

Memo

Date: February 6, 2014
To: Kevin Stewart
From: Markus Ritsch
Subject: January 2014 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 January 1 through January 31, 2014.

II. General System Analysis Summary

In 2014 data will be received at the District through both the legacy ALERT channel and through the ALET2 (concentrator plus A2 self-reports) channel. The following table quantifies the data reception through each telemetry source. 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. All other repeaters in the system send data on both legacy and A2 channels.

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

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Legacy	320,303											
Concentrator	508,306											
ALERT2	129,855											
TOTAL	958,464	0	0	0	0	0	0	0	0	0	0	0
Conc+A2	638,161											
Conc/Leg	1.59											
DataChron	498,846											

The daily ratio of ALERT2 reports received versus legacy ALERT reports received is shown (Figure 1). Beginning on January 6, 2014 a significant decrease in received A2 reports occurred at Diamond Hill. This problem was only present at Diamond Hill as the Contrail base at OneRain was still collecting A2 data. In response to an inquiry from WET on Tuesday, January 7, 2014 Dave Leader wrote "*I patched the ALERT/ALERT2 data collection software. For some reason after the restart, there were two versions of the ALERT2 receive data running that were competing. I fixed this at 16:30 today.*" The ALERT2 data collection again went down on January 8, 2014. After a second inquiry by WET, Dave Leader wrote "*Found the problem. I added more source address information in the receive data log and had a memory problem. Data collection is back up.*"

On February 2nd the debian operating system running the NS5 virtual server was hung. The server was rebooted by Derrick on February 3rd at 11:20 AM. In response to an inquiry by WET on February 3rd, Dave Leader wrote "*I can connect now. Checking the data I discovered the data filing got jammed at 02/02/12 15:21:28 and was unjammed at 02/03/14 09:44:46. I will re-file the logged data collected during this period. This may have something to do with the memory leak I found in the receive data program. I hope to fix that today. It is not a hardware problem, but a software problem. The receive data program was updated to log source address information. This update had a memory leak. A memory leak is when a program allocates system memory and then does not release it. A very small bit of memory was not released, but over time this adds up. Eventually the receive program uses all available memory and stops filing data. Fortunately, the data collection still works because of my buffered data design. That way I can recover the data not filed after discovering the problem.*"

After the system re-boot by Derrick on February 3rd, it was noticed that system log files have not been generated by the debian OS. It was subsequently discovered that the system message files were stopped during an OS upgrade that occurred in 2013. The OS was re-initialized on February 4th and now system log files are again being generated. These files are critical in order to identify problems with the hardware, software and OS after a crash.

