ditch	1570	91%	9	1	0	0	0	0	0	10	11	1	0	0.03937		
A2-Sellers Gulch at Haystack Precip	100150	91%	9	1	0	0	0	0	0	10	11	1	0	0.03937		
Chatfield COE	1350	91%	46	5	0	0	0	0	0	51	56	5	0	0.03937		
Haskins Gulch Conf	2820	91%	19	2	0	0	0	0	0	21	23	2	0	0.03937		
West Cherry Head-Douglas Cnty	2920	91%	68	7	0	0	0	0	0	75	82	7	0	0.03937		
East Cherry Cr-Douglas	2910	92%	20	2	0	0	0	0	0	22	24	2	0	0.03937		
Apple Valley	4490	92%	10	1	0	0	0	0	0	11	12	1	0	0.03937		
Slaughterhouse Glch	1620	92%	31	3	0	0	0	0	1	34	37	3	0	0.03937		
Confluence Pond	720	92%	44	4	0	0	0	0	0	48	52	4	0	0.03937		
Broomfield 3207	1200	92%	11	1	0	0	0	0	0	12	13	1	0	0.03937		
Walker Ranch	4050	92%	11	1	0	0	0	0	0	12	13	1	0	0.03937		
Logan Mill	4140	92%	11	1	0	0	0	0	0	12	13	1	0	0.03937		
Wx-Button Rock	4790	93%	23	2	0	0	0	0	0	25	27	2	0	0.03937		
Red Rocks Park	2370	93%	25	2	0	0	0	0	0	27	29	2	0	0.03937		
Wx-Cal-Wood Ranch	4770	93%	25	2	0	0	0	0	0	27	29	2	0	0.03937		
Lena @ U.S. Hwy 6	1040	93%	13	1	0	0	0	0	0	14	15	1	0	0.03937		
Wx-Urban Farm	1460	93%	13	1	0	0	0	0	0	14	15	1	1	0.03937		
Russelville Gulch-Douglas	2900	94%	28	0	1	0	0	0	0	29	31	2	0	0.03937		
Rio Grande	4020	94%	28	0	1	0	0	0	0	29	31	2	0	0.03937		
Fling's	4220	94%	14	1	0	0	0	0	0	15	16	1	0	0.03937		
Harvard @ Jackson	610	94%	29	2	0	0	0	0	0	31	33	2	0	0.03937		
Horseshoe Park Drop	710	94%	58	4	0	0	0	0	0	62	66	4	1	0.03937		

Flying J	850	94%	29	2	0	0	0	0	0	0	31	33	2	0	0.03937		
Johnny Park	4310	94%	29	2	0	0	0	0	0	0	31	33	2	0	0.03937		
Wx-Elbert	1440	94%	44	3	0	0	0	0	0	0	47	50	3	0	0.03937		
West Woods	120	94%	15	1	0	0	0	0	0	0	16	17	1	0	0.03937		
Willow Creek - DougCnty	2940	94%	15	1	0	0	0	0	0	0	16	17	1	0	0.03937		
Wx-Tomah Rd-DougCnty	2990	94%	32	2	0	0	0	0	0	1	34	36	2	0	0.03937		
Red Garden	4030	94%	16	1	0	0	0	0	0	0	17	18	1	0	0.03937		
Big Elk Park	4300	94%	16	1	0	0	0	0	0	0	17	18	1	0	0.03937		
Englewood Dam	1600	95%	49	3	0	0	0	0	0	0	52	55	3	1	0.03937		
Bear Cr below Cub	2230	95%	33	2	0	0	0	0	0	0	35	37	2	0	0.03937		
Havana Park	500	95%	52	0	0	1	0	0	0	0	53	56	3	0	0.03937		
Iliff Pond	650	95%	34	2	0	0	0	0	0	0	36	38	2	0	0.03937		
Cold Sprg Glch conf	2240	95%	34	2	0	0	0	0	0	0	36	38	2	0	0.03937		
SPR at 3rd Ave	1320	95%	18	1	0	0	0	0	0	0	19	20	1	0	0.03937		
El Rancho	2340	95%	18	1	0	0	0	0	0	0	19	20	1	0	0.03937		
Fire Station #19	530	95%	19	1	0	0	0	0	0	0	20	21	1	0	0.03937		
Wx-Blue Mountain	140	95%	20	1	0	0	0	0	0	0	21	22	1	0	0.03937		
Indian Creek	2960	95%	40	2	0	0	0	0	0	0	42	44	2	0	0.03937		
Lakeshore	4060	95%	20	1	0	0	0	0	0	0	21	22	1	0	0.03937		
Taylor Mountain	4260	95%	20	1	0	0	0	0	0	0	21	22	1	0	0.03937		
