

Memo

Date: May 3, 2013
To: Kevin Stewart
From: Markus Ritsch
Subject: April 2013 ALERT Data Analysis

I. ALERT Data Source

Raw ALERT data records extracted from the Urban Drainage and Flood Control District's NovaStar 5.0 base station were analyzed for the period April 1 through April 30, 2013.

II. General System Analysis Summary

In 2013 the District will upgrade the telemetry backbone from legacy ALERT (A1) to the new A2 protocol. As the season progresses, the A1 feed from outlying repeaters to the District base station at Diamond Hill will terminate and all data will be received as A2. The following table quantifies the data reception throughout the conversion of the telemetry system as the season progresses. As of January 29, 2013, the West Creek repeater in Douglas County processes both incoming data on A1 and A2 but passes on only A2 format messages to Diamond Hill.

Table 1. Reception of A1/A2 Data at Diamond Hill

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Legacy	321,136	218,368	264,984	243,044								
Concentrator	304,067	319,089	379,891	381,523								
ALERT2	--	--	16,450	47,415								
TOTAL	625,203	537,457	661,325	671,982	0	0	0	0	0	0	0	0
Conc+A2	--	--	396,341	428,938								

In 2013, WET will analyze only the concentrator and A2 data each month going forward since only the concentrator and A2 data received at Diamond Hill represents a complete dataset.

A. Performance of New A2 Sites

Currently there are only a handful of remote sites operating on the new A2 protocol. The "event" performance of these sites will be tracked throughout the 2013 flood season.

Table 2. Event Performance of New A2 Sites

Description	ID	Install Date	Apr	May	Jun	Jul	Aug	Sep	Oct	
Heritage Regional Park	3090	03/14/2013	100%							
ETG @ Hampden	10011	05/01/2013	--							
Blackstone	10010	05/03/2013	--							
Rampart Range Road	2970	--	--							
Newlin Gulch	3070	--	--							
Carr Street	10012	--	--							
Maple Grove	10013	--	--							

B. Specific Issues Identified this Month

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

Table 3. Rain Sensors with Poor Performance Characteristics

Sensor ID	Description	Timer	Event	Comments
1200	Broomfield 3207	20%	4%	Data series from this site is poor.
840	Fire Station 12	45%	48%	Data series from this site is poor.
4330	Hansen Rain	60%	54%	
4100	Filter Plant	88%	57%	
4270	Cannon Mountain	67%	64%	
620	Quincy/Highline	63%	69%	
2980	Dakan Road	93%	64%	
1613	Holly Dam, data series for stage jumps all over for the entire month.			
4391, 4392, 4394	Unknown IDs coming from Boulder Falls 4/9..4/10, the problem was fixed on 4/10.			

C. Continuous Operation of Base Receiver/Decoder

The data feeds to the NS5 base station were in continuous operation for the entire month.

III. Rain Sensor Timer Reporting Summary

The following analysis assumes that each rain sensor has a 12-hour timer-reporting interval. The worst performing rain sensors for the month are summarized (Table 4).

Table 4. Monthly Summary of Sensors with Poor Timer Performance (Sensor ID)

Jan*	Feb*	Mar*	Apr	May	Jun	Jul	Aug	Sep	Oct*	Nov*	Dec*
4470	4470	2790	1200								
3070	4550	4550	840								
1660	4870	2710	800								
2790	2790	4870	4330								
4870	4490	4270	2360								
2320	4510	4190	620								

*- 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.

IV. 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 5). 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 5. District-Wide Total Tip/Count Statistical Summary

Statistical Parameter	Value	Comments
Mean	35.96	Only the 1-mm rain sensors were included in the analysis
Median	33	Only the 1-mm rain sensors were included in the analysis
Standard deviation	18.28	Only the 1-mm rain sensors were included in the analysis
Mean plus three standard deviations	90.80	Only the 1-mm rain sensors were included in the analysis
Minimum total count	2	No Name @ Quincy (730)/Elbert (1440)
Maximum total count	94	Shanahan Ridge (4810)

B. Monthly Average Tip/Count Summary

A monthly summary of the District-wide mean total tip/count is presented (Table 6).

Table 6. 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									

*- 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 7).

Table 7. Sensors with a Jump of 6 or More in Sequential Count

Sensor Description	Sensor ID	Comment
Many Boulder Stations	Many	All occurred in early April....likely due to low temperatures causing repeater outage
Iiff Pond	650	Site construction
Fire Station 12	840	
Broomfield 3207	1200	

D. Sensor-by-Sensor Incrementing Count Summary

The system-wide reception rate of incrementing, 1-mm tip reports for the month was approximately 91 percent. A total of 5,820 incrementing reports were received and a total of 6,360 reports were expected. The total loss of incrementing reports for the month was approximately 9 percent. Those sensors with the worst event transmission performance are summarized (Table 8).

Table 8. Monthly Summary of Sensors with the Most Missed Tips

Jan*	Feb*	Mar*	Apr	May	Jun	Jul	Aug	Sep	Oct*	Nov*	Dec*
4470	4510	4270	1200								
2330	2930	4490	840								
2980	4470	4790	4330								
1660	2980	4510	4100								
--	2730	4320	4270								
--	4790	4870	2980								

*-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.

V. Heavy Radio Traffic Analysis

Periods exceeding 1,000 messages per hour are analyzed independently in an attempt to quantify data loss rates from rain sensors using their sequential tip count series.