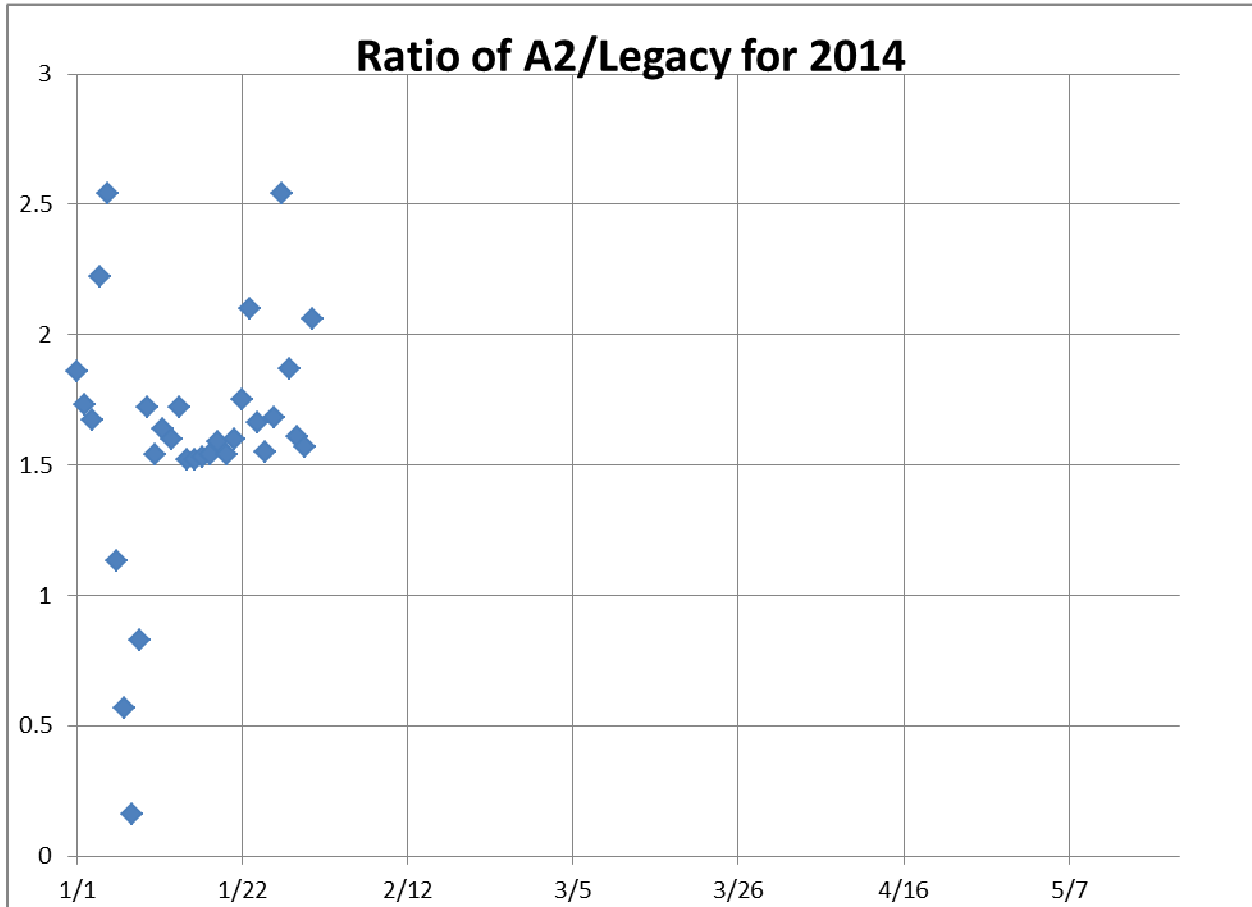


Figure 1. Daily Ratio of ALERT2/Legacy Reports

A. Continuous Operation of Base Receiver/Decoder

The NS5 base station was **NOT** in continuous operation for the entire month. The NS5 base was down for periods on January 6, 7 and 8. The NS5 base first went down on January 6 just after 4:00 PM and came back on line January 7th at 2:00 PM. The NS5 base went back off line on January 8th just after 2:00 AM and came back on line on January 9th at 10:00 AM. The NS5 base was back in full operation beginning January 9th at 10:00 AM for the entire month.

Dave Leader from HydroLynx was making software upgrades to the NS5 base during this period. The ALERT/A2 data collection server was down during these periods.

B. Specific Issues Identified this Month

Performance of the following sensors (Table 2) was questionable this month.

Table 2. Sensors with Poor Performance Characteristics

Sensor ID	Description	Timer	Event	Comments
4470	Little Narrows	38%	100%	
2710	Highlands Ranch WTP	42%	100%	
2330	Morrison	61%	89%	
4520	Eagle Ridge	88%	46%	
2790	West Cherry Creek Weather Station – Sending bad data – WET to investigate			
1383	Ferril Lake – strange data reports resulting in large number of invalid reports			

C. 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 is tracked throughout the 2014 flood season in the table below.

Table 3. Event Performance of New A2 Sites (percent)

Description	ID	Install Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug*	Sep*	Oct	Nov	Dec
Heritage Regional Park	3090	03/14/2013	n/a											
ETG @ Hampden	100110	05/01/2013	n/a											
Blackstone	100100	05/03/2013	n/a											
Newlin Gulch	3070	05/24/2013	100											
Carr Street	100	05/31/2013	n/a											
Maple Grove	1000	05/20/2013	100											
New site 2014														
New site 2014														
New site 2014														
New site 2014														
New site 2014														
New site 2014														

Only two A2 self-reporting sites remain operational over the winter and they are Newlin Gulch and Maple Grove Reservoir.