Side Creek Park	830	96%	42	2	0	0	0	0	0	0	44	46	2	0	0.03937		
Fire Sta 47	3060	96%	63	3	0	0	0	0	0	0	66	69	3	0	0.03937		
Gold Lake	4180	96%	21	1	0	0	0	0	0	0	22	23	1	0	0.03937		
Powers Park	1500	96%	89	4	0	0	0	0	0	0	93	97	4	0	0.03937		
West Metro FS13	1370	96%	45	2	0	0	0	0	0	0	47	49	2	0	0.03937		
Rosedale	2250	96%	45	2	0	0	0	0	0	0	47	49	2	0	0.03937		
Nott Creek	150	96%	48	0	1	0	0	0	0	0	49	51	2	0	0.03937		
Aurora Regional Pond	940	96%	71	3	0	0	0	0	0	0	74	77	3	0	0.03937		
ETG @ Buckley	820	96%	48	2	0	0	0	0	0	0	50	52	2	0	0.03937		
Brook Forest	2260	96%	25	1	0	0	0	0	0	0	26	27	1	0	0.03937		
St. Antons	4570	96%	25	1	0	0	0	0	0	0	26	27	1	0	0.03937		
Cub Cr below Blue	2270	96%	77	3	0	0	0	0	0	0	80	83	3	0	0.03937		
Genesee Village	2310	97%	27	1	0	0	0	0	0	0	28	29	1	0	0.03937		
Shop Creek	1710	97%	57	2	0	0	0	0	0	0	59	61	2	0	0.03937		
Tallman Gulch	3080	97%	57	2	0	0	0	0	0	0	59	61	2	0	0.03937		
CC at Stroh Rd	2860	97%	30	1	0	0	0	0	0	0	31	32	1	0	0.03937		
Sulphur Gulch	2840	97%	63	2	0	0	0	0	0	0	65	67	2	0	0.03937		
Wx-Ward C-1	4710	97%	32	1	0	0	0	0	0	0	33	34	1	0	0.03937		
Pump Sta 3	970	97%	68	2	0	0	0	0	0	0	70	72	2	0	0.03937		
CC @ Russelville Road Precip	3040	97%	34	1	0	0	0	0	0	0	35	36	1	0	0.03937		
Toll Gate @ 6th	700	97%	35	1	0	0	0	0	0	0	36	37	1	0	0.03937		
No Name @ Quincy	730	97%	35	1	0	0	0	0	0	0	36	37	1	0	0.03937		
Piney at Liverpool	950	97%	71	2	0	0	0	0	0	0	73	75	2	0	0.03937		
Temple Pond at DTC	630	98%	88	2	0	0	0	0	0	0	90	92	2	0	0.03937		
WX-Bingham Lake Park	3030	98%	49	1	0	0	0	0	0	0	50	51	1	0	0.03937		
Goldsmith @ Eastman	640	98%	54	1	0	0	0	0	0	0	55	56	1	0	0.03937		
Expo Park	420	98%	63	1	0	0	0	0	0	0	64	65	1	0	0.03937		
Fire Station #7	440	99%	67	1	0	0	0	0	0	0	68	69	1	0	0.03937		
Wx-Aurora Town Hall	920	99%	99	1	0	0	0	0	0	0	100	101	1	0	0.03937		
A2-Carr Street	100	100%	7	0	0	0	0	0	0	0	7	7	0	0	0.03937		
Ralston Reservoir	110	100%	14	0	0	0	0	0	0	0	14	14	0	0	0.03937		
Leyden Reservoir	200	100%	16	0	0	0	0	0	0	0	16	16	0	0	0.03937		
Leyden Confluence	210	100%	10	0	0	0	0	0	0	0	10	10	0	0	0.03937		
Upper Leyden	220	100%	21	0	0	0	0	0	0	0	21	21	0	0	0.03937		
Van Bibber Park	300	100%	11	0	0	0	0	0	0	0	11	11	0	0	0.03937		
Sports Complex	320	100%	8	0	0	0	0	0	0	0	8	8	0	0	0.03937		
Kelly Dam	410	100%	9	0	0	0	0	0	0	0	9	9	0	0	0.03937		
Virginia Court	510	100%	52	0	0	0	0	0	0	0	52	52	0	0	0.03937		

Jewell Detention	520	100%	45	0	0	0	0	0	0	0	45	45	0	0	0.03937		
Parker/Mississippi	540	100%	18	0	0	0	0	0	0	0	18	18	0	0	0.03937		
Harvard Gulch Park	600	100%	52	0	0	0	0	0	0	0	52	52	0	0	0.03937		
Quincy/Highline	620	100%	40	0	0	0	0	0	0	0	40	40	0	0	0.03937		
Wx-Quincy Reservoir	750	100%	42	0	0	0	0	0	0	0	42	42	0	0	0.03937		
