

# Memo



**Date:** August 4, 2010  
**To:** Kevin Stewart  
**From:** Markus Ritsch  
**Subject:** July 2010 ALERT Data Analysis

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## I. ALERT Data Source

Raw ALERT data records extracted from the Urban Drainage and Flood Control District's Nova Star 4.0 base station (ALERT 2) were analyzed for the period July 1 through July 31, 2010.

## II. General System Analysis Summary

A total of 360,234 ALERT (legacy) data reports were analyzed from the ALERT 2 base station. Meteorological sensors account for 70 percent, water level sensors 10 percent, and rain sensors 6 percent of the total monthly records.

The system-wide radio traffic loading was 11,620 reports per day with an average hourly loading of 484 reports. The peak hourly traffic loading was 1,638 reports, which occurred on July 30, between 7:00 PM and 8:00 PM. A plot of monthly average and peak hourly traffic loading is provided.

### A. Specific Issues Identified this Month

Performance of the following sensors (Table 1) was unacceptable this month.

**Table 1. Rain Sensors with Unacceptable Performance Characteristics**

Rain ID	Description	Timer	Event	Comments
540	Parker/Mississippi	0.65	0.47	Poor performance
870	Murphy Creek GC	0.68	0.24	Poor performance
2230	Bear Cr below Blue	0.60	0.70	Poor performance
2270	Cub Cr below Blue	0.58	0.83	Poor performance
2900	Russellville Gulch	0.92	0.51	Antenna system/radio modified to go to Blue Mt
2910	Pine Cliff Road	0.24	0.86	Poor timer performance
2930	Spring Valley Road	0.19	0.88	Poor event performance
2970	Rampart Range Road	0.92	0.93	Antenna system was modified on June 20, 2010
2980	Dakan Road	0.18	0.51	Poor performance
2990	Tomah Road	0.19	0.94	Poor timer performance
3010	EPC at Hwy 105	1.0	0.82	Many invalid reports
3020	West Creek WX	0.23	0.93	Poor timer performance
4330	Hansen	0.53	0.67	Poor performance

### 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 2).

**Table 2. Monthly Summary of Sensors with Poor Timer Performance (Sensor ID)**

Jan*	Feb*	Mar*	Apr	May	Jun	Jul	Aug	Sep	Oct*	Nov*	Dec*
--	--	--	2970	2970	2970	2980			--	--	--
--	--	--	3010	700	1710	2930			--	--	--
--	--	--	700	2240	4330	2990			--	--	--
--	--	--	4860	4330	2270	3020			--	--	--
--	--	--	4330	4490	2240	2810			--	--	--
--	--	--	4170	4270	4470	4330			--	--	--

\*- Due to system start-up/shut-down, timer statistics are evaluated only when the entire network is operational between April 1 and October 15.

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 3).

**Table 3. District-Wide Total Tip/Count Statistical Summary**

Statistical Parameter	Value	Comments
Mean	50.23	Only the 1-mm rain sensors were included in the analysis
Median	45	Only the 1-mm rain sensors were included in the analysis
Standard deviation	25.73	Only the 1-mm rain sensors were included in the analysis
Mean plus three standard deviations	127	Only the 1-mm rain sensors were included in the analysis
Minimum total count	10	ID 860 (Sand Creek at Colfax)
Maximum total count	172	ID 630 (Temple Pond at DTC) – influenced by irrigation

#### B. Monthly Average Tip/Count Summary

A monthly summary of the District-wide mean total tip/count is presented (Table 4).

**Table 4. 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						

\*-Event statistics are skewed in these months because system start-up/shut-down occurs. The rain network is operational between April 1 and October 15. Only the weather stations remain operational throughout the year.

### 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 5).

**Table 5. Sensors with a Jump of 6 or More in Sequential Count**

Sensor Description	Sensor ID	Comment
Russellville Gulch	2900	Multiple times throughout month
Dakan Road	2980	July 20
Murphy Creek GC	870	Between July 2 and July 5

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

The system-wide reception rate of incrementing, 1-mm tip reports for the month was approximately 89 percent. A total of 7,546 incrementing reports were received and a total of 8,438 were expected. The total loss of incrementing reports for the month was approximately 11 percent. Those sensors with the worst event transmission performance are summarized (Table 6).

**Table 6. Monthly Summary of Sensors with the Most Missed Tips**

Jan*	Feb*	Mar*	Apr	May	Jun	Jul	Aug	Sep	Oct*	Nov*	Dec*
--	--	--	2970	700	2900	870			--	--	--
--	--	--	700	2280	2190	540			--	--	--
--	--	--	940	2970	2930	2980			--	--	--
--	--	--	430	2980	4330	2900			--	--	--
--	--	--	2900	2190	2980	4330			--	--	--
--	--	--	4330	2240	2970	2230			--	--	--

\*-Event statistics are skewed in these months and therefore not computed because system start-up/shut-down occurs. The rain network is operational between April 1 and October 15.

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 600 messages per hour were analyzed independently in an attempt to quantify data loss rates from rain sensors using the sequential tip count series.