A. The Heaviest Hourly Traffic Periods This Month

The hourly periods of highest radio traffic this month are shown (Table 9). Each hour exceeding 1,000 reports was analyzed to quantify the number of missing rain reports for that hour.

Table 9. Periods of Heavy Radio Traffic

Day	Hour	Expected	Received	Total Load	Loss
14	1	143	143	1,067	0%
14	0	156	152	1,022	2.56%
30	21	22	22	1,017	0%
30	20	18	18	965	0%
30	11	0	0	957	0%

VI. 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 10).

Table 10. Summary of Unknown IDs

Description	Quantity
Total number of unknown IDs (IDs without a device definition)	439
Total reports from unknown IDs	2,589
Unknown IDs with only a single received report (potential noise)	286
Total reports from all IDs – RecData Log entire month	428,938
Unknown reports as a fraction of total reports	0.60%

The total number of reports from unknown sensors is very small relative to the total reports received for the month. Shown below (Table 11) are the total reports received from unknown sensor IDs for each month of the year.

Table 11. Monthly Summary of Total Reports from Unknown IDs

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								

The fraction of reports from unknown sensors relative to the total number of reports is shown below (Table 12).

Table 12. Monthly Percent of Unknown Sensor Reports

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%								

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 13).

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Table 13. Reports Received by Unknown IDs

Unknown ID	Reports	Comment
2733	396	Problem was fixed on 4/11/2013
2828	323	Change battery ID for EPC Haskins Gulch
2818	187	Change battery ID for Pine Cliff Road
4392	142	Bad ID from Boulder Falls fixed on 4/10/2013
4391	134	Bad ID from Boulder Falls fixed on 4/10/2013
4394	125	Bad ID from Boulder Falls fixed on 4/10/2013
4398	112	Bad ID from Boulder Falls fixed on 4/10/2013
2734	82	Problem was fixed on 4/11/2013
910	80	New Blackstone site
4396	75	Bad ID from Boulder Falls fixed on 4/10/2013
915	63	New Blackstone site

VII. Sensors with Invalid Reports

The following sensors had a large number of invalid reports (bit flip/contention errors/random decode):

Sensor ID	Description	Bad Reports	Comments
2230	Bear Cr below Cub	5	Random bad data decodes.
4870	SBC @ SB Road	4	Random bad data decodes.
2810	Pine Cliff Road	4	Random bad data decodes.
1613	Holly Dam	74	Poor data series for the entire month. The series jumps all over.
4393	Boulder Falls	72	This sensor went bad on the 9 th and 10 th . Looks to be fixed again on the 30 th .
2813	Pine Cliff Road	69	Invalid data flags when stage goes negative. Very little flow in the channel.

VIII. 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.

Urban Drainage and Flood Control District
ALERT Web Server

ID	Description	Alarm Type	Date
4880	Whispering Pines Precipitation-BO	FMC-BA 0.25" in 1 Hour Rainfall	4/3/2013 9:58
4090	Magnolia Precipitation-BO	FMC-BA 0.25" in 1 Hour Rainfall	4/3/2013 11:11
4730	Sugarloaf Precipitation-BO	FMC-BA 0.25" in 1 Hour Rainfall	4/3/2013 11:13
4850	Porphyry Mountain Precipitation-BO	FMC-BA 0.25" in 1 Hour Rainfall	4/3/2013 11:20
4180	Gold Lake Precipitation-BO	FMC-BA 0.25" in 1 Hour Rainfall	4/3/2013 11:34
4080	Twin Sisters Precipitation-BO	FMC-BA 0.25" in 1 Hour Rainfall	4/3/2013 11:48
4140	Logan Mill Precipitation-BO	FMC-BA 0.25" in 1 Hour Rainfall	4/3/2013 11:49
4150	Gold Hill Precipitation-BO	FMC-BA 0.25" in 1 Hour Rainfall	4/3/2013 12:20
4140	Logan Mill Precipitation-BO	FMC-BA 0.25" in 1 Hour Rainfall	4/24/2013 14:19

General System Analysis

Database Name

P:\A207-UDFCD-Data-Analysis\2013\04-2013\Novastar_extract_2013Apr.mdb

First Date in Database

4/1/13 12:00 AM

Total Days

30.0

Last Date in Database

4/30/13 11:59 PM

Total Hours

720.0

Total Records Analyzed

428,938

Records by Group

Wind Data	148,116	35%
Temperature	71,389	17%
Relative Humidity	64,154	15%
Barometric Pressure	31,079	7%
Battery Voltage	26,215	6%
Water Level	23,316	5%
Precipitation	17,360	4%
Solar Radiation	10,852	3%
Fuel Moisture	5,896	1%
Fuel Temperature	5,887	1%
Dew Point Temperature	5,229	1%
Peak Wind	5,229	1%
Wind Chill	5,229	1%
Soil Moisture	2,959	1%
Unknown	2,589	1%
Repeater Status Report	2,444	1%
12Hr Status Report	524	0%
Repeater Pass List	365	0%
Handar 585 ALARM Status	66	0%
Hayman Battery	24	0%
Solar Power	9	0%
ALERT/A2 Testing	6	0%
Dewpoint Temperature	1	0%
Total	428,938	

Records by Major Group

Meteorologic Sensors	177,474	41%
Water Level Sensors	23,316	5%
Rain Sensors	17,360	4%
Soil and Fuel Sensors	14,742	3%
Sensor Status Transmissions	3,408	1%
Total	236,300	