Mission Viejo Park	760	100%	39	0	0	0	0	0	0	0	39	39	0	0	0.03937		
Sable Ditch @ 18th	800	100%	31	0	0	0	0	0	0	0	31	31	0	0	0.03937		
A2-Murphy Creek GC	870	100%	22	0	0	0	0	0	0	0	22	22	0	0	0.03937		
Denver West	1010	100%	10	0	0	0	0	0	0	0	10	10	0	0	0.03937		
NREL/S. Table Mtn.	1030	100%	10	0	0	0	0	0	0	0	10	10	0	0	0.03937		
Jeffco Fairgrounds	1050	100%	12	0	0	0	0	0	0	0	12	12	0	0	0.03937		
Heritage Square	1060	100%	17	0	0	0	0	0	0	0	17	17	0	0	0.03937		
Louisville Rec Ctr	1100	100%	21	0	0	0	0	0	0	0	21	21	0	0	0.03937		
Gunbarrel	1110	100%	6	0	0	0	0	0	0	0	6	6	0	0	0.03937		
Hidden Lake	1300	100%	9	0	0	0	0	0	0	0	9	9	0	0	0.03937		
LDC at 64th	1310	100%	6	0	0	0	0	0	0	0	6	6	0	0	0.03937		
Upper Sloan Det.	1400	100%	8	0	0	0	0	0	0	0	8	8	0	0	0.03937		
Wx-Diamond Hill	1420	100%	6	0	0	0	0	0	0	0	6	6	0	0	0.03937		
Wx-Marston Lake North	1520	100%	14	0	0	0	0	0	0	0	14	14	0	1	0.03937		
Bear Creek @ Lowell	1530	100%	24	0	0	0	0	0	0	0	24	24	0	0	0.03937		
Lakewood CC	1550	100%	12	0	0	0	0	0	0	0	12	12	0	0	0.03937		
SPR at Union Ave.	1640	100%	16	0	0	0	0	0	0	0	16	16	0	1	0.03937		
Cherry Cr @ Champa	1700	100%	12	0	0	0	0	0	0	0	12	12	0	0	0.03937		
Cherry Cr @ Steele	1720	100%	5	0	0	0	0	0	0	0	5	5	0	0	0.03937		
Sand Creek Park	1800	100%	14	0	0	0	0	0	0	0	14	14	0	0	0.03937		
Niver Detention	1900	100%	8	0	0	0	0	0	0	0	8	8	0	0	0.03937		
Wx-Brighton	1920	100%	16	0	0	0	0	0	0	0	16	16	0	0	0.03937		
Wx-Hiwan G.C.	2210	100%	17	0	0	0	0	0	0	0	17	17	0	0	0.03937		
Wx-Salisbury Park	2730	100%	46	0	0	0	0	0	0	0	46	46	0	0	0.03937		
Wx-Castle Rock	2750	100%	18	0	0	0	0	0	0	0	18	18	0	0	0.03937		
Pine Cliff Road	2810	100%	20	0	0	0	0	0	0	0	20	20	0	0	0.03937		
Cottonwood (Apache)	2870	100%	55	0	0	0	0	0	0	0	55	55	0	0	0.03937		
Happy Canyon at N Surrey Dr	2880	100%	28	0	0	0	0	0	0	0	28	28	0	0	0.03937		
Wx-Spring Valley Rd-DougCnty	2930	100%	24	0	0	0	0	0	0	0	24	24	0	0	0.03937		
DC Public Works	2950	100%	22	0	0	0	0	0	0	0	22	22	0	0	0.03937		
Dakan Rd	2980	100%	9	0	0	0	0	0	0	0	9	9	0	0	0.03937		
Wx-West Creek WX	3020	100%	27	0	0	0	0	0	0	0	27	27	0	0	0.03937		
East/West Trailhead	3050	100%	24	0	0	0	0	0	0	0	24	24	0	0	0.03937		
A2-Newlin Gulch Precip	3070	100%	29	0	0	0	0	0	0	0	29	29	0	0	0.03937		
Crescent	4010	100%	23	0	0	0	0	0	0	0	23	23	0	0	0.03937		
Martin Gulch	4040	100%	21	0	0	0	0	0	0	0	21	21	0	0	0.03937		
Bear Peak	4070	100%	15	0	0	0	0	0	0	0	15	15	0	0	0.03937		
Twin Sisters	4080	100%	24	0	0	0	0	0	0	0	24	24	0	0	0.03937		
Magnolia	4090	100%	17	0	0	0	0	0	0	0	17	17	0	0	0.03937		
Filter Plant	4100	100%	13	0	0	0	0	0	0	0	13	13	0	0	0.03937		
Betasso	4110	100%	14	0	0	0	0	0	0	0	14	14	0	0	0.03937		