D. 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											
2710											
2330											
4870											
920											
3010											

*- 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 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	6.88	Only the 1-mm rain sensors were included in the analysis
Median	6	Only the 1-mm rain sensors were included in the analysis
Standard deviation	5.27	Only the 1-mm rain sensors were included in the analysis
Mean plus three standard deviations	22.67	Only the 1-mm rain sensors were included in the analysis
Minimum total count	1	Numerous stations
Maximum total count	25	Betasso – Boulder County (4110)

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	45.87	16.39	52.33	50.63	229.74	29.64	5.86	4.00	42.46
2014	6.88												

*- 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
W. Cherry Creek - Wx	4790	Many jumps in count including 2047 and 255. Scheduled for field visit by WET in February.
Sunset	4240	Several bad reports received on January 3.

D. Sensor-by-Sensor Incrementing Count Summary

The system-wide reception rate of incrementing, 1-mm tip reports for the month was approximately 96 percent. A total of 483 incrementing reports were received and a total of 502 reports were expected. The total loss of incrementing reports for the month was approximately 4 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*
4520											
4010											
4170											
3030											
1460											
1700											

*-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. 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). The five heaviest hours of radio traffic are analyzed to quantify the number of missing rain reports for that hour.

Table 9. Periods of Heavy Radio Traffic (total load includes legacy and A2 reports)

Day	Hour	Expected	Received	Total Load	Loss
21	7	12	12	1,702	0.00%
15	9	2	2	1,695	0.00%
21	14	3	3	1,670	0.00%
21	13	5	5	1,654	0.00%
22	8	6	6	1,648	0.00%

V. 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	Conc & A2	Legacy
Total number of unknown IDs (IDs without a device definition)	217	286
Total reports from unknown IDs	870	1,001
Unknown IDs with only a single received report (potential noise)	79	121
Total reports from all IDs – RecData Log entire month	638,161	320,303
Unknown reports as a fraction of total reports	0.14%	0.31%

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 (Conc & A2)

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											

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 (Conc & A2)

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%											

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).

Table 13. Reports Received by Unknown IDs

ALERT2		Legacy ALERT		Comment
Unknown ID	Reports	Unknown ID	Reports	
1470	38	1470	42	
1534	34	1534	32	
1443	28	1443	31	
4505	27	1951	31	
1951	26	4505	27	
4499	26	4499	26	
1919	20	1950	24	
1929	19	1919	20	

VI. Sensors with Invalid Reports

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

Sensor ID	Description	Invalid Reports	Comments
2793	W. Cherry Creek	561	Having cold weather issues with transmitter....WET to visit.
2790	W. Cherry Creek	61	Having cold weather issues with transmitter....WET to visit.
1383	Ferril Lake	481	Strange data series resulting in many invalid reports
1530	Bear Creek at Lowell	18	Eighteen reports received for the month all flagged as questionable
3013	EPC @ Hwy 105	53	Lower limit violation less than stage = 0.00 feet.....

VII. 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.

No rainfall alarms recorded this month.