Traffic Loading Summary

Alert Reports	428,938	
Average Daily Traffic	14,298	
Average Hourly Traffic	596	
Median Hourly Traffic	582	hour beginning
Peak Hourly Traffic	1,067	Apr 14, 1:00 AM
2nd Max	1,022	Apr 14, 12:00 AM
3rd Max	1,017	Apr 30, 9:00 PM
4th Max	965	Apr 30, 8:00 PM
5th Max	957	Apr 30, 11:00 AM

Rain Timer Performance

Analyze Rain Sensors

Rain Sensors	Description	Rcv	Timer	Exp	Performance
1200	Broomfield 3207	12	11:58	60	20%
840	Fire Station 12	27	22:06	60	45%
800	Sable Ditch @ 18th	34	12:26	60	57%
4330	Hansen Rain	36	14:06	60	60%
2360	Indian Hills	37	17:27	60	62%
620	Quincy/Highline	38	15:40	60	63%
2790	Wx-W. Cherry Creek	38	16:38	60	63%
4270	Cannon Mountain	40	14:31	60	67%
4510	Pinewood Springs	40	14:06	60	67%
4870	SBC @ SB Road	40	16:17	60	67%
4770	Wx-Cal-Wood Ranch	41	12:00	60	68%
920	Wx-Aurora Town Hall	42	16:32	60	70%
4550	Boulder Jail	43	12:59	60	72%
2240	Cold Sprg Glch conf	44	15:26	60	73%
4490	Apple Valley	46	13:51	60	77%
2270	Cub Cr below Blue	47	12:44	60	78%
3020	Wx-West Creek WX	47	13:18	60	78%
4290	Red Hill	48	13:20	60	80%
4790	Wx-Button Rock	48	14:00	60	80%
1710	Shop Creek	49	14:24	60	82%
2800	Columbine Open Space	49	12:18	60	82%
4260	Taylor Mountain	49	12:54	60	82%
4250	Geer Canyon	50	12:59	60	83%
2230	Bear Cr below Cub	51	12:33	60	85%
2250	Rosedale	51	12:38	60	85%
4070	Bear Peak	51	12:33	60	85%
4190	Slaughterhouse	51	12:36	60	85%
4230	Golden Age	51	12:15	60	85%
4310	Johnny Park	51	12:17	60	85%
4360	Justice Center	51	12:56	60	85%
1350	Chatfield COE	52	12:34	60	87%
2850	Cherry Cr bl Bayou Glch	52	12:33	60	87%
4020	Rio Grande	52	12:16	60	87%
4030	Red Garden	52	12:17	60	87%
4340	Riverside	52	12:15	60	87%
1420	Wx-Diamond Hill	53	12:33	60	88%
4100	Filter Plant	53	12:15	60	88%
4110	Betasso	53	11:59	60	88%
4160	Sunshine	53	11:58	60	88%
4520	Eagle Ridge	53	12:01	60	88%
1530	Bear Creek @ Lowell	54	12:30	60	90%
1620	Slaughterhouse Glch	54	12:47	60	90%
2320	Choke Cherry Resvr	54	12:54	60	90%
2330	Morrison	54	12:47	60	90%
3010	EPC at Hwy 105	54	12:50	60	90%
4040	Martin Gulch	54	12:34	60	90%
4060	Lakeshore	54	12:15	60	90%
4320	Lee Hill Rain 2012	54	11:38	60	90%
4710	Wx-Ward C-1	54	13:05	60	90%
700	Toll Gate @ 6th	55	12:15	60	92%
720	Confluence Pond	55	12:28	60	92%
810	Granby Ditch @ 6th	55	12:30	60	92%
1050	Jeffco Fairgrounds	55	12:13	60	92%
1400	Upper Sloan Det.	55	12:44	60	92%

