

# Memo



**Date:** May 7, 2016  
**To:** Kevin Stewart  
**From:** Markus Ritsch  
**Subject:** April 2016 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 April 1 through April 30, 2016.

## II. General System Analysis Summary

The District receives data 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 from Recdatalog)**

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Tot
Legacy	118,519	264,375	241,517	266,465									624,411
Concentrator	194,948	418,430	407,965	435,747									1,021,343
ALERT2	136,144	399,530	505,195	540,654									1,040,869
<b>TOTAL</b>	<b>449,611</b>	<b>1,082,335</b>	<b>1,154,677</b>	<b>1,242,866</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2,686,623</b>
Conc/Leg	1.64	1.58	1.69	1.64	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.64
DataChron	645,913	662,847	674,426	742,749									1,983,186

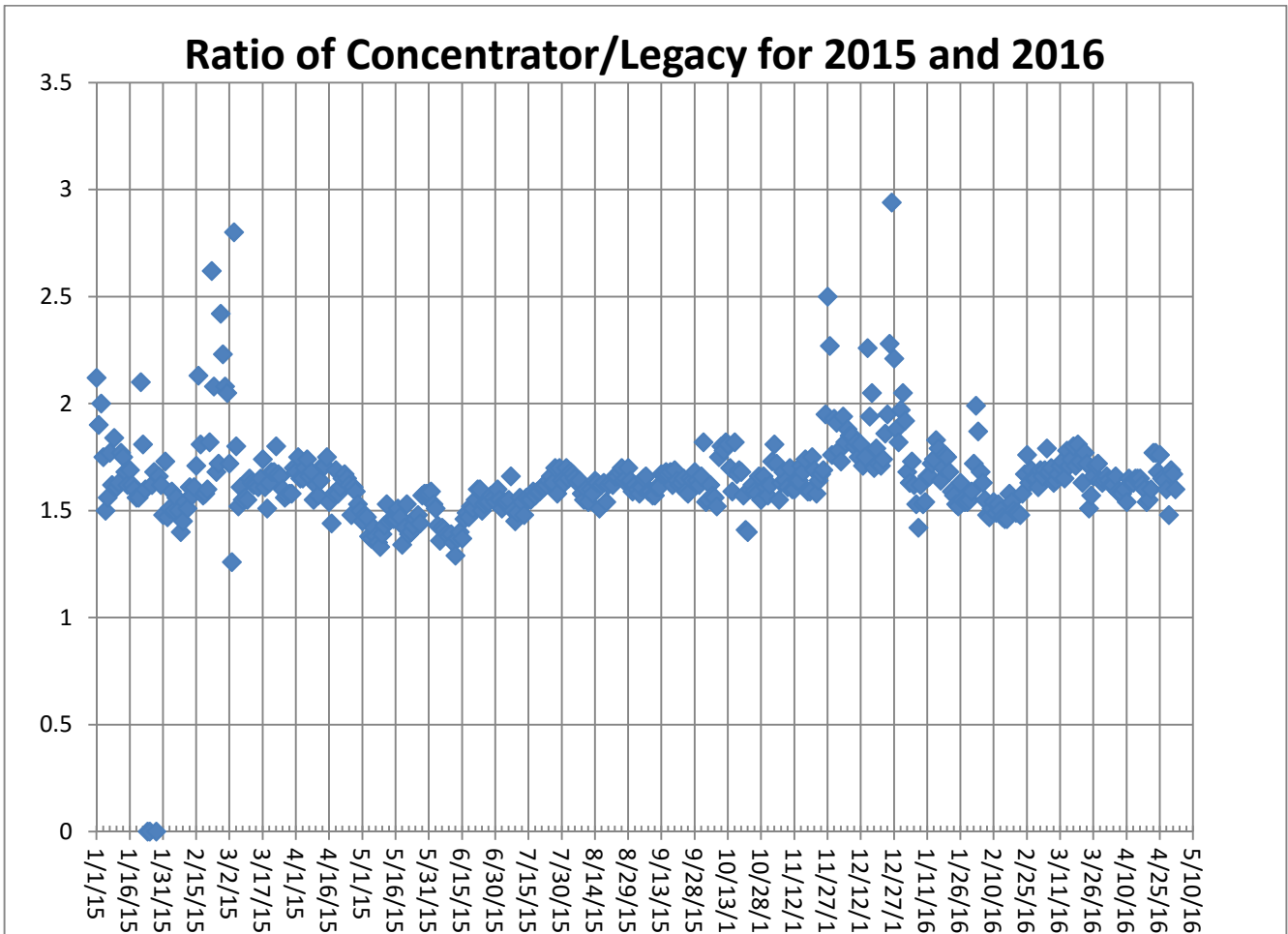
The District operates two redundant NovaStar5 base stations: the primary (ns5a) at Diamond Hill and a redundant base (ns5b) at Greenhouse Data. Additional analyses are conducted on the data received by these two base stations (Table 2). The data received by both base stations for the month are shown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

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

NS5A (Diamond Hill)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Tot
Legacy	118,519	264,375	241,517	266,465									890,876
Concentrator	194,948	418,430	407,965	435,747									1,457,090
ALERT2	136,144	399,530	505,195	540,654									1,581,523
<b>NS5B (Greenhouse)</b>													
Legacy	118,610	264,516	263,959	266,509									913,594
Concentrator	194,968	418,532	446,510	435,558									1,495,568
ALERT2	136,330	399,841	552,747	540,161									1,629,079
<b>Diff (NS5a-NS5b)</b>													
Legacy (Digi One)	-91	-141	-22,442	-44	0	0	0	0	0	0	0	0	-22,718
Concentrator (B2010)	-20	-102	-38,545	189	0	0	0	0	0	0	0	0	-38,478
ALERT2 (B2010)	-186	-311	-47,552	493	0	0	0	0	0	0	0	0	-47,556
Comments	Recdatalog format changed...missing 1/3 of the month		DH base was down for a period										

The reception rates between Diamond Hill and Greenhouse are consistent this month.

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 becomes more volatile in the cold months as the Blue Mountain repeater has problems with legacy ALERT reporting when the temperature drops.

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

The base station was in continuous operation for the entire month. Data was collected on a continuous basis for every hour of every day for a total of 720 hours of operation. Outages of less than one hour are not identified.

## **B. Specific Issues Identified**

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>
2790	Wx-West Cherry Cr	Poor event performance and timer
10026	Wx-A2-Trumbull	Poor event performance
4260	Taylor Mountain	Poor event performance
950	Piney at Liverpool	Poor event performance
2330	Morrison	Poor event performance
2271, 2272, 2274	Unknown IDs	Possibly coming from Cub Creek below Blue (2270)
623	Unknown ID with a large number of 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)
Newlin Gulch	3070		0.967	0.996	0.991	0.991
Heritage Regional Park	3090		0.981	0.989	0.973	0.988
Magnolia	6601		0.981	0.987	0.996	0.985
Blackstone	10010		1.00	1.00	0.990	1.00
ETG @ Hampden	10011		0.997	0.997	0.990	0.983
Carr Street (100)	10012		0.984	0.996	0.978	0.933
Maple Grove (1000)	10013		0.972	0.997	0.996	0.987
Upper Sellers	10014	n/a				
Haystack Road	10015	n/a				
Sand Cr at Colfax	10016		0.992	0.987	1.00	0.991
James Creek	10017		0.615	--	0.998	0.950
Lower Left Hand (4453)	10018		0.993	--	0.994	0.897
Murphy Creek (870)	10019		1.00	0.998	0.998	0.995
OneRain Weather	10020		0.897	0.998	0.930	0.981
S. St. Vrain at Berry Ridge	10021		--	--	0.988	0.616
Arvada/Blunn Reservoir	10022		1.00	0.999	0.980	0.993
Havana Pond	10023		0.994	0.997	0.997	0.995
Westerly Creek Dam	10024		0.998	0.998	0.997	0.995
Lena @ Nolte Pond (1023)	10025		0.995	0.996	0.994	0.978
Trumbull (Hayman)	10026	0.842				
West Creek (Hayman)	10027	--				
Diamond Hill (1420)	10028		0.997	0.997	0.994	0.983
Plum Creek at Sedalia	10029	0.987				
Coal Creek at McCaslin	10030		0.997	0.998	0.998	0.992
Boulder Cr. Broadway (4583)	10031		0.989	0.629	0.977	0.998
Weir Gulch	10032		0.888	0.907	0.958	0.807
Side Creek Park	10033		--	--	--	--
Not Used	10034		--	--	--	--
Sanderson Gulch	10035		0.923	0.954	0.939	0.954
Porphyry Mtn	10036		--	--	--	--