General System Analysis

Database Name P:\A207-UDFCD-Data-Analysis\2014\1-2014\Novastar_extract_2014Jan.mdb

First Date in Database	12/31/13 11:59 PM	Total Days	31.0
Last Date in Database	1/31/14 11:59 PM	Total Hours	744.0

Total Records Analyzed 638,161

Records by Group

Wind Data	277,676	44%
Temperature	97,892	15%
Relative Humidity	86,853	14%
Barometric Pressure	43,680	7%
Battery Voltage	32,222	5%
Water Level	14,334	2%
Dew Point Temperature	14,228	2%
Wind Chill	14,215	2%
Peak Wind	14,140	2%
Solar Radiation	13,193	2%
Precipitation	7,716	1%
Fuel Moisture	7,308	1%
Fuel Temperature	7,256	1%
Soil Moisture	3,607	1%
Repeater Status Report	2,207	0%
Unknown	870	0%
Flasher Status	372	0%
12Hr Status Report	239	0%
Repeater Pass List	104	0%
Solar Power	44	0%
ALERT/A2 Testing	3	0%
Handar 585 ALARM Status	1	0%
Longmont Water Level PT	1	0%
Total	638,161	

Records by Major Group

Meteorologic Sensors	241,618	38%
Soil and Fuel Sensors	18,171	3%
Water Level Sensors	14,335	2%
Rain Sensors	7,716	1%
Sensor Status Transmissions	2,595	0%
Total	284,435	

Traffic Loading Summary

	A2 & Concentrator	Legacy	
Alert Reports	638,161	320,303	
Average Daily Traffic	19,943	10,332	
Average Hourly Traffic	831	431	
Median Hourly Traffic	735	369	hour beginning
Peak Hourly Traffic	1,702	952	Jan 21, 7:00 AM
2nd Max	1,695	924	Jan 21, 6:00 AM
3rd Max	1,670	910	Jan 21, 2:00 PM
4th Max	1,654	906	Jan 21, 1:00 PM
5th Max	1,648	870	Jan 22, 8:00 AM

Rain Timer Performance

Analyze Rain Sensors

Rain Sensors	Description	Rcv	Timer	Exp	Performance
4470	Little Narrows	24	20:56	64	38%
2710	Wx-Highlands Ranch WTP	27	23:32	64	42%
2330	Morrison	39	18:57	64	61%
4870	SBC @ SB Road	45	14:46	64	70%
920	Wx-Aurora Town Hall	46	14:56	64	72%
3010	WX-EPC at Hwy 105	48	13:48	64	75%
2730	Wx-Salisbury Park	49	12:48	64	77%
2320	Choke Cherry Resvr	52	13:31	64	81%
2750	Wx-Castle Rock	52	14:12	64	81%
4330	Hansen Rain	52	13:56	64	81%
4790	Wx-Button Rock	52	12:58	64	81%
1660	SPR at Henderson	53	13:28	64	83%
2930	Wx-Spring Valley Rd-DougCnty	53	13:38	64	83%
3030	WX-Bingham Lake Park	53	12:35	64	83%
4240	Sunset	53	13:09	64	83%
4510	Pinewood Springs	53	11:58	64	83%
4550	Boulder Jail	53	12:29	64	83%
970	Pump Sta 3	54	12:55	64	84%
4190	Slaughterhouse	55	13:22	64	86%
4490	Apple Valley	55	12:52	64	86%
1000	A2-Maple Grove Resv.	56	12:29	64	88%
2990	Wx-Tomah Rd-DougCnty	56	12:00	64	88%
3020	Wx-West Creek WX	56	12:00	64	88%
4050	Walker Ranch	56	12:52	64	88%
4270	Cannon Mountain	56	13:05	64	88%
4520	Eagle Ridge	56	12:13	64	88%
4250	Geer Canyon	57	13:05	64	89%
4830	SBC @ San Souci	57	12:40	64	89%
140	Wx-Blue Mountain	58	12:26	64	91%
1440	Wx-Elbert	58	12:37	64	91%
4030	Red Garden	58	12:39	64	91%
4040	Martin Gulch	58	12:41	64	91%
4070	Bear Peak	58	12:24	64	91%
4220	Fling's	58	12:25	64	91%
4290	Red Hill	58	12:26	64	91%
4300	Big Elk Park	58	12:34	64	91%
4570	St. Antons	58	12:38	64	91%
4710	Wx-Ward C-1	58	12:39	64	91%
4810	Shanahan Ridge	58	12:37	64	91%
700	Toll Gate @ 6th	59	12:26	64	92%
4010	Crescent	59	12:24	64	92%
4020	Rio Grande	59	12:10	64	92%
4060	Lakeshore	59	12:24	64	92%
4140	Logan Mill	59	12:24	64	92%
4150	Gold Hill	59	12:25	64	92%
4160	Sunshine	59	12:23	64	92%
4180	Gold Lake	59	12:22	64	92%
4350	Conifer Hill	59	12:23	64	92%
4850	Porphyry Mtn	59	12:25	64	92%
150	Nott Creek	60	12:10	64	94%
1460	Wx-Urban Farm	60	12:12	64	94%
1520	Wx-Marston Lake North	60	12:13	64	94%
1640	SPR at Union Ave.	60	12:11	64	94%
1700	Cherry Cr @ Champa	60	12:13	64	94%