### A. The Heaviest Hourly Traffic Periods This Month

The hours of highest radio traffic this month are shown (Table 7).

**Table 7. Heavy Radio Traffic Periods**

Peak Traffic Periods	Reports/hour	Hour Beginning
Peak Hourly Traffic	1,638	7/30 7:00 PM
2nd Max	1,612	7/30 6:00 PM
3rd Max	1,544	7/29 4:00 PM
4th Max	1,475	7/30 9:00 PM
5th Max	1,378	7/30 8:00 PM

Each hour exceeding 600 reports was analyzed to quantify the number of missing rain reports for that hour (Figure 1). The following plot shows the loss of data as a function of data loading.

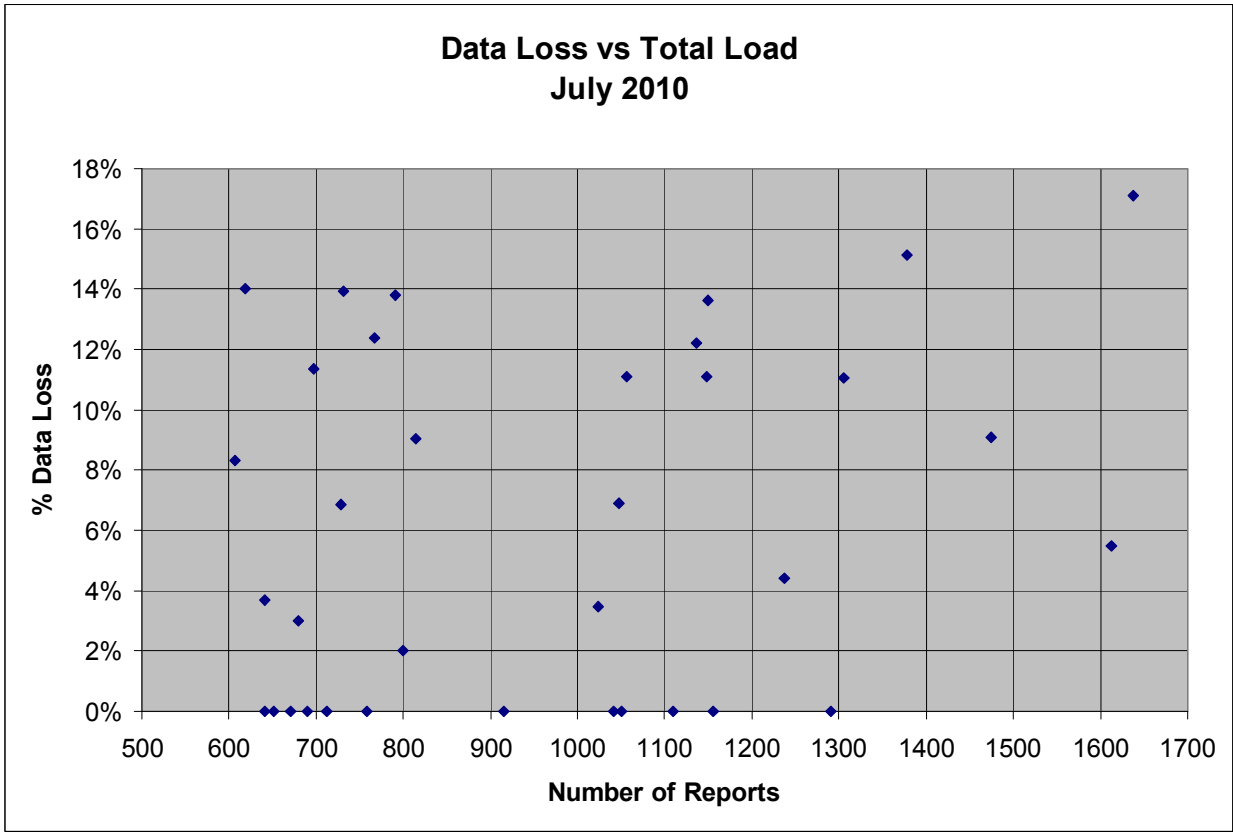


Figure 1. Data Loss vs. Data Loading

## 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 8).

Table 8. Summary of Unknown IDs

Description	Quantity
Total number of unknown IDs (IDs without a device definition)	272
Total reports from unknown IDs	610
Unknown IDs with only a single received report (potential noise)	211
Total reports from all IDs – RecData Log entire month	360,234
Unknown reports as a fraction of total reports	0.17%

The total number of reports from unknown sensors is very small relative to the total reports received for the month. Shown below (Table 9) are the total reports received from unknown sensor IDs for each month of the year.

Table 9. Monthly Summary of Total Reports from Unknown IDs

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ave
2010	1,220	1,474	1,276	1,174	721	5,707	610						

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 10).

