Memo

Water & Earth Technologies, Inc.
Water Resources and Environmental Consulting

Date: February 5, 2008

To: Kevin Stewart and Chad Kudym

From: Markus Ritsch

Subject: **January 2008 ALERT Data Analysis**

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 January 1 through January 31, 2008.

II. General System Analysis Summary

A total of 209,121 individual data records with valid ALERT IDs were analyzed from the ALERT 2 base station. Meteorological sensors account for 88 percent, water level sensors 5 percent, and rain sensors 2 percent of the total monthly transmissions.

Ninety-nine point four percent of the received data reports were flagged as "good" by the Nova Star validation process. Roughly 1,220 reports were flagged as "bad". Of these "bad" reports, 367 originated from Quincy Reservoir (ID 753) and 206 from Squaw Mountain (ID 2192).

The system-wide radio traffic loading this month was 6,746 reports per day with an average hourly loading of 281 reports. The peak hourly traffic loading was 402 reports, which occurred on January 31st between 9:00 AM and 10:00 AM. A plot of monthly average and peak hourly traffic loading is provided.

A total of 65 reports (all from ID 5770) were received from the Hayman gages this month. The Hayman gages are winterized and won't return to operation until April 1, 2008.

The sensors reporting most frequently this month are mostly wind sensors and include:

1. Ward C-1 (ID 4707 - ALERT wind) with 5,361 reports
2. Castle Rock (ID 2747 - ALERT wind) with 4,847 reports, and
3. Salisbury Park (ID 2727 - ALERT wind) with 3,936 reports.

The reports from the above sensors are distributed evenly throughout the month.

The sensors reporting infrequently this month include:

1. Fourmile at Salina (ID 4415) with 1 report,
2. Bear Creek @ Lowell (ID 1533) with 1 report,
3. Stapleton (ID 1463) with 1 report,
4. Roslyn (ID 1338) with 1 report,
5. Kelly Dam (ID 410) with 1 report,
6. SPR at Dartmouth (ID 1626) with 5 reports,
7. Chatfield COE (ID 1358-not defined on ALERT 2 and 1350) with 7 reports,
8. Leyden Reservoir (ID 200) with 9 reports, and
9. Havana Park (ID 500) with 10 reports.

Note that many stations are shut-down over the winter. The reporting for these stations is minimal or non-existent beginning in October.

III. Rain Sensor Timer Reporting Summary

The following analysis assumes that each rain sensor has a 12-hour timer reporting interval. System-wide the ALERT 2 base station received approximately 88 percent of the non-incrementing timer reports. The worst performing rain sensors for the month are summarized (Table 1).

Table 1. Monthly Summary of Sensors with Poor Timer Performance (Sensor ID)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2190											
140											
4150											
4060											
4470											
4530											

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.

Sensor ID 1460 has a 24-hour timer reporting interval and is not included in the timer reporting analysis.

Sensor ID 1810 has an 18-hour timer reporting interval and is not included in the timer reporting analysis.

IV. Rain Sensor Event Reporting Summary

A. District-Wide Total Tip/Count Statistics

The incrementing reports from all 1-mm rain sensors (excluding Hayman sensors) that reported for the entire month are analyzed to quantify the District-wide statistical total monthly tip summary (Table 2).

Table 2. District-Wide Total Tip/Count Statistical Summary

Statistical Parameter	Value	Comments
Mean	4.05	Only the 1-mm rain sensors were included in the analysis
Median	3	Only the 1-mm rain sensors were included in the analysis
Standard deviation	3.24	Only the 1-mm rain sensors were included in the analysis
Mean plus three standard deviations	13.76	Only the 1-mm rain sensors were included in the analysis
Minimum total count	1	Many sensors
Maximum total count	13	Quincy Res, Tomah Rd, Martin Gulch (IDs 750, 2990, 4040)

The highest reporting rain sensors were Quincy Reservoir (ID 750), Tomah Road in Douglas County (ID 2990), and Martin Gulch (ID 4040). There were no sensors that reported more than the system-wide mean plus 3 standard deviations.

A monthly summary of the District-wide mean total tip/count is presented (Table 3).

Table 3. 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												

B. Sensors with a Jump of Six or More in the Sequential Count

The tip count series for sensors with a jump in sequential count of more than six are manually inspected and summarized below.

a. Marston Lake North (ID 1520)

This sensor had a large jump in count on January 24th and January 25th.