## D. ALERT2 Repeater Loading

The District's 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**

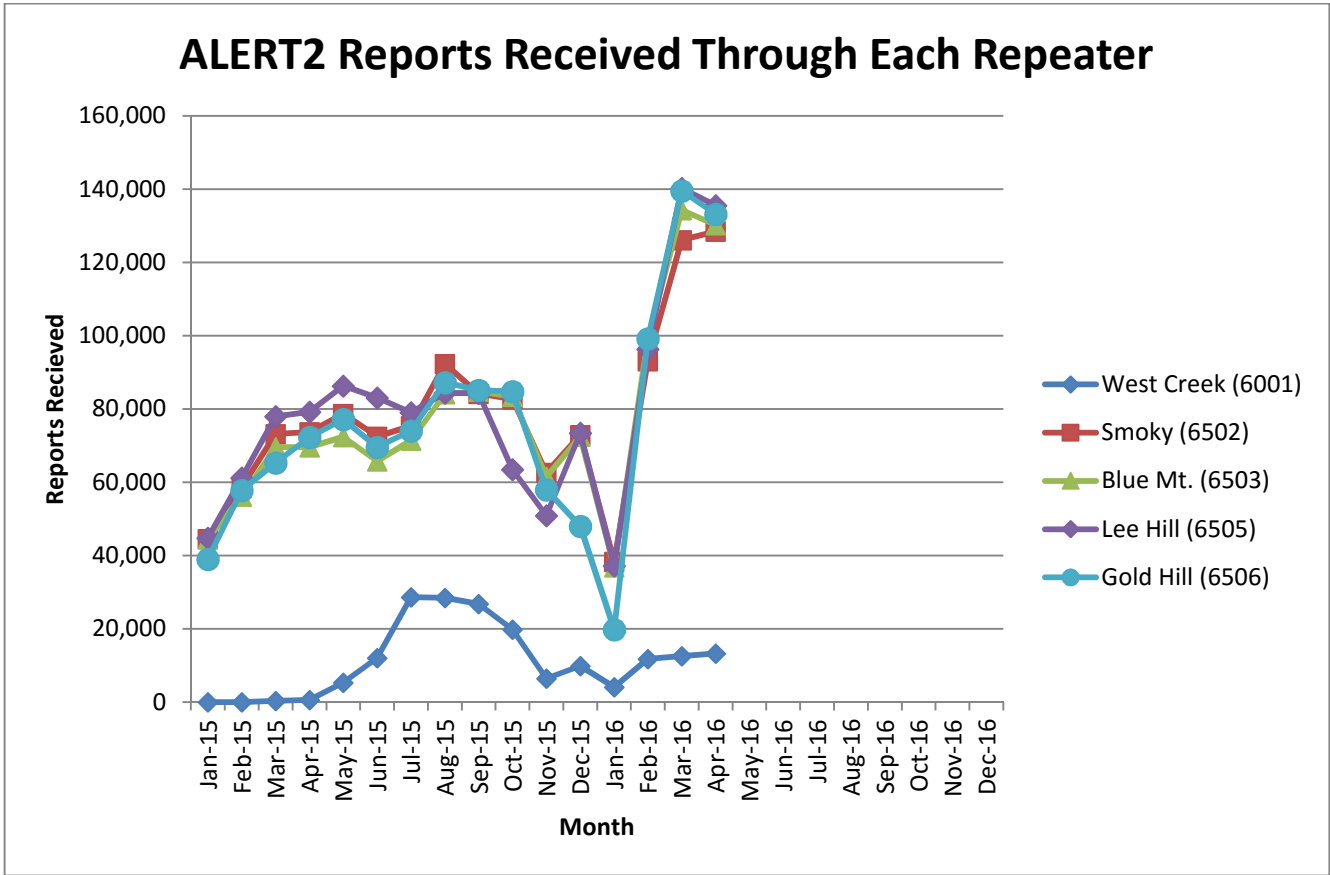
Repeater	Slot Size (sec)	Slot Offset (sec)	Source Address	ALERT2 Input Frequency (MHz)	ALERT2 Output Frequency (MHz) – received at Diamond Hill
West Creek	2	0	6001	169.425	170.300
Smoky	3	2	6502	169.525	170.300
Blue Mt.	4	5	6503	169.525	170.300
Lee Hill	3	9	6505	169.525	170.300
Gold Hill	3	12	6506	169.525	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). This helps to quantify repeater loading for the ALERT2 backbone.

**Table 6. ALERT2 Reports Received through Each Repeater (Only A2 Self Reports)**

Month-Yr	West Creek (6001)	Smoky (6502)	Blue Mt. (6503)	Lee Hill (6505)	Gold Hill (6506)	TOTAL
Jan-15	0	44,501	44,636	44,783	39,007	172,927
Feb-15	0	58,543	56,150	61,160	57,764	233,617
Mar-15	346	73,198	69,604	77,968	65,323	286,439
Apr-15	595	73,711	69,568	79,215	72,310	295,399
May-15	5,259	78,694	72,340	86,297	77,174	319,764
June-15	11,987	72,449	65,742	82,998	69,570	302,746
July-15	28,595	75,379	71,394	79,026	74,041	328,435
Aug-15	28,409	92,299	84,057	84,363	87,211	376,339
Sep-15	26,809	84,143	84,776	84,289	85,123	365,140
Oct-15	19,775	82,683	83,390	63,475**	84,825	334,148
Nov-15	6,438	62,615	61,477	50,888	58,004	239,422
Dec-15	9,835	72,886	72,465	73,431	47,996	276,613
Jan-16	4,034	38,348	36,826	37,168	19,768	138,160
Feb-16	11,732	93,120	99,206	96,284	99,188	399,530
Mar-16	12,533	126,123	134,329	140,226	139,536	552,747
Apr-16	13,262	128,473	130,223	135,499	133,197	540,654

\*\* - The number of reports coming through Lee Hill declined in October



**Figure 2. Reports received through each repeater (ALERT2 Only)**

In general each of the primary repeaters in the District process an equivalent number of ALERT2 reports. Several months are evident where the throughput of one repeater is not consistent with the other three. The reduction of ALERT2 reports through Lee Hill in October is evident (Figure 2) as is the reduction of ALERT2 reports through Gold Hill in December. A convenient mechanism to track repeater performance throughout the year is to monitor total ALERT2 reports passed by each repeater.

The following tables summarize the system-wide latency of ALERT2 self-reports (Table 7 and Table 8).