**Table 10. Reports Received by Unknown IDs**

Unknown ID	Reports
3008	104
2993	50
809	20
319	9
2239	9
329	8
1902	6
1904	6
707	5
1901	5
1663	4
2219	4
2736	4
245	3
391	3
438	3
487	3
773	3
778	3
898	3
1631	3
2249	3
2369	3
4234	3
128	2
175	2
211	2
237	2
243	2
395	2
396	2
402	2
409	2
621	2
688	2
719	2
722	2
729	2
748	2
780	2
897	2
969	2
1147	2
1319	2
1399	2

1609	2
1614	2
2084	2
2185	2
2229	2
2329	2
2445	2
2728	2
2877	2
4094	2
4379	2
4786	2
4831	2
5461	2
5823	2

The “unknown” device reports are analyzed temporally to understand when they are received during the day (Table 11). The goal of this analysis is to determine a pattern of occurrence that may correspond to a source of noise in the system, such as the use of a wireless microphone nearby.

**Table 11. Temporal Distribution of Received Reports**

Hour (AM)	Reports	Hour (PM)	Reports
0:00-00:59	23	12:00-12:59	43
1:00-1:59	4	1:00-1:59	48
2:00-2:59	31	2:00-2:59	48
3:00-3:59	11	3:00-3:59	22
4:00-4:59	6	4:00-4:59	36
5:00-5:59	6	5:00-5:59	18
6:00-6:59	11	6:00-6:59	30
7:00-7:59	8	7:00-7:59	26
8:00-8:59	27	8:00-8:59	38
9:00-9:59	26	9:00-9:59	12
10:00-10:59	29	10:00-10:59	14
11:00-11:59	24	11:00-11:59	10

## VII. Sensors with Invalid Reports

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

Sensor ID	Description	Feb	Mar	Apr	May	June	July	Aug	Sep
700	Toll Gate @ 6th	0	0	0	0	3	0		
1300	Hidden Lake	0	0	0	4	0	1		
1460	Urban Farm	1	3	2	1	0	0		
1530	Bear Creek at Lowell	12	13	10	6	0	0		
1900	Niver Detention	0	0	0	0	0	4		
2320	Choke Cherry Resvr	1	7	3	4	5	0		
2750	Castle Rock WX	--	4	6	1	0	2		
2970	Rampart Range Road	--	3	0	1	0	0		
3010	East Plum Cr at Hwy 105	0	0	0	0	9	12		
4030	Red Garden	6	2	3	1	1	0		
4330	Hansen	2	1	2	0	4	4		



# General System Analysis

**Database Name** P:\A207-UDFCD-Data-Analysis\2010\07-2010\Novastar\_extract\_2010July

<b>First Date in Database</b>	7/1/10 12:00 AM	<b>Total Days</b>	31.0
<b>Last Date in Database</b>	7/31/10 11:59 PM	<b>Total Hours</b>	744.0

**Total Records Analyzed** 360,234

**Records by Group**

Temperature	56,046	16%
Relative Humidity	55,897	16%
Wind Gust	50,786	14%
Water Level PT-HSE	26,692	7%
Barometric Pressure	22,063	6%
Wind Direction	21,018	6%
Wind Speed Average	20,780	6%
Precipitation	20,064	6%
Wind Speed Average & Azimuth	17,346	5%
ALERT 2 Testing	12,992	4%
Solar Radiation	9,701	3%
Battery Voltage HSE	8,589	2%
Fuel Temperature	5,774	2%
Fuel Moisture	5,716	2%
Water Level Float	4,576	1%
Water Level PT	4,134	1%
Battery Voltage Analog	3,760	1%
Battery Voltage Digital	3,671	1%
Soil Moisture	2,862	1%
Repeater Status Report	2,490	1%
Battery	1,646	0%
Wing Gust	726	0%
Unknown IDs	610	0%
Repeater Pass List	607	0%
Hayman Battery	577	0%
12Hr Status Report	543	0%
Water Level	253	0%
Battery Voltage	236	0%
Handar 585 ALARM Status	61	0%
Hayman Stage	18	0%
<b>Total</b>	<b>360,234</b>	

**Records by Major Group**

Meteorologic Sensors	253,637	70%
Water Level Sensors	35,402	10%
Rain Sensors	20,064	6%
Sensor Status Transmissions	19,721	5%
Soil and Fuel Sensors	14,352	4%
<b>Total</b>	<b>343,176</b>	

**Traffic Loading Summary**

Alert Reports	360,234	
Average Daily Traffic	11,620	
Average Hourly Traffic	484	
Median Hourly Traffic	450	hour beginning
Peak Hourly Traffic	1,638	7/30 7:00 PM
2nd Max	1,612	7/30 6:00 PM
3rd Max	1,544	7/29 4:00 PM
4th Max	1,475	7/30 9:00 PM
5th Max	1,378	7/30 8:00 PM



