

Memo



Date: July 5, 2011
To: Kevin Stewart
From: Markus Ritsch
Subject: June 2011 ALERT Data Analysis

I. ALERT Data Source

Raw ALERT data records extracted from the Urban Drainage and Flood Control District's NovaStar base station were analyzed for the period June 1 through June 30, 2011.

II. General System Analysis Summary

A total of 378,358 ALERT (legacy) data reports were analyzed. Meteorological sensors account for 75 percent, water level sensors 10 percent, and rain sensors 4 percent of the total monthly records.

The system-wide radio traffic loading was 12,612 reports per day with an average hourly loading of 525 reports. The peak hourly traffic loading was 1,534 reports, which occurred on June 20, between 3:00 AM and 4:00 AM. 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 questionable this month.

Table 1. Rain Sensors with Poor Performance Characteristics

Rain ID	Description	Timer Performance	Event Performance
700	Toll Gate @ 6th	0.32	0.83
4330	Hansen Rain	0.55	0.55
2280	Kinney Peak	0.85	0.39
4300	Big Elk Park	0.67	0.54
4270	Cannon Mountain	0.65	0.61
4710	Wx-Ward C-1	0.50	0.80
3070	Newlin Gulch	0.52	0.78
2890	Spruce Mt - Douglas	0.45	1.00
1700	Cherry Cr @ Champa	0.60	0.83
4490	Apple Valley	0.75	0.68
2980	Dakan Rd	0.87	0.61
310	Guy Hill Ranch	0.88	0.62
4090	Magnolia	0.82	0.69
2270	Cub Cr below Blue	0.85	0.71
4850	Porphory Mtn	0.83	0.73
4010	Crescent	0.92	0.67

B. Continuous Operation of Base Receiver/Decoder

The ALERT/ALERT2/NS5 receiver/decoder was continuously operational all 30 days and 720 hours of the month.

III. Rain Sensor Timer Reporting Summary

The following analysis assumes that each rain sensor has a 12-hour timer-reporting interval. The worst performing rain sensors for the month are summarized (Table 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*
1520	4710	4490	1700	1700	700						
1440	1440	4270	3060	700	4710						
4470	4470	4330	3030	540	4330						
1460	1460	4510	700	1710	1700						
140	140	1440	3090	500	4270						
1570	4490	4810	2970	710	4300						

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

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

IV. Rain Sensor Event Reporting Summary

A. District-Wide Total Tip/Count Statistics

The incrementing reports from all 1-mm rain sensors were analyzed to quantify the District-wide statistical total monthly tip summary (Table 3).

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

Statistical Parameter	Value	Comments
Mean	39.42	Only the 1-mm rain sensors were included in the analysis
Median	37.00	Only the 1-mm rain sensors were included in the analysis
Standard deviation	15.42	Only the 1-mm rain sensors were included in the analysis
Mean plus three standard deviations	85.67	Only the 1-mm rain sensors were included in the analysis
Minimum total count	0	ID 410 (Kelly Dam)
Maximum total count	95	ID 1500 (Powers Park – 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	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							

*- 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 5).

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

Sensor Description	Sensor ID	Comment
Kinney Peak	2280	Missed a large number of tips between 6/20 4:36:55AM and 6/20 1:10:05 PM
Hansen	4330	Missed a large number of tips between 6/20 2:24AM and 6/20 7:27 PM
Heavy rainfall was experienced on June 20. Missing reports were observed at numerous stations.		

D. Sensor-by-Sensor Incrementing Count Summary

The system-wide reception rate of incrementing, 1-mm tip reports for the month was approximately 81.88 percent. A total of 12,977 incrementing reports were received and a total of 15,848 reports were expected. The total loss of incrementing reports for the month was approximately 18.12 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*
1420	1350	2820	1700	1620	2280						
1460	950	2970	1620	1660	4300						
4470	1320	710	2930	810	4330						
4330	1330	4330	2990	650	4270						
2710	840	870	4330	940	2980						
1640	1720	1200	2950	1900	310						

*-Only sensors that are operational year-round (weather stations and stations in Boulder County) are included for the analysis in these months. **-Due to Spring start-up Fall shut-down the performance values in these months are not accurate.

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 700 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 hourly periods of highest radio traffic this month are shown (Table 7). Each hour exceeding 700 reports was analyzed to quantify the number of missing rain reports for that hour.