**Table 7. System-Wide Latency of ALERT2 Self-Reports (seconds)**

Statistical Parameter	Value (sec)	Comments
Mean	67.48	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	745	The maximum time it took for a report to go from the field to the base
Crazy	--	Exceedingly large latency

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

Statistical Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	66.17	72.6	75.36	67.48								
Minimum	3	2	1	3								
Maximum	300	261	521	745								
Station with Max Latency	Magnolia WX (6602)	Magnolia WX (6607)	Sand Cr (10016)	Magnolia WX (6601)								
Station with Crazy Latency		Trumbull WX – Hayman (100260)	Magnolia WX (6607)	--								

The large latency of 745 seconds from the Magnolia WX (SA 6601) through all four repeaters occurred on April 28<sup>th</sup>. Below are the readings taken from OneRain’s Contrail system for the air temperature reading from the Magnolia WX on the date/time in question. One can see that the readings taken in the field were received at the base station approximately 8 to 12 minutes after they were read in the field.

Field Reading Date/Time, Base Receive Date/Time, Value, Unit, Quality  
 2016-04-28 11:06:42, 2016-04-28 11:14:49, 23.4, F, A  
 2016-04-28 11:02:42, 2016-04-28 11:14:49, 23.5, F, A

This large delay was observed through each repeater and it was observed at all three base stations (Contrails, Diamond Hill and Greenhouse). It is suspected that this delay was introduced by the remote transmitter.

### ***E. TDMA Time Slot Size***

ALERT2 networks will have problems with missing timed station reports when they have transmit times at some stations that exceeded the TDMA slot size. For example, a test transmission from a site will be received when it's sent manually from the site but the timed transmissions are not received. This is a problem with the station preceding the missing station exceeding its slot size in the TDMA assignment.

A program is written for the UDFCD that checks the receive data log files looking for station reports that are too long. For example, when you look at lines with MANT TS=... the Length=# is the data packet size. It should not be more than 45 bytes.

The following stations exceeded the allowable 0.5ms time slot.

) Magnolia WX (6601)

Currently no slot assignment has yet been made for the slot immediately following Magnolia WX.

### ***F. Inefficient ALERT2 Packets***

An inefficient ALERT2 packet contains multiple (MANT) data packets per air link packet. ALERT2 supports the composition of air link packets containing multiple data values in a single MANT packet. Using a single MANT packet for each data packet is an efficient use of the ALERT2 protocol and should be avoided. The following sites were identified as possibly being configured inefficiently:

- ) Newlin Gulch (3070) – Campbell Scientific
- ) OneRain Weather (10020) – Campbell Scientific
- ) Diamond Hill (10028) - ?
- ) Plum Creek at Sedalia (10029) – Campbell Scientific



## G. 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 9).

**Table 9. Monthly Summary of Sensors with Poor Timer Performance (Sensor ID)**

Jan*	Feb*	Mar*	Apr	May	Jun	Jul	Aug	Sep	Oct*	Nov*	Dec*
10026	3020	4470	4850								
4550	4520	2790	2790								
2330	2790	4850	2360								
4270	4850	5940	1420								
1660	10026	10023	4270								
4330	10020	10026	4520								

\*- 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 10). 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 10. District-Wide Total Tip/Count Statistical Summary**

Statistical Parameter	Value	Comments
Mean	52.1	Only the 1-mm rain sensors were included in the analysis
Median	51	Only the 1-mm rain sensors were included in the analysis
Standard deviation	19.1	Only the 1-mm rain sensors were included in the analysis
Mean plus three standard deviations	109	Only the 1-mm rain sensors were included in the analysis
Mean minus two standard deviations	13.9	Only the 1-mm rain sensors were included in the analysis
Minimum total count	4	SBC @ S. Boulder Ditch (4840)
Maximum total count	103	Denver Zoo (1360)
Sensors showing <b>NO</b> rain for the month		Plum Creek at Sedalia (10029) and Little Dry Creek @ 64 <sup>th</sup> (1310)
Sensors greater than 3 SD (over reporting)	--	--

## B. Monthly Average Tip/Count Summary

A monthly summary of the District-wide mean total tip/count is presented (Table 11).

**Table 11. 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	7.16	53.28	22.08	10.80	44.39
2016	4.68	9.91	32.30	52.1									

\*- 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 12).

**Table 12. Sensors with a Jump of 6 or More in Sequential Count**

Sensor Description	Sensor ID	Comment
Wx-West Cherry Creek	2790	Several large jumps ....problem at this site.....WET to investigate
Taylor Mountain	4260	One large jump ....possible due to a start-up field activity

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

The system-wide reception rate of incrementing, 1-mm tip reports for the month was approximately 94 percent. A total of 9,111 incrementing reports were received and a total of 9,685 reports were expected. The total loss of incrementing reports for the month was approximately 6 percent. Those sensors with the worst event transmission performance are summarized (Table 13).

**Table 13. Monthly Summary of Sensors with the Worst Performance**

Jan*	Feb*	Mar*	Apr	May	Jun	Jul	Aug	Sep	Oct*	Nov*	Dec*
1530	4270	2790	2790								
4550	10026	10026	5900								
1640	2790	5940	4260								
4180	4240	4790	950								
1660	5940	4510	2330								
4840	4510	4870	1480								

\*-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 14).

**Table 14. Summary of Unknown IDs**

Description	Concentrator	Legacy	A2
Total number of unknown IDs (IDs without a device definition)	382	388	0
Total reports from unknown IDs	3,586	3,353	0
Unknown IDs with only a single received report (potential noise)	220	252	0
Total reports from all IDs – RecData Log entire month	435,747	266,465	540,654
Unknown reports as a fraction of total reports	0.82%	1.26%	0%

The total number of reports from unknown sensors is very small relative to the total reports received for the month. Shown below (Table 15) are the total reports received from unknown sensor IDs for each month of the year.

**Table 15. 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	1,153	1,063	600	619
2016	323	1,241	3,085	3,586								

The fraction of reports from unknown sensors relative to the total number of reports is shown below (Table 16).

**Table 16. 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%	0.29%	0.24%	0.15%	0.15%
2016	0.10%	0.30%	0.69%	0.82%								

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 17).

**Table 17. Reports Received by Unknown IDs**

Concentrator		Legacy ALERT		Comment
Unknown ID	Reports	Unknown ID	Reports	
2274	1,406	2274	1,343	From Cub Creek below Blue (2270)
2272	318	2272	307	From Cub Creek below Blue (2270)
2271	309	2271	293	From Cub Creek below Blue (2270)
623	105	623	104	
2283	83	2283	80	
443	60	443	60	

## V. Sensors with Invalid Reports

The sensors below (Table 18 and Table 19) 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 18. Rain Sensors with the Most Invalid Reports**

Sensor ID	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1530-Bear Cr. At Lowell	8	5	10	3								
2810-Pine Cliff Rd.	--	18	11	8								
2750-Wx-Castle Rock	10	24	0	0								
2980-Dakan Road	--	--	--	8								
2990-Tomah Rd.	--	12	2	2								
3010-Wx-EPC @ 105	--	--	8	10								
3020-Wx-West Creek	9	103	96	111								
3050-E/W Trailhead	--	--	8	7								
3070-Newlin Gulch	10	52	5	0								
4030-Red Garden	23	41	3	4								

The antenna system at the West Creek repeater is deteriorating and will require maintenance as soon as WET can travel up to the repeater this spring. The likely cause of the poor performance of many Douglas County sites is the deteriorating antenna system at West Creek.