# Rain Timer Performance

Analyze Rain Sensors

h Timer Performance

Rain Sensors	Description	Rcv	Average Timer Interval	Ave	Expected T Performance
2980	Dakan Rd	11	13:42	62.00	18%
2930	Wx-Spring Valley Rd-DougCnty	12	12:00	62.00	19%
2990	Wx-Tomah Rd-DougCnty	12	12:00	62.00	19%
3020	Wx-West Creek WX	14	10:42	62.00	23%
2810	Pine Cliff Road	15	9:20	62.00	24%
4330	Hansen	33	19:34	62.00	53%
2270	Cub Cr below Blue	36	17:21	62.00	58%
2230	Bear Cr below Cub	37	18:26	62.00	60%
540	Parker/Mississippi	40	14:41	62.00	65%
870	Murphy Creek GC	42	14:10	62.00	68%
4860	Fairview Peak	43	12:42	62.00	69%
2280	Kinney Peak	45	13:26	62.00	73%
860	Sand Cr at Colfax	47	12:00	62.00	76%
4510	Pinewood Springs	47	14:37	62.00	76%
4710	Wx-Ward C-1	48	13:07	62.00	77%
4040	Martin Gulch	49	14:21	62.00	79%
4090	Magnolia	49	13:57	62.00	79%
2250	Rosedale	50	12:59	62.00	81%
4010	Crescent	51	13:04	62.00	82%
4470	Little Narrows	51	12:50	62.00	82%
4570	St. Antons	51	13:34	62.00	82%
4850	Porphyry Mtn	51	13:00	62.00	82%
310	Guy Hill Ranch	53	12:32	62.00	85%
320	Sports Complex	53	11:41	62.00	85%
4530	Winiger Ridge	53	13:27	62.00	85%
4820	Doudy Draw	53	13:01	62.00	85%
200	Leyden Reservoir	54	13:16	62.00	87%
300	Van Bibber Park	54	13:00	62.00	87%
970	Pump Sta 3	54	12:50	62.00	87%
1340	Sanderson at Xavier	54	12:15	62.00	87%
1810	Sand Creek at mouth	54	13:17	62.00	87%
2820	Haskins Gulch Conf	54	13:08	62.00	87%
4070	Bear Peak	54	12:48	62.00	87%
4140	Logan Mill	54	12:49	62.00	87%
4490	Apple Valley	54	12:49	62.00	87%
4770	Wx-Cal-Wood Ranch	54	12:18	62.00	87%
110	Ralston Reservoir	55	12:30	62.00	89%
1700	Cherry Cr @ Champa	55	12:44	62.00	89%
1710	Shop Creek	55	13:30	62.00	89%
1720	Cherry Cr @ Steele	55	12:41	62.00	89%
2240	Cold Sprg Glch conf	55	13:06	62.00	89%
4130	Swiss Peaks	55	13:08	62.00	89%
4160	Sunshine	55	13:00	62.00	89%
4170	Pine Brook	55	13:19	62.00	89%
4190	Slaughterhouse	55	12:33	62.00	89%
4240	Sunset	55	12:33	62.00	89%
4270	Cannon Mountain	55	12:49	62.00	89%
4350	Conifer Hill	55	13:21	62.00	89%
150	Nott Creek	56	12:47	62.00	90%
410	Kelly Dam	56	11:58	62.00	90%
620	Quincy/Highline	56	12:27	62.00	90%
1110	Gunbarrel	56	12:28	62.00	90%
1350	Chatfield COE	56	12:30	62.00	90%
2330	Morrison	56	13:01	62.00	90%

2840	Sulphur Gulch	56	12:33	62.00	90%
4030	Red Garden	56	11:59	62.00	90%
4050	Walker Ranch	56	12:44	62.00	90%
4180	Gold Lake	56	12:48	62.00	90%
4200	Lazy Acres	56	12:31	62.00	90%
4220	Fling's	56	13:08	62.00	90%
4290	Red Hill	56	12:44	62.00	90%
4790	Wx-Button Rock	56	12:50	62.00	90%
4840	SBC@S Boulder Ditch	56	12:45	62.00	90%
210	Leyden Confluence	57	12:12	62.00	92%
220	Upper Leyden	57	12:31	62.00	92%
420	Expo Park	57	12:13	62.00	92%
800	Sable Ditch @ 18th	57	12:55	62.00	92%
850	Flying J	57	12:24	62.00	92%
1060	Heritage Square	57	12:27	62.00	92%
1200	Broomfield 3207	57	12:57	62.00	92%
1300	Hidden Lake	57	12:34	62.00	92%
2310	Genesee Village	57	12:13	62.00	92%
2900	Russelville Gulch-Douglas	57	11:44	62.00	92%
2970	Rampart Range Rd	57	12:00	62.00	92%
4100	Filter Plant	57	12:44	62.00	92%
4150	Gold Hill	57	12:13	62.00	92%
4360	Justice Center	57	12:44	62.00	92%
4550	Boulder Jail	57	12:13	62.00	92%
4810	Shanahan Ridge	57	12:31	62.00	92%
140	Wx-Blue Mountain	58	12:15	62.00	94%
400	Montview Park	58	12:22	62.00	94%
530	Fire Station #19	58	12:26	62.00	94%
600	Harvard Gulch Park	58	12:27	62.00	94%
720	Confluence Pond	58	12:27	62.00	94%
820	ETG @ Buckley	58	12:12	62.00	94%
1030	NREL/S. Table Mtn.	58	12:27	62.00	94%
1040	Lena @ U.S. Hwy 6	58	12:29	62.00	94%
1050	Jeffco Fairgrounds	58	12:27	62.00	94%
1420	Wx-Diamond Hill	58	12:45	62.00	94%
1480	Third Creek at DIA	58	12:41	62.00	94%
1520	Wx-Marston Lake North	58	12:28	62.00	94%
1570	Wx-Brighton Ditch	58	12:14	62.00	94%
1640	SPR at Union Ave.	58	12:28	62.00	94%
2730	Wx-Salisbury Park	58	12:15	62.00	94%
2910	East Cherry Cr-Douglas	58	12:15	62.00	94%
2920	West Cherry Head-Douglas Cnty	58	12:00	62.00	94%
4060	Lakeshore	58	12:14	62.00	94%
4080	Twin Sisters	58	11:58	62.00	94%
4250	Geer Canyon	58	12:13	62.00	94%
4260	Taylor Mountain	58	11:58	62.00	94%
4520	Eagle Ridge	58	12:30	62.00	94%
4730	Wx-Sugarloaf	58	12:32	62.00	94%
4830	SBC @ San Souci	58	12:13	62.00	94%
100	Carr Street	59	12:12	62.00	95%
510	Virginia Court	59	12:31	62.00	95%
520	Jewell Detention	59	12:27	62.00	95%
610	Harvard @ Jackson	59	12:11	62.00	95%
630	Temple Pond at DTC	59	12:16	62.00	95%
1010	Denver West	59	12:12	62.00	95%
1100	Louisville Rec Ctr	59	12:13	62.00	95%
1310	LDC at 64th	59	12:26	62.00	95%
1360	Denver Zoo	59	12:13	62.00	95%
1500	Powers Park	59	12:18	62.00	95%