Table 4. Marston Lake North (ID 1520) - Large Jump in Count

Date/Time	Sensor ID	Count
1/24/2008 12:24:59 AM	1520	69
1/24/2008 12:25:01 PM	1520	69
1/24/2008 1:16:09 PM	1520	69
1/24/2008 1:23:40 PM	1520	2046
1/24/2008 1:24:19 PM	1520	2046
1/24/2008 1:25:24 PM	1520	2046
1/25/2008 12:25:00 AM	1520	2046
1/25/2008 11:10:44 AM	1520	2046
1/25/2008 11:56:47 AM	1520	0
1/25/2008 12:25:01 PM	1520	0
1/26/2008 12:25:00 AM	1520	0

Field maintenance is the likely cause of the large jump in count. The monthly sequential count series looks good for the remainder of the month.

C. Sensor-by-Sensor Incrementing Count Summary

The system-wide reception rate of incrementing, 1-mm tip reports for the month was approximately 97 percent. A total of 239 incrementing reports were received and a total of 247 were expected. The total loss of incrementing reports for the month was approximately 3 percent. Those sensors with the worst rain event transmission performance characteristics are summarized (Table 5).

Table 5. Monthly Summary of Sensors with the Most Missed Tips

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1640											
2190											
750											
4570											
2990											
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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.

The incrementing data series for the worst performing sensors is manually inspected to identify periods of missing data.

a. SPR at Union Avenue (ID 1640)

This sensor has a continuous series of data for the entire month and shows a jump in count on January 17 when two incrementing tips were not recorded.

Date/Time	Sensor ID	Count
1/16/2008 2:08:26 PM	1640	685
1/17/2008 2:08:25 AM	1640	685
1/17/2008 12:30:26 PM	1640	688
1/17/2008 12:32:26 PM	1640	689
1/17/2008 2:08:26 PM	1640	689
1/18/2008 2:08:25 AM	1640	689

b. Squaw Mountain (ID 2190)

This sensor has a continuous series of data for the entire month and is missing one tip on January 27. This sensor also has a number if invalid reports during the month.

Date/Time	Sensor ID	Count
1/26/2008 3:06:48 AM	2190	35
1/26/2008 3:06:53 PM	2190	35
1/27/2008 3:06:59 AM	2190	35
1/27/2008 9:39:54 AM	2190	37
1/27/2008 3:07:03 PM	2190	37
1/28/2008 3:07:02 AM	2190	37

c. Quincy Reservoir (ID 750)

This sensor has a continuous series of data for the entire month and exhibits some strange count behavior on January 18. Three incrementing tips are missing between 9:52:08 AM and 1:23:28 PM. These jumps in count are likely due to field maintenance activity.

Date/Time	Sensor ID	Count
1/17/2008 11:31:55 PM	750	338
1/18/2008 9:52:08 AM	750	339
1/18/2008 9:52:23 AM	750	341
1/18/2008 1:18:48 PM	750	0
1/18/2008 1:23:07 PM	750	1
1/18/2008 1:23:28 PM	750	4
1/18/2008 1:24:12 PM	750	5
1/18/2008 1:24:33 PM	750	6

V. Heavy Radio Traffic Analysis

For each month, periods exceeding 600 messages per hour are analyzed independently in an attempt to identify rain tip sequences where 3 or more, sequential messages are lost. These heavy traffic periods are analyzed in the subsequent paragraphs.

A. The Five Heaviest Traffic Hours This Month

The hourly periods of highest radio traffic for the month include:

- 1/31/2008 from 9:00 am to 10:00 am (402 reports)
- 1/28/2008 from 9:00 pm to 10:00 pm (397 reports)
- 1/23/2008 from 8:00 am to 9:00 am (390 reports)
- 1/05/2008 from 9:00 am to 10:00 am (381 reports)
- 1/15/2008 from 6:00 pm to 7:00 pm (380 reports)

B. January 31, 2008

The distribution of hourly traffic about the peak hour on January 31 is summarized:

- 6:00 am to 7:00 am – 264 reports
- 7:00 am to 8:00 am – 330 reports
- 8:00 am to 9:00 am – 375 reports
- 9:00 am to 10:00 am – 402 reports
- 10:00 am to 11:00 am – 375 reports
- 11:00 am to 12:00 pm – 367 reports
- 12:00 pm to 1:00 pm – 368 reports

Incrementing rain records from the 1-mm gages for the heavy radio traffic period were examined to characterize the loss of sequential incrementing tip transmissions (Table 6). Overall, approximately 0.00% of the incrementing tip reports were lost during this period.