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

<b>Sensor ID</b>	<b>Jan</b>	<b>Feb</b>	<b>Mar</b>	<b>Apr</b>	<b>May</b>	<b>Jun</b>	<b>Jul</b>	<b>Aug</b>	<b>Sep</b>	<b>Oct</b>	<b>Nov</b>	<b>Dec</b>
<b>203-Leyden Res</b>	11	22	37	15								
<b>413-Kelly Dam</b>	--	70	2	2								
<b>653-GG at Iliff Pond</b>	--	--	--	15								
<b>713-Horseshoe Park Drop</b>	--	--	--	12								
<b>723-WTG ab Conf Pond</b>	--	--	66	4								
<b>853-Flying J</b>	--	36	57	58								
<b>1203-Brmfld/Pond6</b>	--	--	261	0								
<b>1323-SPR at 3<sup>rd</sup> Ave</b>	--	--	--	78								
<b>1383-Ferril Lake</b>	747	703	686	714								
<b>1803-Sand Cr Park</b>	--	9	0	0								
<b>2273-Cub Cr bl Blue</b>	--	--	37	49								
<b>2873-Cottonwood</b>	--	--	85	2807								
<b>2883-Happy Canyon</b>	--	--	62	0								
<b>3013-EPC@Hwy 105</b>	7	19	11	4								
<b>3043-CC@Russelville</b>	--	--	22	5								
<b>4563-Lyons Diversion</b>	--	13	13	10								

## 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.

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<b>ID</b>	<b>Description</b>	<b>Alarm Type</b>	<b>Date/Time</b>
2970	Rampart Range Road Precipitation-DG	2970 Rampart Range Road 0.2" in 30 Minutes Rainfall	4/19/2016 13:45
2970	Rampart Range Road Precipitation-DG	2970 Rampart Range Road 0.4" in 1 Hour Rainfall	4/19/2016 14:30
950	Piney at Liverpool Precipitation-AR	Plains 10 minute rainfall	4/20/2016 11:04
950	Piney at Liverpool Precipitation-AR	Tweet Arapahoe County Heavy Rain 0.5"-10min	4/20/2016 11:04
950	Piney at Liverpool Precipitation-AR	Tweet Aurora Heavy Rain 0.5"-10min	4/20/2016 11:04
2970	Rampart Range Road Precipitation-DG	2970 Rampart Range Road 0.2" in 30 Minutes Rainfall	4/27/2016 10:30

# General System Analysis

**Database Name** P:\A207-UDFCD-Data-Analysis\2016\04-2016\Novastar\_extract\_2016Apr.mdb

<b>First Date in Database</b>	3/31/16 11:59 PM	<b>Total Days</b>	30.0
<b>Last Date in Database</b>	4/30/16 11:59 PM	<b>Total Hours</b>	720.0

Summarize

**Total Records Analyzed** 435,747

Records by Group	Concentrator	Percent	Legacy	Percent	ALERT2	Percent
Wind Data	164,305	37.71%	93,641	35.14%	178,595	33.03%
Temperature	66,313	15.22%	34,803	13.06%	78,607	14.54%
Relative Humidity	57,735	13.25%	34,744	13.04%	77,156	14.27%
Barometric Pressure	33,643	7.72%	20,456	7.68%	502	0.09%
Water Level	30,930	7.10%	20,806	7.81%	51,825	9.59%
Battery Voltage	29,373	6.74%	13,635	5.12%	60,020	11.10%
Precipitation	19,213	4.41%	15,372	5.77%	34,873	6.45%
Solar Radiation	10,721	2.46%	10,374	3.89%	0	0.00%
Fuel Temperature	5,740	1.32%	5,663	2.13%	0	0.00%
Fuel Moisture	5,704	1.31%	5,579	2.09%	0	0.00%
Unknown	3,586	0.82%	3,353	1.26%	0	0.00%
Soil Moisture	2,847	0.65%	2,817	1.06%	0	0.00%
Repeater Status Report	2,536	0.58%	3,156	1.18%	0	0.00%
Wind Direction	989	0.23%	0	0.00%	16,238	3.00%
ET-Hourly	715	0.16%	701	0.26%	0	0.00%
12Hr Status Report	312	0.07%	300	0.11%	2,839	0.53%
GPS Lock	283	0.06%	113	0.04%	24,827	4.59%
Not Used	277	0.06%	245	0.09%	759	0.14%
Hayman Battery	249	0.06%	0	0.00%	0	0.00%
Water Temp	118	0.03%	74	0.03%	0	0.00%
Handar 585 ALARM Status	61	0.01%	58	0.02%	0	0.00%
Repeater Pass List	60	0.01%	539	0.20%	0	0.00%
ET-Daily	30	0.01%	29	0.01%	0	0.00%
Solar Power	7	0.00%	7	0.00%	0	0.00%
Dew Point Temperature	0	0.00%	0	0.00%	8,513	1.57%
Flasher Status	0	0.00%	0	0.00%	5,900	1.09%
<b>Total</b>	<b>435,747</b>	<b>100.00%</b>	<b>266,465</b>	<b>100.00%</b>	<b>540,654</b>	<b>100.00%</b>

Traffic Loading Summary	Concentrator		Legacy		ALERT2	
Alert Reports	435,747		266,465		540,654	
Average Daily Traffic	14,056		8,882		17,440	
Average Hourly Traffic	586		370		727	
Median Hourly Traffic	589	hour beginning	364	hour beginning	718	hour beginning
Peak Hourly Traffic	918	Apr 5, 3:00 PM	614	Apr 17, 1:00 PM	912	Apr 5, 5:00 PM
2nd Max	905	Apr 17, 1:00 PM	590	Apr 17, 2:00 PM	907	Apr 10, 9:00 PM
3rd Max	903	Apr 17, 2:00 PM	580	Apr 17, 3:00 PM	904	Apr 17, 1:00 PM
4th Max	901	Apr 5, 4:00 PM	579	Apr 10, 10:00 PM	900	Apr 10, 7:00 PM
5th Max	899	Apr 29, 2:00 PM	579	Apr 17, 12:00 PM	897	Apr 10, 10:00 PM

# Rain Timer Performance

Analyze Rain Sensors

Rain Sensors	Description	Rcv	Timer	Exp	Performance	Comment
5720	Four Mile Creek	5	0:00	62	8%	spring start-up
5810	Stump Bump	5		62	8%	spring start-up
5740	Trail Creek	5	12:00	62	8%	spring start-up
5730	West Creek	5	12:00	62	8%	spring start-up
4850	Porphory Mtn	8	21:00	62	13%	
2790	Wx-W. Cherry Creek	10	2:00	62	16%	
2360	Indian Hills	32	18:40	62	52%	
1420	Wx-A2-Diamond Hill	35	12:00	62	56%	
4270	Cannon Mountain	36	16:14	62	58%	
4520	Eagle Ridge	36	12:00	62	58%	
430	Utah Park	36	17:10	62	58%	
2330	Morrison	37	17:04	62	60%	
1480	Third Creek at DIA	38	12:00	62	61%	
1530	Bear Creek @ Lowell	41	12:43	62	66%	
5940	Log Jumper	41	16:24	62	66%	
100260	\2-Trumbull (Hayman) - P	491		720	68%	
4870	SBC @ SB Road	43	13:27	62	69%	
1620	Slaughterhouse Glch	43	14:30	62	69%	
1660	SPR at Henderson	43	15:31	62	69%	
120	West Woods	43	12:20	62	69%	
2980	Dakan Rd	46	15:11	62	74%	
1710	Shop Creek	46	16:21	62	74%	
2230	Bear Cr below Cub	48	13:17	62	77%	
2320	Choke Cherry Resvr	49	12:19	62	79%	
2280	Kinney Peak	49	13:35	62	79%	
4510	Pinewood Springs	49	14:12	62	79%	
730	No Name @ Quincy	50	11:22	62	81%	
4030	Red Garden	50	13:59	62	81%	
1360	Denver Zoo	51	12:18	62	82%	
4330	Hansen Rain	51	13:24	62	82%	
2350	Idledale	51	13:17	62	82%	
1320	SPR at 3rd Ave	51	10:58	62	82%	
2840	Sulphur Gulch	51	13:32	62	82%	
4180	Gold Lake	52	13:05	62	84%	
310	Guy Hill Ranch	52	12:48	62	84%	
2370	Red Rocks Park	52	13:11	62	84%	
3030	WX-Bingham Lake Park	52	13:15	62	84%	
3010	WX-EPC at Hwy 105	52	13:45	62	84%	
1700	Cherry Cr @ Champa	53	12:48	62	85%	
2850	Cherry Cr bl Bayou Glch	53	12:18	62	85%	
1030	NREL/S. Table Mtn.	53	12:45	62	85%	
940	Aurora Regional Pond	54	12:31	62	87%	
2340	El Rancho	54	12:29	62	87%	
1060	Heritage Square	54	12:49	62	87%	
4470	Little Narrows	54	12:36	62	87%	
4040	Martin Gulch	54	13:08	62	87%	
700	Toll Gate @ 6th	54	13:12	62	87%	
330	Van Bibber @ Hwy 93	54	12:32	62	87%	
4790	Wx-Button Rock	54	12:16	62	87%	
4490	Apple Valley	55	12:32	62	89%	
4300	Big Elk Park	55	12:29	62	89%	
2870	Cottonwood (Apache)	55	12:35	62	89%	
3050	East/West Trailhead	55	12:51	62	89%	
2310	Genesee Village	55	12:50	62	89%	