1530	Bear Creek @ Lowell	59	12:11	62.00	95%
1660	SPR at Henderson	59	12:30	62.00	95%
2350	Idledale	59	12:12	62.00	95%
2860	CC at Stroh Rd	59	12:28	62.00	95%
2940	Willow Creek - DougCnty	59	12:15	62.00	95%
2960	Indian Creek	59	12:14	62.00	95%
4020	Rio Grande	59	12:28	62.00	95%
4110	Betasso	59	12:14	62.00	95%
4230	Golden Age	59	12:13	62.00	95%
4310	Johnny Park	59	12:13	62.00	95%
4340	Riverside	59	12:28	62.00	95%
4750	Wx-Louisville Lake	59	12:14	62.00	95%
120	West Woods	60	12:12	62.00	97%
700	Toll Gate @ 6th	60	12:00	62.00	97%
710	Horseshoe Park Drop	60	11:57	62.00	97%
760	Mission Viejo Park	60	11:57	62.00	97%
940	Sampson Gulch	60	12:11	62.00	97%
950	Piney at Liverpool	60	11:58	62.00	97%
1320	SPR at 3rd Ave	60	12:11	62.00	97%
1370	West Metro FS13	60	12:11	62.00	97%
1400	Upper Sloan Det.	60	12:12	62.00	97%
1440	Wx-Elbert	60	12:00	62.00	97%
1550	Lakewood CC	60	11:57	62.00	97%
1900	Niver Detention	60	11:57	62.00	97%
2210	Wx-Hiwan G.C.	60	12:00	62.00	97%
2260	Brook Forest	60	11:58	62.00	97%
2340	El Rancho	60	12:13	62.00	97%
2360	Indian Hills	60	11:57	62.00	97%
2850	Cherry Cr bl Bayou Glch	60	11:59	62.00	97%
2870	Cottonwood (Apache)	60	12:12	62.00	97%
4300	Big Elk Park	60	12:12	62.00	97%
430	Utah Park	61	11:56	62.00	98%
440	Fire Station #7	61	11:57	62.00	98%
840	Fire Station 12	61	12:00	62.00	98%
920	Wx-Aurora Town Hall	61	12:00	62.00	98%
1330	Roslyn	61	12:00	62.00	98%
1600	Englewood Dam	61	11:58	62.00	98%
1620	Slaughterhouse Glch	61	11:58	62.00	98%
1920	Wx-Brighton	61	12:00	62.00	98%
2710	Wx-Highlands Ranch WTP	61	11:32	62.00	98%
2750	Wx-Castle Rock	61	12:16	62.00	98%
2950	DC Public Works	61	12:00	62.00	98%
500	Havana Park	62	11:58	62.00	100%
650	Iliff Pond	62	11:57	62.00	100%
730	No Name @ Quincy	62	11:57	62.00	100%
830	Side Creek Park	62	11:57	62.00	100%
900	Wx-Aurora Reservoir	62	11:22	62.00	100%
640	Goldsmith @ Eastman	63	11:45	62.00	102%
1460	Wx-Urban Farm	63	11:35	62.00	102%
2190	Wx-Squaw Mountain	63	11:40	62.00	102%
2370	Red Rocks Park	63	11:43	62.00	102%
330	Van Bibber @ Hwy 93	64	11:16	62.00	103%
3010	EPC at Hwy 105	65	8:09	62.00	105%
1000	Maple Grove Resv.	66	10:51	62.00	106%
750	Wx-Quincy Reservoir	67	11:10	62.00	108%
1800	Sand Creek Park	76	9:17	62.00	123%
810	Granby Ditch @ 6th	78	8:50	62.00	126%
2320	Choke Cherry Resvr	201		62.00	