Table 7. Heavy Radio Traffic Periods

Day	Hr	Expected	Received	Load	Loss
20	3	658	542	1534	17.63%
20	2	497	408	1276	17.91%
20	4	487	420	1449	13.76%
20	5	364	339	1298	6.87%
20	1	328	309	991	5.79%
20	0	221	209	884	5.43%
19	22	175	153	727	12.57%
20	6	144	143	1148	0.69%
19	23	138	138	724	0.00%
17	12	97	91	764	6.19%
20	7	81	78	997	3.70%
30	21	77	77	733	0.00%
20	8	71	71	938	0.00%
20	9	69	66	888	4.35%
17	13	67	67	740	0.00%
20	15	26	26	797	0.00%
20	14	21	21	780	0.00%
20	10	20	20	799	0.00%
20	13	14	14	782	0.00%
30	22	16	16	720	0.00%
20	12	4	4	756	0.00%
20	11	2	2	796	0.00%
20	16	1	1	718	0.00%

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)	304
Total reports from unknown IDs	439
Unknown IDs with only a single received report (potential noise)	260
Total reports from all IDs – RecData Log entire month	378,358
Unknown reports as a fraction of total reports	0.12%

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
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						

The fraction of reports from unknown sensors relative to the total number of reports is shown below (Table 10).

Table 10. Monthly Percent of Unknown Sensor Reports

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2010	0.42%	0.56%	0.38%	0.32%	0.20%	1.61%	0.17%	0.49%	0.13%	0.16%	0.93%	1.88%
2011	0.39%	0.73%	0.90%	0.37%	0.58%	0.12%						

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 11).

Table 11. Reports Received by Unknown IDs

Unknown ID	Total Reports
1479	24
719	19
2239	13
4063	10
4094	8
1719	7
3015	5
939	4
1631	4
709	3
819	3
2269	3
2876	3
4091	3
4179	3
4359	3
4399	3
4419	3
4469	3
4511	3
4786	3
4826	3
4831	3
652	2
897	2
1008	2
1534	2
4011	2
4031	2
4086	2
4087	2
4093	2
4267	2
4389	2
4397	2
4467	2
4471	2
4521	2
4574	2
4602	2
4749	2
4811	2
4838	2
4863	2

The “unknown” device reports are analyzed temporally to understand when they are received during the day (Table 12). 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 12. Temporal Distribution of Received Reports

Hour (AM)	Reports	Hour (PM)	Reports
0:00-00:59	15	12:00-12:59	33
1:00-1:59	9	1:00-1:59	22
2:00-2:59	9	2:00-2:59	48
3:00-3:59	21	3:00-3:59	28
4:00-4:59	14	4:00-4:59	25
5:00-5:59	13	5:00-5:59	11
6:00-6:59	18	6:00-6:59	6
7:00-7:59	18	7:00-7:59	17
8:00-8:59	11	8:00-8:59	25
9:00-9:59	49	9:00-9:59	30
10:00-10:59	25	10:00-10:59	19
11:00-11:59	44	11:00-11:59	44

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	Apr 2011	May 2011	Jun 2011				
140	Wx-Blue Mountain	0	4	1				
430	Utah Park	0	4	0				
500	Havana Park	0	6	1				
630	Temple Pond at DTC	0	7	0				
650	Iilff Pond	0	4	0				
760	Mission Viejo Park	0	5	0				
810	Granby Ditch @ 6th	0	4	0				
920	Wx-Aurora Town Hall	0	7	1				
940	Sampson Gulch	0	8	0				
1010	Denver West	0	5	0				
1460	Wx-Urban Farm	0	5	1				
1520	Wx-Marston Lake North	2	4	1				
1530	Bear Creek at Lowell	2	10	0				
1710	Shop Creek	0	5	4				
1720	Cherry Cr at Steel	0	0	4				
1660	Spring Creek at Henderson	0	4	0				
1900	Niver Detention	0	5	0				
1920	Wx-Brighton	3	3	1				
2190	Wx-Squaw Mountain	0	8	0				
2970	Rampart Range Road	0	5	1				
3010	EPC at Hwy 105	2	2	3				
3020	West Creek Wx	2	1	3				
4330	Hansen Rain	0	5	4				
4730	Wx-Sugarloaf	0	5	0				

General System Analysis

Database Name

P:\A207-UDFCD-Data-Analysis\2011\06-2011\Novastar_extract_2011Jun.mdb

First Date in Database

6/1/11 12:00 AM

Total Days

30.0

Last Date in Database

6/30/11 11:59 PM

Total Hours

720.0

Total Records Analyzed

378,358

Records by Group

Wind Gust	63,630	17%
Temperature	59,973	16%
Relative Humidity	57,486	15%
Water Level PT-HSE	30,696	8%
Barometric Pressure	28,066	7%
Wind Speed Average & Azimuth	23,083	6%
Wind Direction	20,869	6%
Wind Speed Average	20,391	5%
Battery Voltage	19,546	5%
Precipitation	17,024	4%
Solar Radiation	9,603	3%
Fuel Moisture	5,651	1%
Fuel Temperature	5,636	1%
Water Level Float	4,194	1%
Water Level PT	3,392	1%
Soil Moisture	2,812	1%
Repeater Status Report	2,250	1%
Wind ALERT	1,414	0%
Water Level	696	0%
Repeater Pass List	610	0%
12Hr Status Report	486	0%
Unknown IDs	439	0%
Hayman Battery	350	0%
Handar 585 ALARM Status	59	0%
ALERT/A2 Testing	2	0%
Total	378,358	