1660	SPR at Henderson	55	12:15	60	92%
2280	Kinney Peak	55	12:51	60	92%
2890	Spruce Mt - Douglas	55	12:44	60	92%
4050	Walker Ranch	55	12:29	60	92%
4180	Gold Lake	55	13:09	60	92%
4300	Big Elk Park	55	12:15	60	92%
4820	Doudy Draw	55	12:32	60	92%
540	Parker/Mississippi	56	12:29	60	93%
630	Temple Pond at DTC	56	12:13	60	93%
860	Sand Cr at Colfax	56	12:30	60	93%
1040	Lena @ U.S. Hwy 6	56	12:33	60	93%
1360	Denver Zoo	56	12:00	60	93%
1370	West Metro FS13	56	12:29	60	93%
1480	Third Creek at DIA	56	12:12	60	93%
1720	Cherry Cr @ Steele	56	12:32	60	93%
1800	Sand Creek Park	56	12:13	60	93%
2350	Idledale	56	12:47	60	93%
2730	Wx-Salisbury Park	56	12:14	60	93%
2900	Russelville Gulch-Douglas	56	12:32	60	93%
2960	Indian Creek	56	12:30	60	93%
2980	Dakan Rd	56	12:16	60	93%
4220	Fling's	56	12:16	60	93%
4570	St. Antons	56	12:34	60	93%
150	Nott Creek	57	11:57	60	95%
310	Guy Hill Ranch	57	12:13	60	95%
410	Kelly Dam	57	12:13	60	95%
530	Fire Station #19	57	11:57	60	95%
850	Flying J	57	12:29	60	95%
970	Pump Sta 3	57	12:27	60	95%
1000	Maple Grove Resv.	57	12:30	60	95%
1030	NREL/S. Table Mtn.	57	12:12	60	95%
1060	Heritage Square	57	12:13	60	95%
1100	Louisville Rec Ctr	57	12:15	60	95%
1310	LDC at 64th	57	11:58	60	95%
1340	Sanderson at Xavier	57	12:00	60	95%
1550	Lakewood CC	57	12:12	60	95%
1900	Niver Detention	57	12:27	60	95%
2370	Red Rocks Park	57	12:13	60	95%
2820	Haskins Gulch Conf	57	11:58	60	95%
2870	Cottonwood (Apache)	57	12:00	60	95%
2940	Willow Creek - DougCnty	57	12:15	60	95%
2950	DC Public Works	57	12:15	60	95%
3030	WX-Bingham Lake Park	57	12:00	60	95%
3060	Fire Sta 47	57	12:29	60	95%
3080	Tallman Gulch	57	12:15	60	95%
4830	SBC @ San Souci	57	11:58	60	95%
200	Leyden Reservoir	58	11:57	60	97%
210	Leyden Confluence	58	12:13	60	97%
300	Van Bibber Park	58	12:12	60	97%
420	Expo Park	58	12:12	60	97%
430	Utah Park	58	12:12	60	97%
510	Virginia Court	58	11:57	60	97%
610	Harvard @ Jackson	58	11:57	60	97%
820	ETG @ Buckley	58	12:12	60	97%
940	Sampson Gulch	58	12:12	60	97%
950	Piney at Liverpool	58	12:12	60	97%
1300	Hidden Lake	58	11:58	60	97%
1500	Powers Park	58	11:57	60	97%
1570	Wx-Brighton Ditch	58	12:13	60	97%

1640	SPR at Union Ave.	58	12:12	60	97%
1920	Wx-Brighton	58	12:00	60	97%
2310	Genesee Village	58	11:58	60	97%
2340	El Rancho	58	12:13	60	97%
2750	Wx-Castle Rock	58	12:13	60	97%
2860	CC at Stroh Rd	58	11:57	60	97%
2880	Happy Canyon at N Surrey Dr	58	12:00	60	97%
2910	East Cherry Cr-Douglas	58	12:13	60	97%
2920	West Cherry Head-Douglas Cnty	58	12:13	60	97%
3040	CC @ Prairie Canyon Ranch	58	12:13	60	97%
3050	East/West Trailhead	58	12:14	60	97%
4080	Twin Sisters	58	11:28	60	97%
4240	Sunset	58	12:28	60	97%
4750	Wx-Louisville Lake	58	12:15	60	97%
4810	Shanahan Ridge	58	11:57	60	97%
4850	Porphyry Mtn	58	12:15	60	97%
4860	Fairview Peak	58	12:15	60	97%
140	Wx-Blue Mountain	59	12:00	60	98%
220	Upper Leyden	59	12:00	60	98%
320	Sports Complex	59	11:58	60	98%
440	Fire Station #7	59	11:43	60	98%
500	Havana Park	59	11:58	60	98%
520	Jewell Detention	59	11:57	60	98%
640	Goldsmith @ Eastman	59	11:57	60	98%
710	Horseshoe Park Drop	59	11:58	60	98%
730	No Name @ Quincy	59	12:10	60	98%
760	Mission Viejo Park	59	11:57	60	98%
830	Side Creek Park	59	11:58	60	98%
870	Murphy Creek GC	59	12:00	60	98%
900	Wx-Aurora Reservoir	59	12:00	60	98%
1010	Denver West	59	11:57	60	98%
1110	Gunbarrel	59	11:58	60	98%
1440	Wx-Elbert	59	12:00	60	98%
1460	Wx-Urban Farm	59	12:00	60	98%
1520	Wx-Marston Lake North	59	12:00	60	98%
1600	Englewood Dam	59	11:57	60	98%
1700	Cherry Cr @ Champa	59	12:00	60	98%
1810	Sand Creek at mouth	59	11:58	60	98%
2210	Wx-Hiwan G.C.	59	12:00	60	98%
2810	Pine Cliff Road	59	12:00	60	98%
2930	Wx-Spring Valley Rd-DougCnty	59	12:00	60	98%
2990	Wx-Tomah Rd-DougCnty	59	12:00	60	98%
3090	Highland Heritage Park-A2	59	12:15	60	98%
4010	Crescent	59	11:58	60	98%
4140	Logan Mill	59	11:58	60	98%
4170	Pine Brook	59	11:59	60	98%
4730	Wx-Sugarloaf	59	12:00	60	98%
4880	Whispering Pines	59	11:57	60	98%
110	Ralston Reservoir	60	11:58	60	100%
120	West Woods	60	11:58	60	100%
330	Van Bibber @ Hwy 93	60	11:58	60	100%
400	Montview Park	60	11:58	60	100%
600	Harvard Gulch Park	60	11:58	60	100%
750	Wx-Quincy Reservoir	60	11:57	60	100%
1320	SPR at 3rd Ave	60	11:58	60	100%
2260	Brook Forest	60	11:58	60	100%
2840	Sulphur Gulch	60	11:30	60	100%
4130	Swiss Peaks	60	11:59	60	100%
4150	Gold Hill	60	11:58	60	100%