Rain Event Performance															
		Reports Received	7,546	Analyze Rain Sensors											
	Systemwide Avg	Total Tips	8,438												
	89.43%	Data Loss	10.57%												
Rain ID	Performance	1-tips	2-tips	3-tips	4-tips	5-tips	6-tips	>6-tips	Rcv	Exp	Miss	Hold	Bucket		
870	24%	11	0	0	0	0	0	2	11	46	35	0	0.0393701		
540	47%	5	0	0	1	0	1	0	7	15	8	0	0.0393701		
2980	51%	19	18	5	0	0	1	1	43	84	41	0	0.0393701		
2900	51%	68	3	2	0	1	0	5	74	144	70	0	0.0393701		
4330	67%	25	8	3	0	1	0	0	37	55	18	0	0.0393701		
2230	70%	24	3	3	0	1	0	0	31	44	13	0	0.0393701		
4470	71%	32	8	5	0	0	0	0	45	63	18	1	0.0393701		
4510	72%	30	16	1	0	0	0	0	47	65	18	0	0.0393701		
4750	76%	20	3	1	1	0	0	0	25	33	8	0	0.0393701		
2950	76%	52	10	1	3	0	0	0	66	87	21	0	0.0393701		
2820	80%	36	4	2	1	0	0	0	43	54	11	0	0.0393701		
1110	80%	42	6	2	1	0	0	0	51	64	13	2	0.0393701		
4790	80%	45	10	2	0	0	0	0	57	71	14	0	0.0393701		
1200	81%	15	1	0	1	0	0	0	17	21	4	0	0.0393701		
4290	81%	45	9	2	0	0	0	0	56	69	13	1	0.0393701		
4010	81%	33	5	0	0	1	0	0	39	48	9	0	0.0393701		
2280	83%	47	10	1	0	0	0	0	58	70	12	2	0.0393701		
4840	83%	30	2	1	1	0	0	0	34	41	7	0	0.0393701		
4490	83%	36	7	1	0	0	0	0	44	53	9	0	0.0393701		
810	83%	26	2	2	0	0	0	0	30	36	6	0	0.0393701		
2270	83%	33	6	1	0	0	0	0	40	48	8	0	0.0393701		
2920	83%	81	11	4	0	0	0	0	96	115	19	0	0.0393701		
1330	84%	22	3	1	0	0	0	0	26	31	5	0	0.0393701		
1700	84%	22	3	1	0	0	0	0	26	31	5	0	0.0393701		
2250	84%	64	8	1	0	1	0	0	74	88	14	0	0.0393701		
2750	84%	64	8	1	0	1	0	0	74	88	14	0	0.0393701		
1660	84%	13	3	0	0	0	0	0	16	19	3	0	0.0393701		
4130	84%	36	6	1	0	0	0	0	43	51	8	0	0.0393701		
2240	85%	27	6	0	0	0	0	0	33	39	6	0	0.0393701		
4170	85%	28	4	1	0	0	0	0	33	39	6	0	0.0393701		
4080	85%	34	3	2	0	0	0	0	39	46	7	0	0.0393701		
320	86%	28	1	0	0	1	0	0	30	35	5	0	0.0393701		
4140	86%	36	5	1	0	0	0	0	42	49	7	0	0.0393701		
2810	86%	58	7	0	0	1	0	0	66	77	11	0	0.0393701		
2940	86%	114	17	1	1	0	0	0	133	155	22	0	0.0393701		
4520	86%	31	6	0	0	0	0	0	37	43	6	0	0.0393701		
1640	86%	16	3	0	0	0	0	0	19	22	3	0	0.0393701		
4030	86%	28	3	1	0	0	0	0	32	37	5	0	0.0393701		
4040	87%	40	4	0	1	0	0	0	45	52	7	2	0.0393701		
1600	87%	49	9	0	0	0	0	0	58	67	9	0	0.0393701		
1100	87%	29	3	1	0	0	0	0	33	38	5	0	0.0393701		
4020	87%	28	5	0	0	0	0	0	33	38	5	0	0.0393701		
1420	87%	29	5	0	0	0	0	0	34	39	5	0	0.0393701		
750	88%	49	6	1	0	0	0	0	56	64	8	0	0.0393701		
100	88%	38	4	1	0	0	0	0	43	49	6	0	0.0393701		
4230	88%	37	6	0	0	0	0	0	43	49	6	0	0.0393701		
2930	88%	90	11	0	1	0	0	0	102	116	14	0	0.0393701		
840	88%	20	1	1	0	0	0	0	22	25	3	0	0.0393701		
4730	88%	34	3	1	0	0	0	0	38	43	5	0	0.0393701		
4220	88%	40	6	0	0	0	0	0	46	52	6	0	0.0393701		
4060	89%	27	4	0	0	0	0	0	31	35	4	0	0.0393701		
4070	89%	30	2	1	0	0	0	0	33	37	4	0	0.0393701		
2910	89%	105	10	2	0	0	0	0	117	131	14	0	0.0393701		
700	90%	24	1	1	0	0	0	0	26	29	3	0	0.0393701		
4240	90%	46	6	0	0	0	0	0	52	58	6	0	0.0393701		
860	90%	8	1	0	0	0	0	0	9	10	1	0	0.0393701		
600	90%	24	3	0	0	0	0	0	27	30	3	0	0.0393701		
720	90%	33	2	1	0	0	0	0	36	40	4	0	0.0393701		
1040	90%	34	2	1	0	0	0	0	37	41	4	0	0.0393701		
1480	90%	67	6	1	0	0	0	0	74	82	8	0	0.0393701		
820	90%	25	3	0	0	0	0	0	28	31	3	0	0.0393701		
4180	90%	43	3	1	0	0	0	0	47	52	5	0	0.0393701		
1920	90%	17	2	0	0	0	0	0	19	21	2	0	0.0393701		
310	91%	26	3	0	0	0	0	0	29	32	3	0	0.0393701		
4570	91%	35	4	0	0	0	0	0	39	43	4	0	0.0393701		
1550	91%	28	1	1	0	0	0	0	30	33	3	0	0.0393701		
2870	91%	75	3	1	1	0	0	0	80	88	8	0	0.0393701		
4110	91%	38	4	0	0	0	0	0	42	46	4	0	0.0393701		
4150	91%	49	3	1	0	0	0	0	53	58	5	0	0.0393701		
110	91%	29	3	0	0	0	0	0	32	35	3	0	0.0393701		
4550	91%	29	3	0	0	0	0	0	32	35	3	0	0.0393701		