Records by Major Group

Meteorologic Sensors	283,101	75%
Water Level Sensors	38,282	10%
Rain Sensors	17,024	4%
Soil and Fuel Sensors	14,099	4%
Sensor Status Transmissions	3,405	1%
Total	355,911	

Traffic Loading Summary

Alert Reports	378,358	
Average Daily Traffic	12,612	
Average Hourly Traffic	525	
Median Hourly Traffic	511	hour beginning
Peak Hourly Traffic	1,534	June 20, 3:00 AM
2nd Max	1,449	June 20, 4:00 AM
3rd Max	1,298	June 20, 5:00 AM
4th Max	1,276	June 20, 2:00 AM
5th Max	1,148	June 20, 6:00 AM

Rain Timer Performance

Analyze Rain Sensors

Rain ID	Description	Rcv	Timer Interval	Exp	Performance	Comment
700	Toll Gate @ 6th	19	0:00	60.00	32%	
2890	Spruce Mt - Douglas	27	7:19	60.00	45%	Installed this month
4710	Wx-Ward C-1	30	11:57	60.00	50%	
3070	Newlin Gulch	31	12:27	60.00	52%	Installed this month
4330	Hansen Rain	33	19:23	60.00	55%	
1700	Cherry Cr @ Champa	36	16:00	60.00	60%	
4270	Cannon Mountain	39	16:47	60.00	65%	
4300	Big Elk Park	40	15:17	60.00	67%	
540	Parker/Mississippi	42	16:41	60.00	70%	
2750	Wx-Castle Rock	43	16:06	60.00	72%	
4490	Apple Valley	45	15:57	60.00	75%	
2230	Bear Cr below Cub	46	14:18	60.00	77%	
4550	Boulder Jail	47	14:41	60.00	78%	
2320	Choke Cherry Resvr	48	14:30	60.00	80%	
4790	Wx-Button Rock	48	13:57	60.00	80%	
4090	Magnolia	49	14:18	60.00	82%	
4510	Pinewood Springs	49	13:40	60.00	82%	
4570	St. Antons	49	14:16	60.00	82%	
4820	Doudy Draw	49	13:49	60.00	82%	
870	Murphy Creek GC	50	13:06	60.00	83%	
1710	Shop Creek	50	13:49	60.00	83%	
2310	Genesee Village	50	13:44	60.00	83%	
4530	Winiger Ridge	50	13:46	60.00	83%	
4830	SBC @ San Souci	50	13:47	60.00	83%	
4850	Porphory Mtn	50	13:40	60.00	83%	
1200	Broomfield 3207	51	13:44	60.00	85%	
2270	Cub Cr below Blue	51	13:54	60.00	85%	
2280	Kinney Peak	51	13:16	60.00	85%	
2990	Wx-Tomah Rd-DougCnty	51	14:05	60.00	85%	
4080	Twin Sisters	51	13:41	60.00	85%	
4150	Gold Hill	51	13:35	60.00	85%	
4470	Little Narrows	51	13:23	60.00	85%	
630	Temple Pond at DTC	52	12:39	60.00	87%	
2980	Dakan Rd	52	13:14	60.00	87%	
4130	Swiss Peaks	52	13:16	60.00	87%	
310	Guy Hill Ranch	53	12:55	60.00	88%	
840	Fire Station 12	53	13:01	60.00	88%	
1000	Maple Grove Resv.	53	13:09	60.00	88%	
1050	Jeffco Fairgrounds	53	12:55	60.00	88%	
1100	Louisville Rec Ctr	53	13:14	60.00	88%	
1440	Wx-Elbert	53	12:45	60.00	88%	
1550	Lakewood CC	53	13:46	60.00	88%	
3030	Bingham Lake Park	53	12:58	60.00	88%	
3050	East/West Trailhead	53	12:45	60.00	88%	
4020	Rio Grande	53	12:57	60.00	88%	
4040	Martin Gulch	53	13:09	60.00	88%	
4170	Pine Brook	53	13:11	60.00	88%	
4200	Lazy Acres	53	12:58	60.00	88%	
4240	Sunset	53	13:14	60.00	88%	
4310	Johnny Park	53	12:43	60.00	88%	
4860	Fairview Peak	53	13:31	60.00	88%	
330	Van Bibber @ Hwy 93	54	12:27	60.00	90%	
860	Sand Cr at Colfax	54	12:29	60.00	90%	
1330	Roslyn	54	12:43	60.00	90%	