Table 6. Peak Traffic Analysis - Loss of Incrementing Tip Reports

	Occurrences of lost sequential tip reports during period			
Heavy Traffic Period (Jan 31, 2008)	**Loss of 2 tips**	**Loss of 3 tips**	**Loss of 4 tips**	**Loss of 5 tips**
6:00 am to 1:00 pm	0	0	0	0

VI. Unknown Device Analysis – Received Data Log

The ALERT IDs present in the audio signal received by the decoder are compared against a list of "active" device IDs that are defined within NovaStar. Those IDs received by the decoder that are not defined within NovaStar are considered to be "unknown" and may be the result of radio noise or problems with the telemetry system. The reception of "unknown" device reports for the month is summarized (Table 7).

Table 7. Summary of Unknown IDs

Description	**Quantity**
Total number of unknown IDs (IDs without a device definition)	115
Total reports from unknown IDs	233
Unknown IDs with only a single received report (potential noise)	80
Total reports from all IDs – RecData Log entire month	221,376
Unknown reports as a fraction of total reports	0.11%

The total number of reports from unknown sensors is small relative to the total reports received for the month.

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 quantified (Table 8).

Table 8. Reports Received by Unknown IDs

Unknown Sensor ID	Total Reports
2204	19
499	10
505	10
205	9
4639	7
4765	7
4828	6
2205	6
4063	6
4093	5
4769	5
4636	5
4768	4
4644	4
4863	4
2365	3
4646	3
4643	3
4773	3
4748	3
4831	3
4740	2
4742	2
4620	2
4083	2
4760	2
4827	2
5933	2
4862	2
4092	2
4374	2
4087	2
4763	2
4775	2
4766	2

The "unknown" sensor with the largest number of reports is 2204. This sensor began to report on December 9th, 2007 and continues to report through January 31, 2008. **Could this sensor as well as 2205 be reporting from Hiwan Golf?**

The "unknown" device reports are analyzed temporally to understand when they are received during the day (Table 9). 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 9. Temporal Distribution of Unknown Reports

Hour (AM)	Reports	Hour (PM)	Reports
0:00-00:59	3	12:00-12:59	10
1:00-1:59	5	1:00-1:59	18
2:00-2:59	6	2:00-2:59	6
3:00-3:59	6	3:00-3:59	8
4:00-4:59	5	4:00-4:59	4
5:00-5:59	8	5:00-5:59	26
6:00-6:59	12	6:00-6:59	11
7:00-7:59	6	7:00-7:59	18
8:00-8:59	8	8:00-8:59	16
9:00-9:59	6	9:00-9:59	10
10:00-10:59	8	10:00-10:59	3
11:00-11:59	6	11:00-11:59	5

Reports from unknown sensors occur each hour of the day. The hour from 5:00 pm to 6:00 pm received the highest number of unknown reports.

VII. Issues Identified this Month

Sensors with a large number of invalid reports (other than Wind sensors):

1. Quincy Reservoir (ID 753) - Solar Radiation with 367 invalid reports,
2. Squaw Mountain (ID 2192) - Temperature with 206 reports,
3. Squaw Mountain (ID 2191) - Relative Humidity with 86 reports,
4. Squaw Mountain (ID 2190) - Precipitation with 4 reports,
5. Cal-Wood Ranch (ID 4774) - Barometric Pressure with 41 reports,
6. Cal-Wood Ranch (ID 4770) - Precipitation with 7 reports, and
7. Toll Gate @ 6th (ID 703) - PT with 59 reports.

Sensors reporting frequently:

8. Ward C-1 (ID 4707 - ALERT wind) with 5,361 reports
9. Castle Rock (ID 2747 - ALERT wind) with 4,847 reports, and
10. Salisbury Park (ID 2727 - ALERT wind) with 3,936 reports.