2730	91%	58	6	0	0	0	0	0	64	70	6	0	0.0393701
4270	92%	40	4	0	0	0	0	0	44	48	4	0	0.0393701
2840	92%	51	3	1	0	0	0	0	55	60	5	0	0.0393701
1440	92%	80	8	0	0	0	0	0	88	96	8	0	0.0393701
4770	92%	51	5	0	0	0	0	0	56	61	5	0	0.0393701
1400	92%	31	3	0	0	0	0	0	34	37	3	0	0.0393701
4360	92%	43	2	1	0	0	0	0	46	50	4	0	0.0393701
1300	92%	53	5	0	0	0	0	0	58	63	5	0	0.0393701
2370	92%	22	2	0	0	0	0	0	24	26	2	0	0.0393701
2960	92%	33	3	0	0	0	0	0	36	39	3	0	0.0393701
4250	92%	34	1	1	0	0	0	0	36	39	3	0	0.0393701
1310	93%	34	3	0	0	0	0	0	37	40	3	0	0.0393701
970	93%	68	6	0	0	0	0	0	74	80	6	0	0.0393701
1710	93%	58	5	0	0	0	0	0	63	68	5	0	0.0393701
4100	93%	36	1	1	0	0	0	0	38	41	3	0	0.0393701
1520	93%	24	2	0	0	0	0	0	26	28	2	1	0.0393701
3020	93%	73	4	1	0	0	0	0	78	84	6	0	0.0393701
850	93%	62	5	0	0	0	0	0	67	72	5	1	0.0393701
1810	93%	26	2	0	0	0	0	0	28	30	2	0	0.0393701
150	93%	40	1	1	0	0	0	0	42	45	3	0	0.0393701
900	93%	80	3	0	1	0	0	0	84	90	6	1	0.0393699
4810	93%	53	4	0	0	0	0	0	57	61	4	0	0.0393701
2970	93%	80	6	0	0	0	0	0	86	92	6	0	0.0393701
2850	94%	67	5	0	0	0	0	0	72	77	5	0	0.0393701
440	94%	28	0	1	0	0	0	0	29	31	2	0	0.0393701
610	94%	42	3	0	0	0	0	0	45	48	3	0	0.0393701
4710	94%	57	2	1	0	0	0	0	60	64	4	0	0.0393701
940	94%	70	5	0	0	0	0	0	75	80	5	0	0.0393699
4830	94%	43	3	0	0	0	0	0	46	49	3	0	0.0393701
2990	94%	72	5	0	0	0	0	0	77	82	5	0	0.0393701
2860	94%	59	4	0	0	0	0	0	63	67	4	0	0.0393701
830	94%	30	2	0	0	0	0	0	32	34	2	0	0.0393701
4340	94%	30	2	0	0	0	0	0	32	34	2	0	0.0393701
4310	94%	46	3	0	0	0	0	0	49	52	3	0	0.0393701
4530	94%	46	3	0	0	0	0	0	49	52	3	0	0.0393701
640	94%	62	4	0	0	0	0	0	66	70	4	0	0.0393701
1500	94%	79	5	0	0	0	0	0	84	89	5	0	0.0393701
330	94%	32	2	0	0	0	0	0	34	36	2	0	0.0393701
800	94%	32	2	0	0	0	0	0	34	36	2	0	0.0393701
500	94%	48	3	0	0	0	0	0	51	54	3	0	0.0393701
2710	94%	48	3	0	0	0	0	0	51	54	3	0	0.0393701
530	95%	17	1	0	0	0	0	0	18	19	1	0	0.0393701
1000	95%	34	2	0	0	0	0	0	36	38	2	0	0.0393701
4050	95%	34	2	0	0	0	0	0	36	38	2	0	0.0393701
4090	95%	51	3	0	0	0	0	0	54	57	3	0	0.0393701
1060	95%	35	2	0	0	0	0	0	37	39	2	0	0.0393701
510	95%	36	2	0	0	0	0	0	38	40	2	0	0.0393701
1900	95%	36	2	0	0	0	0	0	38	40	2	0	0.0393701
420	95%	37	2	0	0	0	0	0	39	41	2	1	0.0393701
2320	95%	38	2	0	0	0	0	0	40	42	2	0	0.0393701
2340	95%	39	2	0	0	0	0	0	41	43	2	0	0.0393701
950	95%	60	3	0	0	0	0	0	63	66	3	0	0.0393701
4160	96%	41	2	0	0	0	0	0	43	45	2	0	0.0393701
1370	96%	21	1	0	0	0	0	0	22	23	1	0	0.0393701
4300	96%	43	2	0	0	0	0	0	45	47	2	0	0.0393701
400	96%	45	2	0	0	0	0	0	47	49	2	0	0.0393701
1620	96%	23	1	0	0	0	0	0	24	25	1	0	0.0393701
210	96%	24	1	0	0	0	0	0	25	26	1	0	0.0393701
200	96%	25	1	0	0	0	0	0	26	27	1	0	0.0393701
300	96%	25	1	0	0	0	0	0	26	27	1	0	0.0393701
650	96%	25	1	0	0	0	0	0	26	27	1	0	0.0393701
2350	96%	25	1	0	0	0	0	0	26	27	1	0	0.0393701
620	96%	26	1	0	0	0	0	0	27	28	1	0	0.0393701
1030	97%	27	1	0	0	0	0	0	28	29	1	0	0.0393701
1340	97%	27	1	0	0	0	0	0	28	29	1	0	0.0393701
760	97%	60	2	0	0	0	0	0	62	64	2	0	0.0393701
710	97%	31	1	0	0	0	0	0	32	33	1	0	0.0393701
4190	97%	64	2	0	0	0	0	0	66	68	2	0	0.0393701
1050	97%	33	1	0	0	0	0	0	34	35	1	0	0.0393701
4820	97%	33	1	0	0	0	0	0	34	35	1	0	0.0393701
410	98%	39	1	0	0	0	0	0	40	41	1	0	0.0393701
220	98%	44	1	0	0	0	0	0	45	46	1	2	0.0393701
1800	98%	44	1	0	0	0	0	0	45	46	1	1	0.0393701
4200	98%	44	1	0	0	0	0	0	45	46	1	0	0.0393701
1010	98%	47	1	0	0	0	0	0	48	49	1	0	0.0393701