1500	Powers Park	54	12:44	60.00	90%
1520	Wx-Marston Lake North	54	13:16	60.00	90%
2330	Morrison	54	12:41	60.00	90%
2340	El Rancho	54	12:54	60.00	90%
2370	Red Rocks Park	54	12:27	60.00	90%
2730	Wx-Salisbury Park	54	12:14	60.00	90%
4060	Lakeshore	54	12:55	60.00	90%
4290	Red Hill	54	12:43	60.00	90%
4360	Justice Center	54	13:29	60.00	90%
140	Wx-Blue Mountain	55	12:42	60.00	92%
220	Upper Leyden	55	12:43	60.00	92%
300	Van Bibber Park	55	12:39	60.00	92%
410	Kelly Dam	55	12:51	60.00	92%
620	Quincy/Highline	55	12:26	60.00	92%
900	Wx-Aurora Reservoir	55	13:13	60.00	92%
1040	Lena @ U.S. Hwy 6	55	12:42	60.00	92%
1110	Gunbarrel	55	12:40	60.00	92%
2850	Cherry Cr bl Bayou Glch	55	12:13	60.00	92%
4010	Crescent	55	12:25	60.00	92%
4050	Walker Ranch	55	12:39	60.00	92%
4260	Taylor Mountain	55	12:42	60.00	92%
4770	Wx-Cal-Wood Ranch	55	12:44	60.00	92%
100	Carr Street	56	12:25	60.00	93%
150	Nott Creek	56	12:26	60.00	93%
210	Leyden Confluence	56	12:40	60.00	93%
500	Havana Park	56	12:33	60.00	93%
610	Harvard @ Jackson	56	12:25	60.00	93%
640	Goldsmith @ Eastman	56	11:25	60.00	93%
650	Iliff Pond	56	12:41	60.00	93%
730	No Name @ Quincy	56	12:27	60.00	93%
800	Sable Ditch @ 18th	56	12:26	60.00	93%
820	ETG @ Buckley	56	12:12	60.00	93%
920	Wx-Aurora Town Hall	56	12:30	60.00	93%
1010	Denver West	56	12:38	60.00	93%
1030	NREL/S. Table Mtn.	56	12:39	60.00	93%
1310	LDC at 64th	56	12:25	60.00	93%
1320	SPR at 3rd Ave	56	11:57	60.00	93%
1530	Bear Creek @ Lowell	56	12:11	60.00	93%
1800	Sand Creek Park	56	12:26	60.00	93%
2190	Wx-Squaw Mountain	56	12:42	60.00	93%
2240	Cold Sprg Glch conf	56	12:12	60.00	93%
2710	Wx-Highlands Ranch WTP	56	12:13	60.00	93%
2860	CC at Stroh Rd	56	12:40	60.00	93%
2910	East Cherry Cr-Douglas	56	12:44	60.00	93%
2920	West Cherry Head-Douglas Cnty	56	12:41	60.00	93%
3080	Tallman Gulch	56	12:29	60.00	93%
4100	Filter Plant	56	12:13	60.00	93%
4110	Betasso	56	12:13	60.00	93%
4190	Slaughterhouse	56	12:57	60.00	93%
4220	Fling's	56	12:50	60.00	93%
4520	Eagle Ridge	56	12:00	60.00	93%
120	West Woods	57	12:12	60.00	95%
200	Leyden Reservoir	57	12:11	60.00	95%
320	Sports Complex	57	12:11	60.00	95%
430	Utah Park	57	12:47	60.00	95%
440	Fire Station #7	57	12:25	60.00	95%
510	Virginia Court	57	12:16	60.00	95%
750	Wx-Quincy Reservoir	57	12:12	60.00	95%
810	Granby Ditch @ 6th	57	12:12	60.00	95%