1920	Wx-Brighton	60	12:13	64	94%
2210	Wx-Hiwan G.C.	60	12:13	64	94%
4080	Twin Sisters	60	12:10	64	94%
4170	Pine Brook	60	12:10	64	94%
4200	Lazy Acres	60	12:10	64	94%
4260	Taylor Mountain	60	12:10	64	94%
4320	Lee Hill Rain 2012	60	12:10	64	94%
4360	Justice Center	60	12:11	64	94%
4530	Winiger Ridge	60	12:10	64	94%
4880	Whispering Pines	60	12:10	64	94%
110	Ralston Reservoir	61	12:09	64	95%
750	Wx-Quincy Reservoir	61	11:57	64	95%
900	Wx-Aurora Reservoir	61	12:00	64	95%
1420	Wx-Diamond Hill	61	12:00	64	95%
1570	Wx-Brighton Ditch	61	12:00	64	95%
4090	Magnolia	61	11:58	64	95%
4310	Johnny Park	61	11:57	64	95%
4340	Riverside	61	11:58	64	95%
4730	Wx-Sugarloaf	61	12:00	64	95%
4770	Wx-Cal-Wood Ranch	61	12:00	64	95%
4820	Doudy Draw	61	11:58	64	95%
4840	SBC@S Boulder Ditch	61	11:58	64	95%
4860	Fairview Peak	61	12:00	64	95%
4100	Filter Plant	62	11:59	64	97%
4110	Betasso	62	11:46	64	97%
4130	Swiss Peaks	62	11:59	64	97%
4230	Golden Age	62	11:57	64	97%
4750	Wx-Louisville Lake	62	11:47	64	97%
3070	Newlin Gulch-A2	111	6:17	64	173%
2790	Wx-W. Cherry Creek	124	4:29	64	194%