430	98%	99	2	0	0	0	0	0	101	103	2	0	0.0393701
2210	98%	50	1	0	0	0	0	0	51	52	1	0	0.0393701
4260	98%	51	1	0	0	0	0	0	52	53	1	0	0.0393701
730	98%	55	1	0	0	0	0	0	56	57	1	0	0.0393701
920	98%	60	1	0	0	0	0	0	61	62	1	0	0.0393701
630	99%	170	1	0	0	0	0	0	171	172	1	0	0.0393701
1530	100%	17	0	0	0	0	0	0	17	17	0	0	0.0393701
1720	100%	17	0	0	0	0	0	0	17	17	0	0	0.0393701
1570	100%	18	0	0	0	0	0	0	18	18	0	0	0.0393701
2330	100%	18	0	0	0	0	0	0	18	18	0	0	0.0393701
1360	100%	22	0	0	0	0	0	0	22	22	0	0	0.0393701
2260	100%	26	0	0	0	0	0	0	26	26	0	0	0.0393701
2310	100%	26	0	0	0	0	0	0	26	26	0	0	0.0393701
1320	100%	30	0	0	0	0	0	0	30	30	0	0	0.0393701
120	100%	32	0	0	0	0	0	0	32	32	0	0	0.0393701
520	100%	33	0	0	0	0	0	0	33	33	0	0	0.0393701
1350	100%	33	0	0	0	0	0	0	33	33	0	0	0.0393701
2360	100%	37	0	0	0	0	0	0	37	37	0	0	0.0393701
140	100%	42	0	0	0	0	0	0	42	42	0	0	0.0393701
4350	100%	47	0	0	0	0	0	0	47	47	0	0	0.0393701
2190	100%	49	0	0	0	0	0	0	49	49	0	1	0.0393701
1460	100%	53	0	0	0	0	0	0	53	53	0	1	0.0393701
	<b>Total Tips</b>	<b>6,890</b>	<b>558</b>	<b>74</b>	<b>14</b>	<b>8</b>	<b>2</b>	<b>8</b>	<b>7,546</b>	<b>8,438</b>	<b>892</b>	<b>17</b>	

# Monthly Traffic Loading

## 2010 Monthly ALERT Radio Traffic Summary