830	Side Creek Park	57	12:25	60.00	95%
850	Flying J	57	12:18	60.00	95%
950	Piney at Liverpool	57	12:12	60.00	95%
1340	Sanderson at Xavier	57	12:25	60.00	95%
1360	Denver Zoo	57	12:13	60.00	95%
1400	Upper Sloan Det.	57	12:26	60.00	95%
1420	Wx-Diamond Hill	57	12:27	60.00	95%
1570	Wx-Brighton Ditch	57	12:14	60.00	95%
1810	Sand Creek at mouth	57	12:25	60.00	95%
1900	Niver Detention	57	12:11	60.00	95%
2260	Brook Forest	57	12:25	60.00	95%
2350	Idledale	57	12:11	60.00	95%
2360	Indian Hills	57	12:24	60.00	95%
2840	Sulphur Gulch	57	12:13	60.00	95%
2870	Cottonwood (Apache)	57	11:57	60.00	95%
2950	DC Public Works	57	12:13	60.00	95%
3010	EPC at Hwy 105	57	12:28	60.00	95%
3020	Wx-West Creek WX	57	12:13	60.00	95%
4070	Bear Peak	57	12:25	60.00	95%
4140	Logan Mill	57	12:12	60.00	95%
4180	Gold Lake	57	12:11	60.00	95%
4230	Golden Age	57	12:25	60.00	95%
4340	Riverside	57	12:11	60.00	95%
4350	Conifer Hill	57	12:26	60.00	95%
4840	SBC@S Boulder Ditch	57	12:25	60.00	95%
110	Ralston Reservoir	58	12:11	60.00	97%
400	Montview Park	58	11:58	60.00	97%
520	Jewell Detention	58	12:11	60.00	97%
530	Fire Station #19	58	12:11	60.00	97%
600	Harvard Gulch Park	58	12:11	60.00	97%
760	Mission Viejo Park	58	12:11	60.00	97%
1060	Heritage Square	58	12:11	60.00	97%
1370	West Metro FS13	58	12:25	60.00	97%
1600	Englewood Dam	58	12:11	60.00	97%
1660	SPR at Henderson	58	11:57	60.00	97%
2250	Rosedale	58	12:11	60.00	97%
2820	Haskins Gulch Conf	58	12:13	60.00	97%
2900	Russelville Gulch-Douglas	58	12:15	60.00	97%
2930	Wx-Spring Valley Rd-DougCnty	58	11:51	60.00	97%
2940	Willow Creek - DougCnty	58	12:00	60.00	97%
2960	Indian Creek	58	12:00	60.00	97%
3060	Fire Sta 47	58	12:13	60.00	97%
3090	Highland Heritage Park	58	12:23	60.00	97%
4030	Red Garden	58	11:59	60.00	97%
4160	Sunshine	58	11:58	60.00	97%
4730	Wx-Sugarloaf	58	12:13	60.00	97%
420	Expo Park	59	11:58	60.00	98%
710	Horseshoe Park Drop	59	11:43	60.00	98%
970	Pump Sta 3	59	12:00	60.00	98%
1300	Hidden Lake	59	11:58	60.00	98%
1350	Chatfield COE	59	11:59	60.00	98%
1460	Wx-Urban Farm	59	12:00	60.00	98%
1620	Slaughterhouse Glch	59	12:11	60.00	98%
1640	SPR at Union Ave.	59	12:00	60.00	98%
1920	Wx-Brighton	59	12:13	60.00	98%
2210	Wx-Hiwan G.C.	59	11:46	60.00	98%
2810	Pine Cliff Road	59	12:00	60.00	98%
4250	Geer Canyon	59	12:11	60.00	98%
4750	Wx-Louisville Lake	59	11:57	60.00	98%

4810	Shanahan Ridge	59	11:57	60.00	98%	
940	Sampson Gulch	61	11:46	60.00	102%	
1720	Cherry Cr @ Steele	63	11:07	60.00	105%	
1480	Third Creek at DIA	71	9:32	60.00	118%	
720	Confluence Pond	74	9:04	60.00	123%	
5720	Four Mile Creek	32	21:00	60.00	53%	Hayman Burn
5730	West Creek	58	12:00	60.00	97%	Hayman Burn
5740	Trail Creek	56	12:27	60.00	93%	Hayman Burn
5810	Stump Bump	57	12:27	60.00	95%	Hayman Burn
5860	Cedar Mountain	59	12:00	60.00	98%	Hayman Burn
5880	Hackett Mountain	56	12:40	60.00	93%	Hayman Burn
5940	Log Jumper	19	4:00	60.00	32%	Hayman Burn