4200	Lazy Acres	60	10:27	60	100%
4530	Winiger Ridge	60	11:40	60	100%
4840	SBC@S Boulder Ditch	60	11:58	60	100%
4090	Magnolia	61	11:42	60	102%
4470	Little Narrows	61	8:52	60	102%
650	Iliff Pond	87	7:20	60	145%
5720	Four Mile Creek	4	0:01	60	7%
5740	Trail Creek	2	12:00	60	3%
5810	Stump Bump	1		60	
5860	Cedar Mountain	2	12:00	60	3%
5880	Hackett Mountain	2	12:00	60	3%
5900	Horse Creek-Satellite	21	0:01	60	35%

Rain Event Performance			Reports Received	5,820	Analyze Rain Sensors											
	Systemwide Avg	Total Tips	6,360													
	91.51%	Data Loss	8.49%													
Description	Sensor	Performance	1-tips	2-tips	3-tips	4-tips	5-tips	6-tips	>6-tips	Rcv	Exp	Miss	Hold	Bucket		
Broomfield 3207	1200	4%	1	0	0	0	0	0	1	1	23	0	0	0.0393701		
Fire Station 12	840	48%	19	0	1	0	0	0	2	20	42	2	0	0.0393701		
Hansen Rain	4330	54%	30	2	2	0	0	0	2	34	63	6	0	0.0393701		
Filter Plant	4100	57%	17	0	0	0	0	0	1	17	30	0	0	0.0393701		
Cannon Mountain	4270	64%	19	2	0	0	0	0	1	21	33	2	0	0.0393701		
Dakan Rd	2980	64%	14	14	1	0	0	0	0	29	45	16	0	0.0393701		
Iliff Pond	650	66%	42	1	1	0	0	0	2	44	67	3	0	0.0393701		
Taylor Mountain	4260	66%	27	2	0	0	0	0	1	29	44	2	0	0.0393701		
Quincy/Highline	620	69%	18	2	3	1	0	0	0	24	35	11	0	0.0393701		
Big Elk Park	4300	70%	27	0	1	0	0	0	1	28	40	2	0	0.0393701		
Riverside	4340	71%	32	2	0	0	0	0	1	34	48	2	0	0.0393701		
Denver Zoo	1360	71%	24	6	0	1	1	0	0	32	45	13	0	0.0393701		
Wx-Cal-Wood Ranch	4770	71%	28	1	0	1	0	0	1	30	42	4	0	0.0393701		
Rio Grande	4020	72%	31	0	0	0	0	0	1	31	43	0	0	0.0393701		
Cold Sprg Glch conf	2240	72%	20	4	1	0	1	0	0	26	36	10	0	0.0393701		
Wx-Button Rock	4790	76%	42	1	1	0	0	0	1	44	58	3	0	0.0393701		
Pinewood Springs	4510	76%	52	5	0	0	1	0	1	58	76	9	0	0.0393701		
Johnny Park	4310	77%	50	6	0	0	0	0	1	56	73	6	0	0.0393701		
Bear Peak	4070	78%	42	0	0	0	0	0	1	42	54	0	0	0.0393701		
Walker Ranch	4050	78%	17	0	0	0	0	1	0	18	23	5	0	0.0393701		
Little Narrows	4470	80%	55	7	2	2	0	0	0	66	83	17	0	0.0393701		
Wx-W. Cherry Creek	2790	83%	9	0	1	0	0	0	0	10	12	2	0	0.0393701		
Apple Valley	4490	84%	29	7	0	0	0	0	0	36	43	7	0	0.0393701		
Wx-Highlands Ranch WTP	2710	84%	13	3	0	0	0	0	0	16	19	3	0	0.0393701		
Eagle Ridge	4520	84%	33	4	0	1	0	0	0	38	45	7	0	0.0393701		
Slaughterhouse	4190	85%	59	1	0	0	0	0	1	60	71	1	0	0.0393701		
Sunshine	4160	85%	54	1	0	0	0	0	1	55	65	1	0	0.0393701		
Red Hill	4290	85%	53	2	0	0	0	0	1	55	65	2	0	0.0393701		
Justice Center	4360	85%	68	3	0	1	0	0	1	72	85	6	0	0.0393701		
Red Garden	4030	85%	43	3	0	0	0	1	0	47	55	8	0	0.0393701		
Bear Cr below Cub	2230	86%	33	4	0	0	0	0	1	37	43	4	0	0.0393701		
Martin Gulch	4040	87%	59	5	0	0	0	1	0	65	75	10	0	0.0393701		