Gold Hill	4150	100%	18	0	0	0	0	0	0	0	18	18	0	0	0.03937		
Sunshine	4160	100%	12	0	0	0	0	0	0	0	12	12	0	0	0.03937		
Slaughterhouse	4190	100%	18	0	0	0	0	0	0	0	18	18	0	0	0.03937		
Lazy Acres	4200	100%	11	0	0	0	0	0	0	0	11	11	0	0	0.03937		
Golden Age	4230	100%	14	0	0	0	0	0	0	0	14	14	0	0	0.03937		
Sunset	4240	100%	15	0	0	0	0	0	0	0	15	15	0	0	0.03937		
Geer Canyon	4250	100%	3	0	0	0	0	0	0	0	3	3	0	0	0.03937		
Lee Hill Rain 2012	4320	100%	16	0	0	0	0	0	0	0	16	16	0	0	0.03937		
Riverside	4340	100%	25	0	0	0	0	0	0	0	25	25	0	0	0.03937		
Conifer Hill	4350	100%	24	0	0	0	0	0	0	0	24	24	0	0	0.03937		
Justice Center	4360	100%	6	0	0	0	0	0	0	0	6	6	0	0	0.03937		
Eagle Ridge	4520	100%	8	0	0	0	0	0	0	0	8	8	0	0	0.03937		

Winger Ridge	4530	100%	30	0	0	0	0	0	0	0	30	30	0	0	0.03937
Wx-Sugarloaf	4730	100%	16	0	0	0	0	0	0	0	16	16	0	0	0.03937
Wx-Louisville Lake	4750	100%	9	0	0	0	0	0	0	0	9	9	0	0	0.03937
Doudy Draw	4820	100%	21	0	0	0	0	0	0	0	21	21	0	0	0.03937
SBC @ San Souci	4830	100%	7	0	0	0	0	0	0	0	7	7	0	0	0.03937
SBC@S Boulder Ditch	4840	100%	7	0	0	0	0	0	0	0	7	7	0	0	0.03937
SBC @ SB Road	4870	100%	6	0	0	0	0	0	0	0	6	6	0	0	0.03937
Whispering Pines	4880	100%	10	0	0	0	0	0	0	0	10	10	0	0	0.03937
A2-Blackstone Precip	100100	100%	48	0	0	0	0	0	0	0	48	48	0	1	0.03937
A2-ETG @ Hampden Precip	100110	100%	27	0	0	0	0	0	0	0	27	27	0	0	0.03937
A2-Sand Creek at Colfax Precip	100160	100%	35	0	0	0	0	0	0	0	35	35	0	0	0.03937
A2-Havana Pond Precip	100230	100%	12	0	0	0	0	0	0	0	12	12	0	0	0.03937
A2-Westerly Cr Dam Precip	100240	100%	11	0	0	0	0	0	0	0	11	11	0	0	0.03937
Wx-Aurora Reservoir	900	100%	19	0	0	0	0	0	0	0	19	19	0	1	0.03937
		Total Tips	4828	213	25	8	6	2	6	5082	5450	368	8		
WX-EPC at Hwy 105	3010	86%	70	7	3	0	0	0	0	0	80	93	13	0	0.01
Porphory Mtn	4850	87%	49	4	2	0	0	0	0	3	55	63	8	0	0.01
Fairview Peak	4860	96%	122	6	0	0	0	0	0	0	128	134	6	0	0.01
A2-Magnolia WX-Precip	6601	99%	98	1	0	0	0	0	0	0	99	100	1	19	0.01
Four Mile Creek	5720	92%	44	4	0	0	0	0	0	0	48	52	4	0	0.03937
West Creek	5730	98%	62	1	0	0	0	0	0	0	63	64	1	0	0.03937
Trail Creek	5740	92%	50	3	1	0	0	0	0	0	54	59	5	1	0.03937
Stump Bump	5810	99%	73	1	0	0	0	0	0	0	74	75	1	0	0.03937
Cedar Mountain	5860	98%	40	1	0	0	0	0	0	0	41	42	1	0	0.03937
Hackett Mountain	5880	97%	33	1	0	0	0	0	0	0	34	35	1	0	0.03937
Horse Creek-Satellite	5900	100%	27	0	0	0	0	0	0	0	27	27	0	0	0.03937
Log Jumper	5940	76%	19	6	1	0	0	0	0	0	26	34	8	0	0.03937
A2-Trumbull (Hayman) - Precip	100260	76%	11	1	0	1	0	0	0	3	13	17	4	0	0.03937
A2-WestCreek (Hayman) - Precip	100270	92%	51	5	0	0	0	0	0	0	56	61	5	0	0.03937

## 2015 Monthly Peak Hour ALERT Radio Traffic Summary