Rain Event Performance				Analyze Rain Sensors										
		Reports Received	5,835											
	Systemwide Avg	Total Tips	6,780											
	86.06%	Data Loss	13.94%											
Rain ID	Performance	1-tips	2-tips	3-tips	4-tips	5-tips	6-tips	>6-tips	Rcv	Exp	Miss	Hold	Bucket	
2280	39%	12	2	2	4	0	0	1	20	51	31	0	0.0393701	
4300	54%	9	0	4	0	1	0	0	14	26	12	0	0.0393701	
4330	55%	12	3	2	0	0	0	1	17	31	14	0	0.0393701	
4270	61%	10	5	0	2	0	0	0	17	28	11	0	0.0393701	
2980	61%	20	9	5	1	0	0	0	35	57	22	0	0.0393701	
310	62%	24	4	3	2	0	1	0	34	55	21	0	0.0393701	
4010	67%	14	2	0	1	1	0	0	18	27	9	0	0.0393701	
4490	68%	12	2	3	0	0	0	0	17	25	8	0	0.0393701	
4090	69%	24	6	2	0	0	1	0	33	48	15	0	0.0393701	
4100	70%	14	5	2	0	0	0	0	21	30	9	0	0.0393701	
2270	71%	26	5	5	0	0	0	0	36	51	15	0	0.0393701	
4220	71%	19	5	3	0	0	0	0	27	38	11	1	0.0393701	
1920	72%	11	1	0	0	1	0	0	13	18	5	0	0.0393701	
1620	73%	20	4	3	0	0	0	0	27	37	10	0	0.0393701	
2920	73%	8	2	1	0	0	0	0	11	15	4	0	0.0393701	
4040	74%	19	2	1	0	1	0	0	23	31	8	0	0.0393701	
4750	75%	11	3	1	0	0	0	0	15	20	5	0	0.0393701	
4060	75%	24	8	0	1	0	0	0	33	44	11	0	0.0393701	
4530	75%	26	5	0	2	0	0	0	33	44	11	0	0.0393701	
2960	77%	23	5	2	0	0	0	0	30	39	9	0	0.0393701	
4310	77%	15	1	0	0	1	0	0	17	22	5	0	0.0393701	
2930	78%	11	2	1	0	0	0	0	14	18	4	0	0.0393701	
4820	78%	16	4	1	0	0	0	0	21	27	6	0	0.0393701	
3070	78%	26	8	1	0	0	0	0	35	45	10	0	0.0393701	
3090	78%	27	6	2	0	0	0	0	35	45	10	0	0.0393701	
4570	78%	29	3	2	1	0	0	0	35	45	10	0	0.0393701	
2330	78%	33	8	2	0	0	0	0	43	55	12	1	0.0393701	
2370	78%	25	2	1	0	1	0	0	29	37	8	0	0.0393701	
4170	79%	12	2	1	0	0	0	0	15	19	4	0	0.0393701	
1640	80%	34	3	2	1	0	0	0	40	50	10	0	0.0393701	
2730	80%	39	6	3	0	0	0	0	48	60	12	0	0.0393701	
4710	80%	36	7	2	0	0	0	0	45	56	11	0	0.0393701	
4130	81%	22	7	0	0	0	0	0	29	36	7	0	0.0393701	
4140	81%	21	3	0	1	0	0	0	25	31	6	0	0.0393701	
4180	81%	21	2	2	0	0	0	0	25	31	6	0	0.0393701	
820	81%	15	1	0	1	0	0	0	17	21	4	0	0.0393701	
3060	81%	41	9	0	1	0	0	0	51	63	12	0	0.0393701	
4150	81%	25	3	2	0	0	0	0	30	37	7	0	0.0393701	
4730	81%	28	6	1	0	0	0	0	35	43	8	0	0.0393701	
4790	81%	18	3	1	0	0	0	0	22	27	5	0	0.0393701	
520	82%	25	5	1	0	0	0	0	31	38	7	0	0.0393701	
4770	82%	24	2	0	0	1	0	0	27	33	6	0	0.0393701	
1480	82%	19	3	1	0	0	0	0	23	28	5	0	0.0393701	
2810	82%	29	8	0	0	0	0	0	37	45	8	0	0.0393701	
700	83%	31	6	1	0	0	0	0	38	46	8	0	0.0393701	
2250	83%	35	7	1	0	0	0	0	43	52	9	0	0.0393701	
860	83%	38	10	0	0	0	0	0	48	58	10	1	0.0393701	
1800	83%	28	5	1	0	0	0	0	34	41	7	0	0.0393701	
4360	83%	16	4	0	0	0	0	0	20	24	4	0	0.0393701	
4510	83%	17	2	1	0	0	0	0	20	24	4	0	0.0393701	
4520	83%	16	4	0	0	0	0	0	20	24	4	0	0.0393701	
1700	83%	27	2	0	0	1	0	0	30	36	6	0	0.0393701	
2710	84%	22	3	1	0	0	0	0	26	31	5	0	0.0393701	
4110	84%	22	3	1	0	0	0	0	26	31	5	0	0.0393701	
4240	84%	21	5	0	0	0	0	0	26	31	5	0	0.0393701	
4290	84%	18	2	1	0	0	0	0	21	25	4	0	0.0393701	
1340	84%	27	4	1	0	0	0	0	32	38	6	0	0.0393701	
1530	84%	27	4	1	0	0	0	0	32	38	6	0	0.0393701	
2900	84%	23	3	1	0	0	0	0	27	32	5	0	0.0393701	
750	84%	32	5	1	0	0	0	0	38	45	7	0	0.0393701	
1460	85%	30	2	0	0	1	0	0	33	39	6	1	0.0393701	
1060	85%	33	5	1	0	0	0	0	39	46	7	0	0.0393701	
2820	85%	33	5	1	0	0	0	0	39	46	7	0	0.0393701	
530	85%	25	1	2	0	0	0	0	28	33	5	0	0.0393701	
620	85%	24	3	1	0	0	0	0	28	33	5	0	0.0393701	
1520	85%	23	5	0	0	0	0	0	28	33	5	1	0.0393701	