1500	Powers Park	55	13:09	62	89%
300	Van Bibber Park	55	11:58	62	89%
1920	Wx-Brighton	55	13:04	62	89%
1440	Wx-Elbert	55	13:04	62	89%
1520	Wx-Marston Lake North	55	12:17	62	89%
1460	Wx-Urban Farm	55	12:16	62	89%
2240	Cold Sprg Glch conf	56	12:33	62	90%
4350	Conifer Hill	56	12:27	62	90%
2270	Cub Cr below Blue	56	12:15	62	90%
610	Harvard @ Jackson	56	11:57	62	90%
520	Jewell Detention	56	12:46	62	90%
4310	Johnny Park	56	12:13	62	90%
1550	Lakewood CC	56	12:31	62	90%
620	Quincy/Highline	56	12:31	62	90%
110	Ralston Reservoir	56	12:33	62	90%
2250	Rosedale	56	11:57	62	90%
1640	SPR at Union Ave.	56	12:13	62	90%
3080	Tallman Gulch	56	12:36	62	90%
4260	Taylor Mountain	56	12:47	62	90%
3090	42-Highland Heritage Park	651		720	90%
4070	Bear Peak	57	12:12	62	92%
1200	Broomfield 3207	57	12:28	62	92%
3040	3 @ Russelville Road Prec	57	12:32	62	92%
4820	Doudy Draw	57	12:33	62	92%
2910	East Cherry Cr-Douglas	57	12:15	62	92%
4860	Fairview Peak	57	12:30	62	92%
4100	Filter Plant	57	12:16	62	92%
530	Fire Station #19	57	12:14	62	92%
4220	Fling's	57	12:15	62	92%
810	Granby Ditch @ 6th	57	11:57	62	92%
1110	Gunbarrel	57	12:28	62	92%
2880	Happy Canyon at N Surrey	57	12:36	62	92%
2820	Haskins Gulch Conf	57	12:17	62	92%
4060	Lakeshore	57	12:26	62	92%
2900	Russelville Gulch-Douglas	57	12:16	62	92%
4830	SBC @ San Souci	57	12:14	62	92%
4810	Shanahan Ridge	57	12:15	62	92%
2890	Spruce Mt - Douglas	57	12:32	62	92%
220	Upper Leyden	57	12:00	62	92%
4050	Walker Ranch	57	12:32	62	92%
2920	East Cherry Head-Douglas C	57	12:30	62	92%
2940	Willow Creek - DougCnty	57	12:34	62	92%
4530	Winiger Ridge	57	12:14	62	92%
900	Wx-Aurora Reservoir	57	12:28	62	92%
1570	Wx-Brighton Ditch	57	12:00	62	92%
4770	Wx-Cal-Wood Ranch	57	12:15	62	92%
2730	Wx-Salisbury Park	57	12:15	62	92%
2990	Wx-Tomah Rd-DougCnty	57	12:16	62	92%
4110	Betasso	58	12:15	62	94%
2260	Brook Forest	58	12:31	62	94%
2860	CC at Stroh Rd	58	12:13	62	94%
1350	Chatfield COE	58	12:16	62	94%
1720	Cherry Cr @ Steele	58	11:57	62	94%
4010	Crescent	58	12:13	62	94%
2950	DC Public Works	58	12:17	62	94%
1010	Denver West	58	12:14	62	94%
1600	Englewood Dam	58	12:15	62	94%
850	Flying J	58	12:00	62	94%
4250	Geer Canyon	58	12:13	62	94%
640	Goldsmith @ Eastman	58	12:13	62	94%

600	Harvard Gulch Park	58	11:58	62	94%
4360	Justice Center	58	12:14	62	94%
4200	Lazy Acres	58	11:59	62	94%
1310	LDC at 64th	58	12:10	62	94%
4320	Lee Hill Rain 2012	58	12:31	62	94%
210	Leyden Confluence	58	12:13	62	94%
200	Leyden Reservoir	58	12:03	62	94%
760	Mission Viejo Park	58	12:13	62	94%
1900	Niver Detention	58	12:13	62	94%
150	Nott Creek	58	12:32	62	94%
2810	Pine Cliff Road	58	12:16	62	94%
970	Pump Sta 3	58	12:00	62	94%
4290	Red Hill	58	12:12	62	94%
4340	Riverside	58	11:58	62	94%
1800	Sand Creek Park	58	11:58	62	94%
4570	St. Antons	58	11:59	62	94%
4160	Sunshine	58	12:13	62	94%
630	Temple Pond at DTC	58	11:57	62	94%
510	Virginia Court	58	12:13	62	94%
1370	West Metro FS13	58	12:15	62	94%
100200	OneRain Weather - Precip	58	12:00	62	94%
2930	Spring Valley Rd-DougC	58	12:00	62	94%
4730	Wx-Sugarloaf	58	12:16	62	94%
4710	Wx-Ward C-1	58	12:00	62	94%
100100	A2-Blackstone Precip	59	12:00	62	95%
100110	A2-ETG @ Hampden Preci	59	12:00	62	95%
4550	Boulder Jail	59	11:57	62	95%
820	ETG @ Buckley	59	11:57	62	95%
420	Expo Park	59	11:57	62	95%
440	Fire Station #7	59	11:57	62	95%
840	Fire Station 12	59	12:00	62	95%
4150	Gold Hill	59	11:58	62	95%
4230	Golden Age	59	11:57	62	95%
500	Havana Park	59	11:57	62	95%
2960	Indian Creek	59	12:17	62	95%
410	Kelly Dam	59	11:57	62	95%
1040	Lena @ U.S. Hwy 6	59	11:58	62	95%
1100	Louisville Rec Ctr	59	11:59	62	95%
4090	Magnolia	59	11:58	62	95%
540	Parker/Mississippi	59	11:57	62	95%
4020	Rio Grande	59	11:58	62	95%
800	Sable Ditch @ 18th	59	11:57	62	95%
4840	SBC@S Boulder Ditch	59	11:57	62	95%
4190	Slaughterhouse	59	12:11	62	95%
4240	Sunset	59	11:58	62	95%
4130	Swiss Peaks	59	11:59	62	95%
1400	Upper Sloan Det.	59	11:58	62	95%
920	Wx-Aurora Town Hall	59	12:00	62	95%
140	Wx-Blue Mountain	59	12:00	62	95%
2710	Wx-Highlands Ranch WTF	59	12:00	62	95%
2210	Wx-Hiwan G.C.	59	12:00	62	95%
4750	Wx-Louisville Lake	59	12:00	62	95%
750	Wx-Quincy Reservoir	59	11:56	62	95%
3060	Fire Sta 47	60	12:00	62	97%
1300	Hidden Lake	60	11:29	62	97%
4140	Logan Mill	60	11:58	62	97%
4170	Pine Brook	60	11:57	62	97%
950	Piney at Liverpool	60	11:57	62	97%
4080	Twin Sisters	60	11:58	62	97%
100290	A2-PlumCr at Sedalia - Pr	708		720	98%