Sensors reporting infrequently (under reporting):

11. Fourmile at Salina (ID 4415) with 1 report,
12. Bear Creek @ Lowell (ID 1533) with 1 report,
13. Stapleton (ID 1463) with 1 report,
14. Roslyn (ID 1338) with 1 report,
15. Kelly Dam (ID 410) with 1 report,
16. SPR at Dartmouth (ID 1626) with 5 reports,
17. Chatfield COE (ID 1358 and 1350) with 7 reports, (***What is the battery ID for Chatfield COE?***)
18. Leyden Reservoir (ID 200) with 9 reports, and
19. Havana Park (ID 500) with 10 reports.

Poor timer reporting:

The following sensors reported for the entire month and showed poor timer performance.

20. **Squaw Mountain (ID 2190)** – Only 62 % of the timer reports were received from this sensor which reported the entire month. Possible telemetry issue at this station.
21. **Blue Mountain (ID 140)** – Only 69% of the timer reports were received from this sensor.
22. **Gold Hill (ID 4150)** – Only 77% of the timer reports were received from this sensor.
23. **Lakeshore (ID 4060)** – Only 79% of the timer reports were received from this sensor.
24. **Little Narrows (ID 4470)** – Only 81% of the timer reports received for the entire month.

Low rain total:

25. **Squaw Mountain (ID 2190) –** This sensor recorded only 1 tip for the entire month. Nothing suspicious in the data series. Surrounding stations also had low monthly totals.

High rain total:

26. **Martin Gulch (ID 4040)** – This was the highest recording sensor for the month with a total of 13 tips. Nothing suspicious was identified in the incrementing series.

Large Jump in Sequential Count Value:

27. **Marston Lake North (ID 1520)** - This sensor experienced several jumps in the sequential count on January 24th and January 25th. These jumps are possibly due to field maintenance.

Reports from "Unknown Sensors":

28. **2204 and 2205 –** The "unknown" sensor with the largest number of reports is 2204. This sensor begins to report on December 9th, 2007 and continues to report through January 31st, 2008. **Could this sensor, as well as 2205, be reporting from Hiwan Golf?**

29. **499 and 505 -** These sensor IDs each reported 10 times during the month. Is it possible they are from the same transmitter? These transmissions could be from field testing.

30. The following table shows the "unknown" sensor IDs and the total number of reports received during the month. These reports indicate the existence of a transmitter that is sending information on an ID that is not currently defined within NovaStar.

Unknown Sensor ID	Total Reports
2204	19
499	10
505	10
205	9
4639	7
4765	7
4828	6
2205	6
4063	6
4093	5
4769	5
4636	5
4768	4
4644	4
4863	4
2365	3
4646	3
4643	3
4773	3
4748	3
4831	3

General System Analysis

Database Name P:\A207-UDFCD-Data-Analysis\2008_Jan\Novastar_extract_2008Jan.mdb

First Date in Database	1/1/08 12:00 AM	**Total Days**	31.0
Last Date in Database	1/31/08 11:59 PM	**Total Hours**	744.0

Total Records Analyzed 209121

Records by Group

Wind Gust	40308	19%
Relative Humidity	36631	18%
Temperature	34009	16%
Wind Speed Average & Azimuth	28714	14%
Wind Direction	19251	9%
Wind Speed Average	15316	7%
Water Level PT-HSE	8326	4%
Solar Radiation	5351	3%
Precipitation	5010	2%
Barometric Pressure	4140	2%
Battery Voltage HSE	3757	2%
Battery Voltage Digital	2805	1%
Water Level Float	1362	1%
Fuel Moisture	670	0%
Fuel Temperature	663	0%
Battery Voltage Analog	645	0%
Repeater Pass List	615	0%
Repeater Status Report	489	0%
Precipitation - Test	248	0%
Battery	184	0%
Water Level PT	175	0%
Longmont Flow Gage	115	0%
12Hr Status Report	114	0%
Hayman Precipitation	65	0%
Soil Moisture	62	0%
Longmont Water Level PT	56	0%
Handar 585 ALARM Status	40	0%
Total	209121	

Records by Major Group

Meteorologic Sensors	183720	88%
Water Level Sensors	10034	5%
Sensor Status Transmissions	8465	4%
Rain Sensors	5010	2%
Soil and Fuel Sensors	1395	1%
Total	208624	