2850	85%	14	3	0	0	0	0	0	17	20	3	0	0.0393701
4550	85%	15	1	1	0	0	0	0	17	20	3	0	0.0393701
400	85%	28	6	0	0	0	0	0	34	40	6	0	0.0393701
3030	85%	25	3	1	0	0	0	0	29	34	5	0	0.0393701
4080	85%	29	6	0	0	0	0	0	35	41	6	0	0.0393701
1660	86%	15	3	0	0	0	0	0	18	21	3	0	0.0393701
4200	86%	15	3	0	0	0	0	0	18	21	3	0	0.0393701
3020	86%	20	4	0	0	0	0	0	24	28	4	0	0.0393701
1710	86%	26	3	1	0	0	0	0	30	35	5	0	0.0393701
3080	86%	39	4	0	1	0	0	0	44	51	7	0	0.0393701
720	86%	33	4	1	0	0	0	0	38	44	6	0	0.0393701
2950	86%	33	4	1	0	0	0	0	38	44	6	0	0.0393701
2860	86%	50	5	2	0	0	0	0	57	66	9	0	0.0393701
2230	87%	35	2	2	0	0	0	0	39	45	6	0	0.0393701
4830	87%	17	3	0	0	0	0	0	20	23	3	0	0.0393701
950	87%	43	3	0	0	1	0	0	47	54	7	0	0.0393701
4030	87%	25	1	0	1	0	0	0	27	31	4	0	0.0393701
4160	87%	23	4	0	0	0	0	0	27	31	4	0	0.0393701
850	87%	46	8	0	0	0	0	0	54	62	8	1	0.0393701
2840	87%	52	9	0	0	0	0	0	61	70	9	0	0.0393701
940	87%	49	4	2	0	0	0	0	55	63	8	0	0.0393699
1900	88%	18	3	0	0	0	0	0	21	24	3	0	0.0393701
1030	88%	37	4	1	0	0	0	0	42	48	6	0	0.0393701
2240	88%	43	7	0	0	0	0	0	50	57	7	0	0.0393701
830	88%	31	5	0	0	0	0	0	36	41	5	0	0.0393701
1720	88%	32	3	1	0	0	0	0	36	41	5	0	0.0393701
2350	88%	32	3	1	0	0	0	0	36	41	5	0	0.0393701
1360	88%	26	2	1	0	0	0	0	29	33	4	0	0.0393701
4260	88%	26	2	1	0	0	0	0	29	33	4	0	0.0393701
1110	88%	20	1	1	0	0	0	0	22	25	3	0	0.0393701
1310	88%	20	3	0	0	0	0	0	23	26	3	0	0.0393701
1330	88%	20	3	0	0	0	0	0	23	26	3	0	0.0393701
800	88%	42	3	0	1	0	0	0	46	52	6	0	0.0393701
2320	88%	40	6	0	0	0	0	0	46	52	6	0	0.0393701
900	89%	47	7	0	0	0	0	0	54	61	7	0	0.0393699
2750	89%	27	4	0	0	0	0	0	31	35	4	0	0.0393701
840	89%	34	5	0	0	0	0	0	39	44	5	0	0.0393701
4340	89%	21	3	0	0	0	0	0	24	27	3	0	0.0393701
4350	89%	21	3	0	0	0	0	0	24	27	3	0	0.0393701
2360	89%	29	4	0	0	0	0	0	33	37	4	0	0.0393701
920	90%	62	6	1	0	0	0	0	69	77	8	0	0.0393701
2990	90%	23	3	0	0	0	0	0	26	29	3	0	0.0393701
500	90%	57	2	1	1	0	0	0	61	68	7	0	0.0393701
330	90%	39	5	0	0	0	0	0	44	49	5	0	0.0393701
870	90%	40	3	1	0	0	0	0	44	49	5	1	0.0393701
1570	90%	16	2	0	0	0	0	0	18	20	2	0	0.0393701
100	90%	24	3	0	0	0	0	0	27	30	3	0	0.0393701
610	90%	33	4	0	0	0	0	0	37	41	4	0	0.0393701
1050	90%	33	4	0	0	0	0	0	37	41	4	0	0.0393701
320	90%	25	3	0	0	0	0	0	28	31	3	0	0.0393701
4020	90%	25	3	0	0	0	0	0	28	31	3	0	0.0393701
4190	90%	25	3	0	0	0	0	0	28	31	3	1	0.0393701
2190	90%	17	2	0	0	0	0	0	19	21	2	0	0.0393701
510	91%	44	3	1	0	0	0	0	48	53	5	0	0.0393701
2210	91%	43	5	0	0	0	0	0	48	53	5	1	0.0393701
4470	91%	27	1	1	0	0	0	0	29	32	3	0	0.0393701
540	91%	27	3	0	0	0	0	0	30	33	3	0	0.0393701
150	91%	47	3	1	0	0	0	0	51	56	5	0	0.0393701
440	91%	28	3	0	0	0	0	0	31	34	3	0	0.0393701
1320	91%	29	3	0	0	0	0	0	32	35	3	0	0.0393701
1420	91%	30	1	1	0	0	0	0	32	35	3	0	0.0393701
4070	91%	29	3	0	0	0	0	0	32	35	3	0	0.0393701
300	91%	40	2	1	0	0	0	0	43	47	4	0	0.0393701
710	91%	39	4	0	0	0	0	0	43	47	4	0	0.0393701
2340	91%	39	4	0	0	0	0	0	43	47	4	0	0.0393701
4230	92%	20	2	0	0	0	0	0	22	24	2	0	0.0393701
1000	92%	30	3	0	0	0	0	0	33	36	3	0	0.0393701
3050	92%	41	2	1	0	0	0	0	44	48	4	0	0.0393701
1370	92%	41	4	0	0	0	0	0	45	49	4	0	0.0393701
140	92%	22	0	1	0	0	0	0	23	25	2	0	0.0393701
4840	92%	21	2	0	0	0	0	0	23	25	2	0	0.0393701