Rain Event Performance																			
		Reports Received	483	Analyze Rain Sensors															
	Systemwide Avg	Total Tips	502																
	96.22%	Data Loss	3.78%																
Description	Sensor	Performance	1-tips	2-tips	3-tips	4-tips	5-tips	6-tips	>6-tips	Rcv	Exp	Miss	Hold	Bucket					
Eagle Ridge	4520	46%	6	0	0	0	0	0	1	6	13	0	0	0.03937					
Crescent	4010	80%	3	1	0	0	0	0	0	4	5	1	0	0.03937	Mean		6.8767		
Pine Brook	4170	83%	4	1	0	0	0	0	0	5	6	1	0	0.03937	Median		6		
WX-Bingham Lake Park	3030	85%	10	0	1	0	0	0	0	11	13	2	0	0.03937	St. Dev		5.265		
Wx-Urban Farm	1460	88%	6	1	0	0	0	0	0	7	8	1	0	0.03937	Mean plus 3 SD		22.672		
Cherry Cr @ Champa	1700	88%	6	1	0	0	0	0	0	7	8	1	0	0.03937	Min		1		
Morrison	2330	89%	7	1	0	0	0	0	0	8	9	1	0	0.03937	Max		25		
Justice Center	4360	89%	15	2	0	0	0	0	0	17	19	2	0	0.03937					
Wx-Tomah Rd-DougCnty	2990	90%	8	1	0	0	0	0	0	9	10	1	0	0.03937					
SBC @ San Souci	4830	92%	10	1	0	0	0	0	0	11	12	1	0	0.03937					
Geer Canyon	4250	92%	11	1	0	0	0	0	0	12	13	1	0	0.03937					
Ralston Reservoir	110	100%	1	0	0	0	0	0	0	1	1	0	0	0.03937					
Wx-Blue Mountain	140	100%	3	0	0	0	0	0	0	3	3	0	0	0.03937					
Nott Creek	150	100%	3	0	0	0	0	0	0	3	3	0	0	0.03937					
Toll Gate @ 6th	700	100%	5	0	0	0	0	0	0	5	5	0	0	0.03937					
Wx-Quincy Reservoir	750	100%	2	0	0	0	0	0	0	2	2	0	0	0.03937					
Wx-Aurora Town Hall	920	100%	1	0	0	0	0	0	0	1	1	0	0	0.03937					
A2-Maple Grove Resv.	1000	100%	12	0	0	0	0	0	0	12	12	0	0	0.03937					
Wx-Diamond Hill	1420	100%	12	0	0	0	0	0	0	12	12	0	0	0.03937					
Wx-Marston Lake North	1520	100%	18	0	0	0	0	0	0	18	18	0	0	0.03937					
SPR at Union Ave.	1640	100%	6	0	0	0	0	0	0	6	6	0	0	0.03937					
SPR at Henderson	1660	100%	6	0	0	0	0	0	0	6	6	0	0	0.03937					
Wx-Brighton	1920	100%	7	0	0	0	0	0	0	7	7	0	0	0.03937					
Wx-Hiwan G.C.	2210	100%	4	0	0	0	0	0	0	4	4	0	0	0.03937					
Choke Cherry Resvr	2320	100%	7	0	0	0	0	0	0	7	7	0	0	0.03937					
Wx-Highlands Ranch WTP	2710	100%	4	0	0	0	0	0	0	4	4	0	0	0.03937					
Wx-Salisbury Park	2730	100%	2	0	0	0	0	0	0	2	2	0	0	0.03937					
Wx-Castle Rock	2750	100%	2	0	0	0	0	0	0	2	2	0	0	0.03937					
Wx-W. Cherry Creek	2790	100%	4	0	0	0	0	0	21	4	4	0	0	0.03937					
Wx-Spring Valley Rd-DougCnty	2930	100%	1	0	0	0	0	0	0	1	1	0	0	0.03937					
Wx-West Creek WX	3020	100%	5	0	0	0	0	0	0	5	5	0	0	0.03937					
Rio Grande	4020	100%	3	0	0	0	0	0	0	3	3	0	0	0.03937					
Red Garden	4030	100%	9	0	0	0	0	0	0	9	9	0	0	0.03937					
Martin Gulch	4040	100%	13	0	0	0	0	0	0	13	13	0	0	0.03937					
Walker Ranch	4050	100%	2	0	0	0	0	0	0	2	2	0	0	0.03937					
Lakeshore	4060	100%	4	0	0	0	0	0	0	4	4	0	0	0.03937					
Bear Peak	4070	100%	6	0	0	0	0	0	0	6	6	0	0	0.03937					
Magnolia	4090	100%	6	0	0	0	0	0	0	6	6	0	0	0.03937					
Filter Plant	4100	100%	8	0	0	0	0	0	0	8	8	0	0	0.03937					
Betasso	4110	100%	25	0	0	0	0	0	0	25	25	0	0	0.03937					
Swiss Peaks	4130	100%	3	0	0	0	0	0	0	3	3	0	0	0.03937					
Logan Mill	4140	100%	7	0	0	0	0	0	0	7	7	0	0	0.03937					
Gold Hill	4150	100%	6	0	0	0	0	0	0	6	6	0	0	0.03937					
Sunshine	4160	100%	2	0	0	0	0	0	0	2	2	0	0	0.03937					
Slaughterhouse	4190	100%	6	0	0	0	0	0	0	6	6	0	0	0.03937					
Lazy Acres	4200	100%	14	0	0	0	0	0	0	14	14	0	0	0.03937					
Fling's	4220	100%	7	0	0	0	0	0	0	7	7	0	0	0.03937					
Golden Age	4230	100%	1	0	0	0	0	0	0	1	1	0	0	0.03937					
Sunset	4240	100%	1	0	0	0	0	0	2	1	1	0	0	0.03937					
Taylor Mountain	4260	100%	2	0	0	0	0	0	0	2	2	0	0	0.03937					