Sand Cr at Colfax	860	88%	18	3	0	0	0	0	0	21	24	3	0	0.0393701		
Morrison	2330	88%	38	4	1	0	0	0	0	43	49	6	0	0.0393701		
Confluence Pond	720	88%	13	2	0	0	0	0	0	15	17	2	0	0.0393701		
Chatfield COE	1350	89%	21	3	0	0	0	0	0	24	27	3	0	0.0393701		
Cherry Cr @ Steele	1720	89%	28	4	0	0	0	0	0	32	36	4	0	0.0393701		
SBC @ SB Road	4870	89%	57	6	1	0	0	0	0	64	72	8	0	0.0393701		
SPR at Henderson	1660	89%	15	2	0	0	0	0	0	17	19	2	0	0.0393701		
Indian Hills	2360	90%	33	0	2	0	0	0	0	35	39	4	0	0.0393701		
Twin Sisters	4080	90%	31	4	0	0	0	0	0	35	39	4	0	0.0393701		
Golden Age	4230	90%	26	0	0	1	0	0	0	27	30	3	0	0.0393701		
Wx-Aurora Town Hall	920	91%	9	1	0	0	0	0	0	10	11	1	0	0.0393701		
Sable Ditch @ 18th	800	92%	21	2	0	0	0	0	0	23	25	2	0	0.0393701		
Toll Gate @ 6th	700	92%	22	2	0	0	0	0	0	24	26	2	0	0.0393701		
Haskins Gulch Conf	2820	93%	23	2	0	0	0	0	0	25	27	2	0	0.0393701		
Wx-Salisbury Park	2730	93%	12	1	0	0	0	0	0	13	14	1	0	0.0393701		
Indian Creek	2960	93%	24	2	0	0	0	0	0	26	28	2	0	0.0393701		
Boulder Jail	4550	93%	51	2	1	0	0	0	0	54	58	4	0	0.0393701		
Third Creek at DIA	1480	93%	13	1	0	0	0	0	0	14	15	1	0	0.0393701		
Whispering Pines	4880	94%	55	4	0	0	0	0	0	59	63	4	0	0.0393701		
Betasso	4110	94%	75	0	0	0	0	1	0	76	81	5	0	0.0393701		
Englewood Dam	1600	94%	15	1	0	0	0	0	0	16	17	1	0	0.0393701		
Leyden Confluence	210	94%	31	2	0	0	0	0	0	33	35	2	0	0.0393701		
Kelly Dam	410	94%	16	1	0	0	0	0	0	17	18	1	0	0.0393701		
El Rancho	2340	94%	16	1	0	0	0	0	0	17	18	1	0	0.0393701		
Rosedale	2250	95%	33	2	0	0	0	0	0	35	37	2	0	0.0393701		
Fling's	4220	95%	50	3	0	0	0	0	0	53	56	3	0	0.0393701		
ETG @ Buckley	820	95%	17	1	0	0	0	0	0	18	19	1	0	0.0393701		
Choke Cherry Resvr	2320	95%	34	2	0	0	0	0	0	36	38	2	0	0.0393701		
Ralston Reservoir	110	95%	18	1	0	0	0	0	0	19	20	1	0	0.0393701		
Sanderson at Xavier	1340	95%	36	2	0	0	0	0	0	38	40	2	0	0.0393701		
Wx-West Creek WX	3020	95%	18	1	0	0	0	0	0	19	20	1	0	0.0393701		
Doudy Draw	4820	95%	55	3	0	0	0	0	0	58	61	3	0	0.0393701		
Shop Creek	1710	95%	19	1	0	0	0	0	0	20	21	1	0	0.0393701		
Van Bibber @ Hwy 93	330	95%	39	2	0	0	0	0	0	41	43	2	0	0.0393701		
CC at Stroh Rd	2860	96%	21	1	0	0	0	0	0	22	23	1	0	0.0393701		
Sand Creek Park	1800	96%	22	1	0	0	0	0	0	23	24	1	0	0.0393701		
Sulphur Gulch	2840	96%	22	1	0	0	0	0	0	23	24	1	0	0.0393701		
Red Rocks Park	2370	96%	46	2	0	0	0	0	0	48	50	2	0	0.0393701		
Montview Park	400	96%	24	1	0	0	0	0	0	25	26	1	0	0.0393701		
Sand Creek at mouth	1810	96%	24	1	0	0	0	0	0	25	26	1	0	0.0393701		
Cherry Cr bl Bayou Glch	2850	96%	24	1	0	0	0	0	0	25	26	1	0	0.0393701		
Cottonwood (Apache)	2870	96%	24	1	0	0	0	0	0	25	26	1	0	0.0393701		