2260	92%	55	2	0	1	0	0	0	58	63	5	0	0.0393701
2910	92%	22	2	0	0	0	0	0	24	26	2	0	0.0393701
4810	92%	22	2	0	0	0	0	0	24	26	2	0	0.0393701
1040	92%	44	4	0	0	0	0	0	48	52	4	0	0.0393701
630	93%	82	5	1	0	0	0	0	88	95	7	0	0.0393701
650	93%	36	3	0	0	0	0	0	39	42	3	0	0.0393701
1010	93%	36	3	0	0	0	0	0	39	42	3	0	0.0393701
430	93%	62	5	0	0	0	0	0	67	72	5	0	0.0393701
1200	93%	25	2	0	0	0	0	0	27	29	2	0	0.0393701
1300	93%	27	0	1	0	0	0	0	28	30	2	0	0.0393701
2870	94%	42	3	0	0	0	0	0	45	48	3	0	0.0393701
210	94%	30	2	0	0	0	0	0	32	34	2	0	0.0393701
810	94%	47	3	0	0	0	0	0	50	53	3	0	0.0393701
1600	95%	33	2	0	0	0	0	0	35	37	2	0	0.0393701
2940	95%	33	2	0	0	0	0	0	35	37	2	0	0.0393701
200	95%	51	3	0	0	0	0	0	54	57	3	0	0.0393701
120	95%	52	3	0	0	0	0	0	55	58	3	1	0.0393701
1350	95%	18	1	0	0	0	0	0	19	20	1	0	0.0393701
110	95%	38	2	0	0	0	0	0	40	42	2	0	0.0393701
970	95%	58	3	0	0	0	0	0	61	64	3	0	0.0393701
420	96%	81	4	0	0	0	0	0	85	89	4	0	0.0393701
600	96%	41	2	0	0	0	0	0	43	45	2	0	0.0393701
220	96%	43	2	0	0	0	0	0	45	47	2	1	0.0393701
4050	96%	22	1	0	0	0	0	0	23	24	1	0	0.0393701
4250	96%	22	1	0	0	0	0	0	23	24	1	0	0.0393701
1550	97%	55	2	0	0	0	0	0	57	59	2	0	0.0393701
1810	97%	30	1	0	0	0	0	0	31	32	1	0	0.0393701
730	97%	37	1	0	0	0	0	0	38	39	1	0	0.0393701
1500	98%	91	2	0	0	0	0	0	93	95	2	0	0.0393701
640	99%	75	1	0	0	0	0	0	76	77	1	0	0.0393701
2310	100%	7	0	0	0	0	0	0	7	7	0	0	0.0393701
1100	100%	10	0	0	0	0	0	0	10	10	0	0	0.0393701
1440	100%	12	0	0	0	0	0	0	12	12	0	0	0.0393701
1400	100%	17	0	0	0	0	0	0	17	17	0	0	0.0393701
760	100%	37	0	0	0	0	0	0	37	37	0	0	0.0393701
	Total Tips	5,104	586	110	23	10	2	2	5,835	6,780	945	11	
3010	74%	58	11	2	0	0	0	1	71	96	25	0	0.01
4850	73%	76	17	5	1	2	0	0	101	139	38	7	0.01
4860	73%	86	26	4	2	0	1	0	119	164	45	0	0.01
5720	76%	22	3	3	0	0	0	0	28	37	9	0	0.0393701
5730	87%	23	4	0	0	0	0	0	27	31	4	0	0.0393701
5740	84%	24	1	2	0	0	0	0	27	32	5	0	0.0393701
5810	91%	19	2	0	0	0	0	0	21	23	2	0	0.0393701
5860	87%	11	2	0	0	0	0	0	13	15	2	0	0.0393701
5880	95%	17	1	0	0	0	0	0	18	19	1	0	0.0393701
5940	51%	14	4	2	0	0	0	1	20	39	19	0	0.0393701

2011 Monthly ALERT Radio Traffic Summary