1050	Jeffco Fairgrounds	61	11:43	62	98%
320	Sports Complex	61	11:29	62	98%
4880	Whispering Pines	61	11:42	62	98%
100320	A2-Weir Gulch - Precip	717		720	100%
100160	-Sand Creek at Colfax Pre	718		720	100%
100	A2-Carr Street	719		720	100%
100300	CoalCreek at McCaslin - Pi	719		720	100%
100230	A2-Havana Pond Precip	719		720	100%
1000	A2-Maple Grove Resv.	719		720	100%
870	A2-Murphy Creek GC	719		720	100%
3070	A2-Newlin Gulch Precip	719		720	100%
100240	W2-Westerly Cr Dam Precip	719		720	100%
720	Confluence Pond	62	11:12	62	100%
5900	Horse Creek-Satellite	177		177	100%
2970	Lampart Range Rd-Satellit	219		219	100%
710	Horseshoe Park Drop	66	10:24	62	106%
650	Hliff Pond	81	6:47	62	131%
6601	Vx-A2-Magnolia WX-Precip	89	8:00	62	144%
1340	Sanderson at Xavier	132		62	213%

Rain Event Performance																
	Reports Received	Reports Received	9,111													
	Systemwide Avg	Total Tips	9,685		Analyze Rain Sensors					0	<<show stations with zero rain (1-yes, 0-no)					
	94.07%	Data Loss	5.93%													
Description	Sensor	Performance	1-tips	2-tips	3-tips	4-tips	5-tips	6-tips	>6-tips	Rcv	Exp	Miss	Hold	Bucket		
Wx-W. Cherry Creek	2790	19%	3	3	0	2	1	0	0	2	9	48	39	0	0.03937	
Horse Creek-Satellite	5900	38%	5	3	1	0	1	0	1	10	26	16	0	0.03937	Mean	52.1
Taylor Mountain	4260	67%	23	3	0	0	0	0	1	26	39	13	0	0.03937	Median	51
Piney at Liverpool	950	70%	22	1	0	0	0	0	1	23	33	10	0	0.03937	St. Dev	19.1
Morrison	2330	71%	43	9	2	2	1	0	0	57	80	23	0	0.03937	Mean plus 3 SD	109
Third Creek at DIA	1480	73%	38	2	1	0	0	0	1	41	56	15	1	0.03937	Min	4
Choke Cherry Resvr	2320	73%	28	2	1	1	0	1	0	33	45	12	0	0.03937	Max	103
Dakan Rd	2980	73%	44	5	5	0	0	1	0	55	75	20	0	0.03937		
Hansen Rain	4330	75%	23	2	1	0	0	1	0	27	36	9	0	0.03937		
Bear Creek @ Lowell	1530	80%	32	1	0	0	0	0	2	33	41	8	1	0.03937		
Indian Hills	2360	81%	35	5	1	1	0	0	0	42	52	10	0	0.03937		
Riverside	4340	81%	36	5	0	0	0	1	0	42	52	10	1	0.03937		
Denver Zoo	1360	82%	73	6	2	3	0	0	0	84	103	19	0	0.03937		
Slaughterhouse Glch	1620	82%	45	2	0	0	1	1	0	49	60	11	0	0.03937		
Bear Cr below Cub	2230	84%	42	5	2	0	0	0	0	49	58	9	0	0.03937		
SPR at Henderson	1660	85%	34	5	1	0	0	0	0	40	47	7	0	0.03937		
Idledale	2350	86%	36	7	0	0	0	0	0	43	50	7	0	0.03937		
SBC @ SB Road	4870	87%	76	6	0	1	1	0	0	84	97	13	0	0.03937		
Eagle Ridge	4520	87%	29	3	1	0	0	0	0	33	38	5	0	0.03937		
Pinewood Springs	4510	87%	36	4	1	0	0	0	0	41	47	6	0	0.03937		
Guy Hill Ranch	310	89%	21	3	0	0	0	0	0	24	27	3	0	0.03937		
Cherry Cr bl Bayou Glch	2850	89%	44	6	0	0	0	0	0	50	56	6	0	0.03937		
Cub Cr below Blue	2270	90%	48	3	0	1	0	0	0	52	58	6	0	0.03937		
Cold Sprg Glch conf	2240	90%	48	4	1	0	0	0	0	53	59	6	0	0.03937		
Justice Center	4360	90%	63	8	0	0	0	0	0	71	79	8	0	0.03937		
Lena @ U.S. Hwy 6	1040	91%	60	7	0	0	0	0	0	67	74	7	1	0.03937		
Little Narrows	4470	91%	54	4	1	0	0	0	0	59	65	6	0	0.03937		
Kelly Dam	410	91%	48	1	2	0	0	0	0	51	56	5	0	0.03937		
Wx-Button Rock	4790	91%	46	5	0	0	0	0	0	51	56	5	0	0.03937		
NREL/S. Table Mtn.	1030	91%	37	4	0	0	0	0	0	41	45	4	0	0.03937		
Flying J	850	91%	57	4	1	0	0	0	0	62	68	6	0	0.03937		
East Cherry Cr-Douglas	2910	91%	20	0	1	0	0	0	0	21	23	2	0	0.03937		
Bear Peak	4070	91%	30	1	1	0	0	0	0	32	35	3	0	0.03937		
West Woods	120	92%	71	3	2	0	0	0	0	76	83	7	0	0.03937		
Hidden Lake	1300	92%	70	5	1	0	0	0	0	76	83	7	0	0.03937		
ETG @ Buckley	820	92%	40	4	0	0	0	0	0	44	48	4	0	0.03937		
Doudy Draw	4820	92%	74	2	1	1	0	0	0	78	85	7	0	0.03937		
Toll Gate @ 6th	700	92%	54	1	2	0	0	0	0	57	62	5	0	0.03937		
Wx-Elbert	1440	92%	21	2	0	0	0	0	0	23	25	2	0	0.03937		
Wx-A2-Trumbull (Hayman) - Precip	100260	92%	43	4	0	0	0	0	0	47	51	4	0	0.03937		
Wx-Urban Farm	1460	92%	55	5	0	0	0	0	0	60	65	5	0	0.03937		
Shop Creek	1710	93%	47	2	1	0	0	0	0	50	54	4	0	0.03937		
Ralston Reservoir	110	93%	47	4	0	0	0	0	0	51	55	4	0	0.03937		
Upper Sloan Det.	1400	93%	59	5	0	0	0	0	0	64	69	5	0	0.03937		
Heritage Square	1060	93%	24	2	0	0	0	0	0	26	28	2	0	0.03937		
Russelville Gulch-Douglas	2900	93%	36	3	0	0	0	0	0	39	42	3	0	0.03937		
Shanahan Ridge	4810	93%	86	3	2	0	0	0	0	91	98	7	0	0.03937		
Log Jumper	5940	93%	24	2	0	0	0	0	0	26	28	2	0	0.03937		
Wx-Blue Mountain	140	93%	26	2	0	0	0	0	0	28	30	2	0	0.03937		
Tallman Gulch	3080	93%	39	3	0	0	0	0	0	42	45	3	0	0.03937		