SBC@S Boulder Ditch	4840	96%	74	3	0	0	0	0	0	0	77	80	3	0	0.0393701
WX-Bingham Lake Park	3030	96%	26	1	0	0	0	0	0	0	27	28	1	0	0.0393701
LDC at 64th	1310	97%	27	1	0	0	0	0	0	0	28	29	1	0	0.0393701
Fire Sta 47	3060	97%	28	1	0	0	0	0	0	0	29	30	1	0	0.0393701
West Metro FS13	1370	97%	29	1	0	0	0	0	0	0	30	31	1	0	0.0393701
Sunset	4240	97%	29	1	0	0	0	0	0	0	30	31	1	0	0.0393701
Upper Leyden	220	97%	31	1	0	0	0	0	0	0	32	33	1	0	0.0393701
Bear Creek @ Lowell	1530	97%	31	1	0	0	0	0	0	0	32	33	1	0	0.0393701
Kinney Peak	2280	97%	31	1	0	0	0	0	0	0	32	33	1	0	0.0393701
Flying J	850	97%	32	1	0	0	0	0	0	0	33	34	1	0	0.0393701
Brook Forest	2260	97%	32	1	0	0	0	0	0	0	33	34	1	0	0.0393701
St. Antons	4570	97%	65	2	0	0	0	0	0	0	67	69	2	1	0.0393701
Fire Station #7	440	97%	36	1	0	0	0	0	0	0	37	38	1	0	0.0393701
Harvard @ Jackson	610	97%	36	1	0	0	0	0	0	0	37	38	1	0	0.0393701
Lakewood CC	1550	97%	36	1	0	0	0	0	0	0	37	38	1	0	0.0393701
Cub Cr below Blue	2270	97%	36	1	0	0	0	0	0	0	37	38	1	1	0.0393701
Geer Canyon	4250	97%	72	2	0	0	0	0	0	0	74	76	2	0	0.0393701
Leyden Reservoir	200	97%	37	1	0	0	0	0	0	0	38	39	1	0	0.0393701
Fire Station #19	530	98%	40	1	0	0	0	0	0	0	41	42	1	0	0.0393701
Denver West	1010	98%	40	1	0	0	0	0	0	0	41	42	1	0	0.0393701
Lee Hill Rain 2012	4320	98%	42	1	0	0	0	0	0	2	43	44	1	0	0.0393701
Wx-Diamond Hill	1420	98%	43	1	0	0	0	0	0	0	44	45	1	0	0.0393701
Wx-Louisville Lake	4750	98%	43	1	0	0	0	0	0	0	44	45	1	0	0.0393701
Nott Creek	150	98%	44	1	0	0	0	0	0	0	45	46	1	0	0.0393701
Lena @ U.S. Hwy 6	1040	98%	44	1	0	0	0	0	0	0	45	46	1	0	0.0393701
Idledale	2350	98%	45	1	0	0	0	0	0	0	46	47	1	0	0.0393701
Wx-Sugarloaf	4730	98%	45	1	0	0	0	0	0	0	46	47	1	0	0.0393701
Genesee Village	2310	98%	46	1	0	0	0	0	0	0	47	48	1	0	0.0393701
Lakeshore	4060	98%	48	1	0	0	0	0	0	0	49	50	1	0	0.0393701
Crescent	4010	98%	49	1	0	0	0	0	0	0	50	51	1	0	0.0393701
Magnolia	4090	98%	51	1	0	0	0	0	0	0	52	53	1	0	0.0393701
Gold Lake	4180	98%	53	1	0	0	0	0	0	0	54	55	1	0	0.0393701
Pine Brook	4170	98%	55	1	0	0	0	0	0	0	56	57	1	0	0.0393701
SBC @ San Souci	4830	99%	68	1	0	0	0	0	0	0	69	70	1	0	0.0393701
Shanahan Ridge	4810	99%	92	1	0	0	0	0	0	0	93	94	1	0	0.0393701
Lazy Acres	4200	100%	61	0	0	0	0	0	0	1	61	61	0	0	0.0393701
West Woods	120	100%	45	0	0	0	0	0	0	0	45	45	0	0	0.0393701
Wx-Blue Mountain	140	100%	34	0	0	0	0	0	0	0	34	34	0	0	0.0393701
Van Bibber Park	300	100%	27	0	0	0	0	0	0	0	27	27	0	0	0.0393701
Guy Hill Ranch	310	100%	24	0	0	0	0	0	0	0	24	24	0	0	0.0393701
Sports Complex	320	100%	35	0	0	0	0	0	0	0	35	35	0	0	0.0393701
Expo Park	420	100%	21	0	0	0	0	0	0	0	21	21	0	0	0.0393701
Utah Park	430	100%	36	0	0	0	0	0	0	0	36	36	0	0	0.0393701
Havana Park	500	100%	3	0	0	0	0	0	0	0	3	3	0	0	0.0393701
Virginia Court	510	100%	34	0	0	0	0	0	0	0	34	34	0	0	0.0393701
Jewell Detention	520	100%	27	0	0	0	0	0	0	0	27	27	0	0	0.0393701
Parker/Mississippi	540	100%	31	0	0	0	0	0	0	0	31	31	0	0	0.0393701
Harvard Gulch Park	600	100%	27	0	0	0	0	0	0	0	27	27	0	0	0.0393701
Temple Pond at DTC	630	100%	32	0	0	0	0	0	0	0	32	32	0	0	0.0393701
Goldsmith @ Eastman	640	100%	29	0	0	0	0	0	0	0	29	29	0	0	0.0393701
Horseshoe Park Drop	710	100%	21	0	0	0	0	0	0	0	21	21	0	0	0.0393701
No Name @ Quincy	730	100%	2	0	0	0	0	0	0	0	2	2	0	0	0.0393701
Wx-Quincy Reservoir	750	100%	14	0	0	0	0	0	0	0	14	14	0	0	0.0393701
Mission Viejo Park	760	100%	26	0	0	0	0	0	0	0	26	26	0	0	0.0393701
Granby Ditch @ 6th	810	100%	29	0	0	0	0	0	0	0	29	29	0	0	0.0393701
Side Creek Park	830	100%	23	0	0	0	0	0	0	0	23	23	0	0	0.0393701
Murphy Creek GC	870	100%	22	0	0	0	0	0	0	0	22	22	0	0	0.0393701
Piney at Liverpool	950	100%	21	0	0	0	0	0	0	0	21	21	0	0	0.0393701
Pump Sta 3	970	100%	10	0	0	0	0	0	0	0	10	10	0	0	0.0393701
Maple Grove Resv.	1000	100%	49	0	0	0	0	0	0	0	49	49	0	0	0.0393701
NREL/S. Table Mtn.	1030	100%	28	0	0	0	0	0	0	0	28	28	0	0	0.0393701
Jeffco Fairgrounds	1050	100%	28	0	0	0	0	0	0	0	28	28	0	0	0.0393701
Heritage Square	1060	100%	33	0	0	0	0	0	0	0	33	33	0	0	0.0393701
Louisville Rec Ctr	1100	100%	40	0	0	0	0	0	0	0	40	40	0	0	0.0393701
Gunbarrel	1110	100%	36	0	0	0	0	0	0	0	36	36	0	0	0.0393701
Hidden Lake	1300	100%	26	0	0	0	0	0	0	0	26	26	0	0	0.0393701
SPR at 3rd Ave	1320	100%	37	0	0	0	0	0	0	0	37	37	0	0	0.0393701
Upper Sloan Det.	1400	100%	32	0	0	0	0	0	0	0	32	32	0	0	0.0393701
Wx-Elbert	1440	100%	2	0	0	0	0	0	0	0	2	2	0	0	0.0393701
Wx-Urban Farm	1460	100%	27	0	0	0	0	0	0	0	27	27	0	0	0.0393701
Powers Park	1500	100%	36	0	0	0	0	0	0	0	36	36	0	0	0.0393701
Wx-Marston Lake North	1520	100%	30	0	0	0	0	0	0	0	30	30	0	0	0.0393701
Wx-Brighton Ditch	1570	100%	15	0	0	0	0	0	0	0	15	15	0	0	0.0393701
Slaughterhouse Glch	1620	100%	24	0	0	0	0	0	0	0	24	24	0	0	0.0393701
SPR at Union Ave.	1640	100%	22	0	0	0	0	0	0	0	22	22	0	0	0.0393701
Cherry Cr @ Champa	1700	100%	24	0	0	0	0	0	0	0	24	24	0	0	0.0393701
Niver Detention	1900	100%	19	0	0	0	0	0	0	0	19	19	0	0	0.0393701
Wx-Brighton	1920	100%	22	0	0	0	0	0	0	0	22	22	0	0	0.0393701
Wx-Hiwan G.C.	2210	100%	30	0	0	0	0	0	0	0	30	30	0	0	0.0393701