Cannon Mountain	4270	100%	2	0	0	0	0	0	0	2	2	0	0	0.03937
Red Hill	4290	100%	16	0	0	0	0	0	0	16	16	0	0	0.03937
Johnny Park	4310	100%	14	0	0	0	0	0	0	14	14	0	0	0.03937
Lee Hill Rain 2012	4320	100%	4	0	0	0	0	0	0	4	4	0	0	0.03937
Hansen Rain	4330	100%	4	0	0	0	0	0	0	4	4	0	0	0.03937
Riverside	4340	100%	2	0	0	0	0	0	0	2	2	0	0	0.03937
Conifer Hill	4350	100%	4	0	0	0	0	0	0	4	4	0	0	0.03937
Little Narrows	4470	100%	11	0	0	0	0	0	0	11	11	0	0	0.03937
Apple Valley	4490	100%	1	0	0	0	0	0	0	1	1	0	0	0.03937
Pinewood Springs	4510	100%	15	0	0	0	0	0	0	15	15	0	0	0.03937
Boulder Jail	4550	100%	14	0	0	0	0	0	0	14	14	0	0	0.03937
St. Antons	4570	100%	2	0	0	0	0	0	0	2	2	0	0	0.03937
Wx-Ward C-1	4710	100%	3	0	0	0	0	0	0	3	3	0	0	0.03937
Wx-Sugarloaf	4730	100%	2	0	0	0	0	0	0	2	2	0	0	0.03937
Wx-Louisville Lake	4750	100%	6	0	0	0	0	0	0	6	6	0	0	0.03937
Wx-Cal-Wood Ranch	4770	100%	1	0	0	0	0	0	0	1	1	0	0	0.03937
Wx-Button Rock	4790	100%	4	0	0	0	0	0	0	4	4	0	0	0.03937
Shanahan Ridge	4810	100%	8	0	0	0	0	0	0	8	8	0	0	0.03937
Doudy Draw	4820	100%	7	0	0	0	0	0	0	7	7	0	0	0.03937
SBC@S Boulder Ditch	4840	100%	18	0	0	0	0	0	0	18	18	0	0	0.03937
SBC @ SB Road	4870	100%	12	0	0	0	0	0	0	12	12	0	0	0.03937
Whispering Pines	4880	100%	1	0	0	0	0	0	0	1	1	0	0	0.03937
Wx-Aurora Reservoir	900	100%	5	0	0	0	0	0	0	5	5	0	0	0.03937
		Total Tips	472	10	1	0	0	0	24	483	502	12	0	
A2-Newlin Gulch	3070	81%	12	0	0	1	0	0	0	13	16	9	0	0.019685
WX-EPC at Hwy 105	3010	100%	11	0	0	0	0	0	1	11	11	0	0	0.01
Porphory Mtn	4850	100%	1	0	0	0	0	0	0	1	1	0	0	0.01
Fairview Peak	4860	100%	2	0	0	0	0	0	0	2	2	0	0	0.01

2014 Monthly Peak Hour ALERT Radio Traffic Summary