Stump Bump	5810	93%	13	1	0	0	0	0	0	0	14	15	1	0	0.03937
SBC @ San Souci	4830	93%	82	2	0	0	1	0	0	0	85	91	6	0	0.03937
Utah Park	430	94%	69	1	2	0	0	0	0	0	72	77	5	0	0.03937
Jeffco Fairgrounds	1050	94%	41	3	0	0	0	0	0	0	44	47	3	0	0.03937
Haskins Gulch Conf	2820	94%	55	4	0	0	0	0	0	0	59	63	4	0	0.03937
Wx-Marston Lake North	1520	94%	72	5	0	0	0	0	0	0	77	82	5	0	0.03937
Wx-Salisbury Park	2730	94%	29	2	0	0	0	0	0	0	31	33	2	0	0.03937
Red Rocks Park	2370	94%	59	4	0	0	0	0	0	0	63	67	4	0	0.03937
Wx-Highlands Ranch WTP	2710	94%	60	4	0	0	0	0	0	0	64	68	4	0	0.03937
Cannon Mountain	4270	94%	30	2	0	0	0	0	0	0	32	34	2	0	0.03937
Geer Canyon	4250	94%	61	4	0	0	0	0	0	0	65	69	4	0	0.03937
Conifer Hill	4350	94%	32	2	0	0	0	0	0	0	34	36	2	0	0.03937
Wx-Ward C-1	4710	94%	33	0	1	0	0	0	0	0	34	36	2	0	0.03937
Aurora Regional Pond	940	95%	49	3	0	0	0	0	0	0	52	55	3	0	0.03937
Sports Complex	320	95%	66	4	0	0	0	0	0	0	70	74	4	0	0.03937
Big Elk Park	4300	95%	34	0	1	0	0	0	0	0	35	37	2	0	0.03937
Goldsmith @ Eastman	640	95%	51	3	0	0	0	0	0	0	54	57	3	0	0.03937
El Rancho	2340	95%	34	2	0	0	0	0	0	0	36	38	2	0	0.03937
Upper Leyden	220	95%	58	3	0	0	0	0	0	0	61	64	3	0	0.03937
Rampart Range Rd-Satellite	2970	95%	39	2	0	0	0	0	0	0	41	43	2	0	0.03937
Louisville Rec Ctr	1100	95%	20	1	0	0	0	0	0	0	21	22	1	0	0.03937
Chatfield COE	1350	95%	60	3	0	0	0	0	0	0	63	66	3	0	0.03937
Granby Ditch @ 6th	810	96%	61	3	0	0	0	0	0	0	64	67	3	0	0.03937
SPR at Union Ave.	1640	96%	61	3	0	0	0	0	0	0	64	67	3	0	0.03937
Rio Grande	4020	96%	41	2	0	0	0	0	0	0	43	45	2	0	0.03937
Nott Creek	150	96%	42	2	0	0	0	0	0	0	44	46	2	0	0.03937
Kinney Peak	2280	96%	42	2	0	0	0	0	0	0	44	46	2	0	0.03937
Pine Cliff Road	2810	96%	63	3	0	0	0	0	0	0	66	69	3	0	0.03937
Martin Gulch	4040	96%	64	3	0	0	0	0	0	0	67	70	3	0	0.03937
Fire Station #19	530	96%	65	3	0	0	0	0	0	0	68	71	3	0	0.03937
Lakewood CC	1550	96%	65	3	0	0	0	0	0	0	68	71	3	0	0.03937
Cherry Cr @ Champa	1700	96%	44	2	0	0	0	0	0	0	46	48	2	0	0.03937
Filter Plant	4100	96%	44	2	0	0	0	0	0	0	46	48	2	0	0.03937
St. Antons	4570	96%	44	2	0	0	0	0	0	0	46	48	2	0	0.03937
Apple Valley	4490	96%	45	2	0	0	0	0	0	0	47	49	2	0	0.03937
Mission Viejo Park	760	96%	46	2	0	0	0	0	0	0	48	50	2	0	0.03937
West Cherry Head-Douglas Cnty	2920	96%	23	1	0	0	0	0	0	0	24	25	1	0	0.03937
Genesee Village	2310	96%	48	0	1	0	0	0	0	0	49	51	2	0	0.03937
Wx-Cal-Wood Ranch	4770	96%	24	1	0	0	0	0	0	0	25	26	1	0	0.03937
Rosedale	2250	96%	49	2	0	0	0	0	0	0	51	53	2	0	0.03937
Cherry Cr @ Steele	1720	96%	76	3	0	0	0	0	0	0	79	82	3	0	0.03937
Indian Creek	2960	96%	77	3	0	0	0	0	0	0	80	83	3	0	0.03937
Wx-Tomah Rd-DougCnty	2990	96%	52	2	0	0	0	0	0	0	54	56	2	0	0.03937
Happy Canyon at N Surrey Dr	2880	96%	53	2	0	0	0	0	0	0	55	57	2	0	0.03937
Golden Age	4230	97%	27	1	0	0	0	0	0	0	28	29	1	0	0.03937
Sanderson at Xavier	1340	97%	82	3	0	0	0	0	0	0	85	88	3	0	0.03937
Havana Park	500	97%	55	2	0	0	0	0	0	0	57	59	2	0	0.03937
Slaughterhouse	4190	97%	28	1	0	0	0	0	0	0	29	30	1	0	0.03937
Fire Station #7	440	97%	58	2	0	0	0	0	0	0	60	62	2	0	0.03937
Leyden Reservoir	200	97%	59	2	0	0	0	0	0	0	61	63	2	0	0.03937
Red Garden	4030	97%	59	2	0	0	0	0	0	0	61	63	2	0	0.03937
Parker/Mississippi	540	97%	60	2	0	0	0	0	0	0	62	64	2	0	0.03937
Virginia Court	510	97%	61	2	0	0	0	0	0	0	63	65	2	0	0.03937
Denver West	1010	97%	61	2	0	0	0	0	0	0	63	65	2	0	0.03937
Sable Ditch @ 18th	800	97%	62	2	0	0	0	0	0	0	64	66	2	0	0.03937