Wx-Castle Rock	2750	100%	10	0	0	0	0	0	0	10	10	0	0	0.0393701
Columbine Open Space	2800	100%	26	0	0	0	0	0	0	26	26	0	0	0.0393701
Pine Cliff Road	2810	100%	26	0	0	0	0	0	0	26	26	0	0	0.0393701
Happy Canyon at N Surrey Dr	2880	100%	23	0	0	0	0	0	0	23	23	0	0	0.0393701
Spruce Mt - Douglas	2890	100%	7	0	0	0	0	0	0	7	7	0	0	0.0393701
Russelville Gulch-Douglas	2900	100%	22	0	0	0	0	0	0	22	22	0	0	0.0393701
East Cherry Cr-Douglas	2910	100%	7	0	0	0	0	0	0	7	7	0	0	0.0393701
West Cherry Head-Douglas C	2920	100%	8	0	0	0	0	0	0	8	8	0	0	0.0393701
Wx-Spring Valley Rd-DougCn	2930	100%	8	0	0	0	0	0	0	8	8	0	0	0.0393701
Willow Creek - DougCnty	2940	100%	14	0	0	0	0	0	0	14	14	0	0	0.0393701
DC Public Works	2950	100%	21	0	0	0	0	0	0	21	21	0	0	0.0393701
Wx-Tomah Rd-DougCnty	2990	100%	36	0	0	0	0	0	0	36	36	0	0	0.0393701
CC @ Prairie Canyon Ranch	3040	100%	8	0	0	0	0	0	0	8	8	0	0	0.0393701
East/West Trailhead	3050	100%	17	0	0	0	0	0	0	17	17	0	0	0.0393701
Tallman Gulch	3080	100%	24	0	0	0	0	0	0	24	24	0	0	0.0393701
Highland Heritage Park-A2	3090	100%	27	0	0	0	0	0	0	27	27	0	0	0.0393701
Swiss Peaks	4130	100%	47	0	0	0	0	0	0	47	47	0	0	0.0393701
Logan Mill	4140	100%	58	0	0	0	0	0	0	58	58	0	0	0.0393701
Gold Hill	4150	100%	62	0	0	0	0	0	0	62	62	0	0	0.0393701
Winiger Ridge	4530	100%	72	0	0	0	0	0	0	72	72	0	0	0.0393701
Wx-Ward C-1	4710	100%	41	0	0	0	0	0	0	41	41	0	0	0.0393701
Wx-Aurora Reservoir	900	100%	12	0	0	0	0	0	0	12	12	0	0	0.0393699
Sampson Gulch	940	100%	27	0	0	0	0	0	0	27	27	0	0	0.0393699
TOTALS			5,582	204	19	8	3	4	26	5,820	6,360	298	2	
EPC at Hwy 105	3010	87%	48	6	1	0	0	0	0	55	63	8	0	0.01
Porphory Mtn	4850	93%	93	6	1	0	0	0	0	100	108	8	0	0.01
Fairview Peak	4860	98%	121	2	0	0	0	0	0	123	125	2	0	0.01
Trail Creek	5740	100%	1	0	0	0	0	0	0	1	1	0	0	0.0393701
Stump Bump	5810	50%	0	1	0	0	0	0	0	1	2	1	0	0.0393701
Cedar Mountain	5860	50%	0	1	0	0	0	0	0	1	2	1	0	0.0393701
Horse Creek-Satellite	5900	67%	2	2	0	0	0	0	0	4	6	2	0	0.0393701

2013 Monthly ALERT Radio Traffic Summary