Van Bibber @ Hwy 93	330	97%	63	2	0	0	0	0	0	65	67	2	0	0.03937
Sand Creek Park	1800	97%	64	2	0	0	0	0	0	66	68	2	0	0.03937
Lakeshore	4060	97%	32	1	0	0	0	0	0	33	34	1	0	0.03937
Harvard Gulch Park	600	97%	68	2	0	0	0	0	0	70	72	2	0	0.03937
CC @ Russelville Road Precip	3040	98%	38	1	0	0	0	0	0	39	40	1	0	0.03937
Powers Park	1500	98%	78	2	0	0	0	0	0	80	82	2	0	0.03937
Niver Detention	1900	98%	39	1	0	0	0	0	0	40	41	1	0	0.03937
Lee Hill Rain 2012	4320	98%	39	1	0	0	0	0	0	40	41	1	1	0.03937
SPR at 3rd Ave	1320	98%	79	2	0	0	0	0	0	81	83	2	1	0.03937
Crescent	4010	98%	42	1	0	0	0	0	0	43	44	1	0	0.03937
Magnolia	4090	98%	42	1	0	0	0	0	0	43	44	1	0	0.03937
Johnny Park	4310	98%	42	1	0	0	0	0	0	43	44	1	0	0.03937
Wx-Quincy Reservoir	750	98%	43	1	0	0	0	0	0	44	45	1	0	0.03937
Winiger Ridge	4530	98%	43	1	0	0	0	0	0	44	45	1	0	0.03937
DC Public Works	2950	98%	44	1	0	0	0	0	0	45	46	1	0	0.03937
East/West Trailhead	3050	98%	45	1	0	0	0	0	0	46	47	1	0	0.03937
Red Hill	4290	98%	48	1	0	0	0	0	0	49	50	1	0	0.03937
West Metro FS13	1370	98%	49	1	0	0	0	0	0	50	51	1	0	0.03937
Expo Park	420	98%	52	1	0	0	0	0	0	53	54	1	0	0.03937
Fling's	4220	98%	52	1	0	0	0	0	0	53	54	1	0	0.03937
CC at Stroh Rd	2860	98%	55	1	0	0	0	0	0	56	57	1	0	0.03937
Cottonwood (Apache)	2870	98%	55	1	0	0	0	0	0	56	57	1	0	0.03937
Van Bibber Park	300	98%	59	1	0	0	0	0	0	60	61	1	0	0.03937
Englewood Dam	1600	98%	59	1	0	0	0	0	0	60	61	1	0	0.03937
Iliff Pond	650	99%	65	1	0	0	0	0	0	66	67	1	0	0.03937
Broomfield 3207	1200	99%	65	1	0	0	0	0	0	66	67	1	0	0.03937
Harvard @ Jackson	610	99%	69	1	0	0	0	0	0	70	71	1	0	0.03937
Wx-Brighton	1920	99%	71	1	0	0	0	0	0	72	73	1	0	0.03937
Quincy/Highline	620	99%	72	1	0	0	0	0	0	73	74	1	0	0.03937
A2-Carr Street	100	100%	90	0	0	0	0	0	0	90	90	0	0	0.03937
Leyden Confluence	210	100%	54	0	0	0	0	0	0	54	54	0	0	0.03937
Jewell Detention	520	100%	64	0	0	0	0	0	0	64	64	0	0	0.03937
Temple Pond at DTC	630	100%	70	0	0	0	0	0	0	70	70	0	0	0.03937
Horseshoe Park Drop	710	100%	53	0	0	0	0	0	0	53	53	0	0	0.03937
Confluence Pond	720	100%	44	0	0	0	0	0	0	44	44	0	0	0.03937
No Name @ Quincy	730	100%	50	0	0	0	0	0	0	50	50	0	0	0.03937
Fire Station 12	840	100%	12	0	0	0	0	0	0	12	12	0	2	0.03937
A2-Murphy Creek GC	870	100%	60	0	0	0	0	0	0	60	60	0	0	0.03937
Wx-Aurora Town Hall	920	100%	15	0	0	0	0	0	0	15	15	0	0	0.03937
Pump Sta 3	970	100%	14	0	0	0	0	0	0	14	14	0	0	0.03937
A2-Maple Grove Resv.	1000	100%	71	0	0	0	0	0	0	71	71	0	0	0.03937
Gunbarrel	1110	100%	54	0	0	0	0	0	0	54	54	0	0	0.03937
Wx-A2-Diamond Hill	1420	100%	48	0	0	0	0	0	0	48	48	0	0	0.03937
Wx-Brighton Ditch	1570	100%	23	0	0	0	0	0	0	23	23	0	0	0.03937
Wx-Hiwan G.C.	2210	100%	41	0	0	0	0	0	0	41	41	0	0	0.03937
Brook Forest	2260	100%	56	0	0	0	0	0	0	56	56	0	0	0.03937
Sulphur Gulch	2840	100%	47	0	0	0	0	0	0	47	47	0	0	0.03937
Spruce Mt - Douglas	2890	100%	24	0	0	0	0	0	0	24	24	0	0	0.03937
Wx-Spring Valley Rd-DougCnty	2930	100%	27	0	0	0	0	0	0	27	27	0	0	0.03937
Willow Creek - DougCnty	2940	100%	33	0	0	0	0	0	0	33	33	0	0	0.03937
WX-Bingham Lake Park	3030	100%	42	0	0	0	0	0	0	42	42	0	0	0.03937
Fire Sta 47	3060	100%	43	0	0	0	0	0	0	43	43	0	0	0.03937
A2-Newlin Gulch Precip	3070	100%	47	0	0	0	0	0	0	47	47	0	0	0.03937
A2-Highland Heritage Park	3090	100%	67	0	0	0	0	0	0	67	67	0	0	0.03937
Walker Ranch	4050	100%	38	0	0	0	0	0	0	38	38	0	0	0.03937

Twin Sisters	4080	100%	33	0	0	0	0	0	0	33	33	0	0	0.03937
Betasso	4110	100%	69	0	0	0	0	0	0	69	69	0	0	0.03937
Swiss Peaks	4130	100%	41	0	0	0	0	0	0	41	41	0	0	0.03937
Logan Mill	4140	100%	30	0	0	0	0	0	0	30	30	0	0	0.03937
Gold Hill	4150	100%	44	0	0	0	0	0	0	44	44	0	0	0.03937
Sunshine	4160	100%	39	0	0	0	0	0	0	39	39	0	0	0.03937
Pine Brook	4170	100%	34	0	0	0	0	0	0	34	34	0	0	0.03937
Gold Lake	4180	100%	42	0	0	0	0	0	0	42	42	0	0	0.03937
Lazy Acres	4200	100%	31	0	0	0	0	0	0	31	31	0	0	0.03937
Sunset	4240	100%	39	0	0	0	0	0	0	39	39	0	0	0.03937
Boulder Jail	4550	100%	74	0	0	0	0	0	0	74	74	0	0	0.03937
Wx-Sugarloaf	4730	100%	45	0	0	0	0	0	0	45	45	0	0	0.03937
Wx-Louisville Lake	4750	100%	51	0	0	0	0	0	0	51	51	0	0	0.03937
SBC@S Boulder Ditch	4840	100%	4	0	0	0	0	0	0	4	4	0	0	0.03937
Whispering Pines	4880	100%	50	0	0	0	0	0	0	50	50	0	0	0.03937
Four Mile Creek	5720	100%	5	0	0	0	0	0	0	5	5	0	0	0.03937
West Creek	5730	100%	6	0	0	0	0	0	0	6	6	0	0	0.03937
Trail Creek	5740	100%	12	0	0	0	0	0	0	12	12	0	0	0.03937
A2-Blackstone Precip	100100	100%	40	0	0	0	0	0	0	40	40	0	0	0.03937
A2-ETG @ Hampden Precip	100110	100%	45	0	0	0	0	0	0	45	45	0	0	0.03937
A2-Sand Creek at Colfax Precip	100160	100%	66	0	0	0	0	0	0	66	66	0	0	0.03937
A2-Havana Pond Precip	100230	100%	51	0	0	0	0	0	0	51	51	0	0	0.03937
A2-Westerly Cr Dam Precip	100240	100%	48	0	0	0	0	0	0	48	48	0	0	0.03937
A2-CoalCreek at McCaslin - Precip	100300	100%	73	0	0	0	0	0	0	73	73	0	0	0.03937
A2-Weir Gulch - Precip	100320	100%	79	0	0	0	0	0	0	79	79	0	1	0.03937
Wx-Aurora Reservoir	900	100%	16	0	0	0	0	0	0	16	16	0	0	0.03937
	<b>TOTAL</b>		<b>8709</b>	<b>339</b>	<b>40</b>	<b>12</b>	<b>6</b>	<b>5</b>	<b>8</b>	<b>9111</b>	<b>9685</b>	<b>574</b>	<b>9</b>	
WX-EPC at Hwy 105	3010	85%	121	14	1	0	2	0	0	138	162	24	0	0.01
Porphory Mtn	4850	89%	50	3	2	0	0	0	0	55	62	7	0	0.01
Fairview Peak	4860	99%	73	1	0	0	0	0	0	74	75	1	0	0.01
Wx-A2-Magnolia WX-Precip	6601	100%	125	0	0	0	0	0	0	125	125	0	0	0.01
Wx-A2-OneRain Weather - Precipitation	100200	86%	179	36	0	0	0	0	0	215	251	36	0	0.01

## 2016 Monthly Peak Hour ALERT Radio Traffic Summary