Records by Validation Type

Good	0	207901	99.42%
Questionable	1	1220	0.58%
	Total	209121	

Sensors With Most Invalid Data

Description	**Sensor**	**Reports**
Quincy Reservoir	753	367
Squaw Mountain	2192	206
Squaw Mountain	2191	86
Toll Gate @ 6th	703	59
Squaw Mountain	2187	49

Traffic Loading Summary

Alert Reports	209121	
Average Daily Traffic	6746	
Average Hourly Traffic	281	
Median Hourly Traffic	285	hour beginning
Peak Hourly Traffic	402	1/31/08 9:00 AM
2nd Max	397	1/28/08 9:00 PM
3rd Max	390	1/23/08 8:00 AM
4th Max	381	1/5/08 9:00 AM
5th Max	380	1/15/08 6:00 PM

General System Analysis

Reports per Sensor

Description	Sensor	Reports	Fraction of Total
Ward C-1	4707	5361	3%
Castle Rock	2747	4847	2%
Salisbury Park	2727	3936	2%
Louisville Lake	4747	3321	2%
Stapleton	1461	3178	2%
Stapleton	1464	2964	1%
Stapleton	1465	2959	1%
Stapleton	1467	2949	1%
Elbert	1438	2942	1%
Elbert	1439	2940	1%
Stapleton	1466	2937	1%
Elbert	1437	2934	1%
Elbert	1441	2915	1%
Elbert	1442	2913	1%
Marston Lake North	1526	2865	1%
Castle Rock	2744	2795	1%
Salisbury Park	2724	2756	1%
Quincy Reservoir	751	2743	1%
Ward C-1	4704	2664	1%
Hiwan G.C.	2208	2564	1%
Sugarloaf	4724	2559	1%
Sugarloaf	4727	2502	1%
Squaw Mountain	2188	2500	1%
Marston Lake North	1521	2479	1%
Louisville Lake	4744	2449	1%
Highlands Ranch WTP	2707	2365	1%
Cal-Wood Ranch	4764	2351	1%
Diamond Hill	1414	2335	1%
Salisbury Park	2732	2310	1%
Highlands Ranch WTP	2704	2307	1%
Squaw Mountain	2192	2271	1%
Blue Mountain	139	2254	1%
Blue Mountain	138	2234	1%
Blue Mountain	137	2221	1%
Blue Mountain	141	2173	1%
Blue Mountain	142	2117	1%
Quincy Reservoir	752	2108	1%
Squaw Mountain	2189	1953	1%
Button Rock	4784	1919	1%
Brighton	1921	1890	1%
Salisbury Park	2731	1890	1%
Sugarloaf	4731	1888	1%
Cal-Wood Ranch	4771	1879	1%
Squaw Mountain	2187	1873	1%
Stapleton	1462	1858	1%
Ward C-1	4711	1846	1%
Brighton	1914	1842	1%
Squaw Mountain	2191	1831	1%
Button Rock	4791	1812	1%
Cal-Wood Ranch	4767	1801	1%
Highlands Ranch WTP	2711	1790	1%
Castle Rock	2752	1789	1%
Highlands Ranch WTP	2712	1775	1%
Castle Rock	2751	1770	1%
Hiwan G.C.	2209	1749	1%
Aurora Reservoir	906	1746	1%
Brighton	1922	1719	1%

General System Analysis

Marston Lake North	1527	1713	1%
Louisville Lake	4751	1688	1%
Diamond Hill	1417	1685	1%
Louisville Lake	4752	1641	1%
Sugarloaf	4732	1619	1%
Cal-Wood Ranch	4772	1616	1%
Button Rock	4792	1584	1%
Hiwan G.C.	2212	1578	1%
Diamond Hill	1422	1552	1%
SPR at Union Ave.	1643	1478	1%
Hiwan G.C.	2207	1422	1%
Marston Lake North	1522	1325	1%
Aurora Reservoir	905	1319	1%
Aurora Reservoir	901	1283	1%
Ward C-1	4712	1250	1%
Hiwan G.C.	2211	1179	1%
Marston Lake North	1525	1152	1%
Aurora Reservoir	907	1133	1%
Cal-Wood Ranch	4774	1098	1%
Lyons Diversion NSV	4563	1096	1%
Brighton	1917	1080	1%
Marston Lake North	1523	1076	1%

Rain Timer Performance

Analyze Rain Sensors

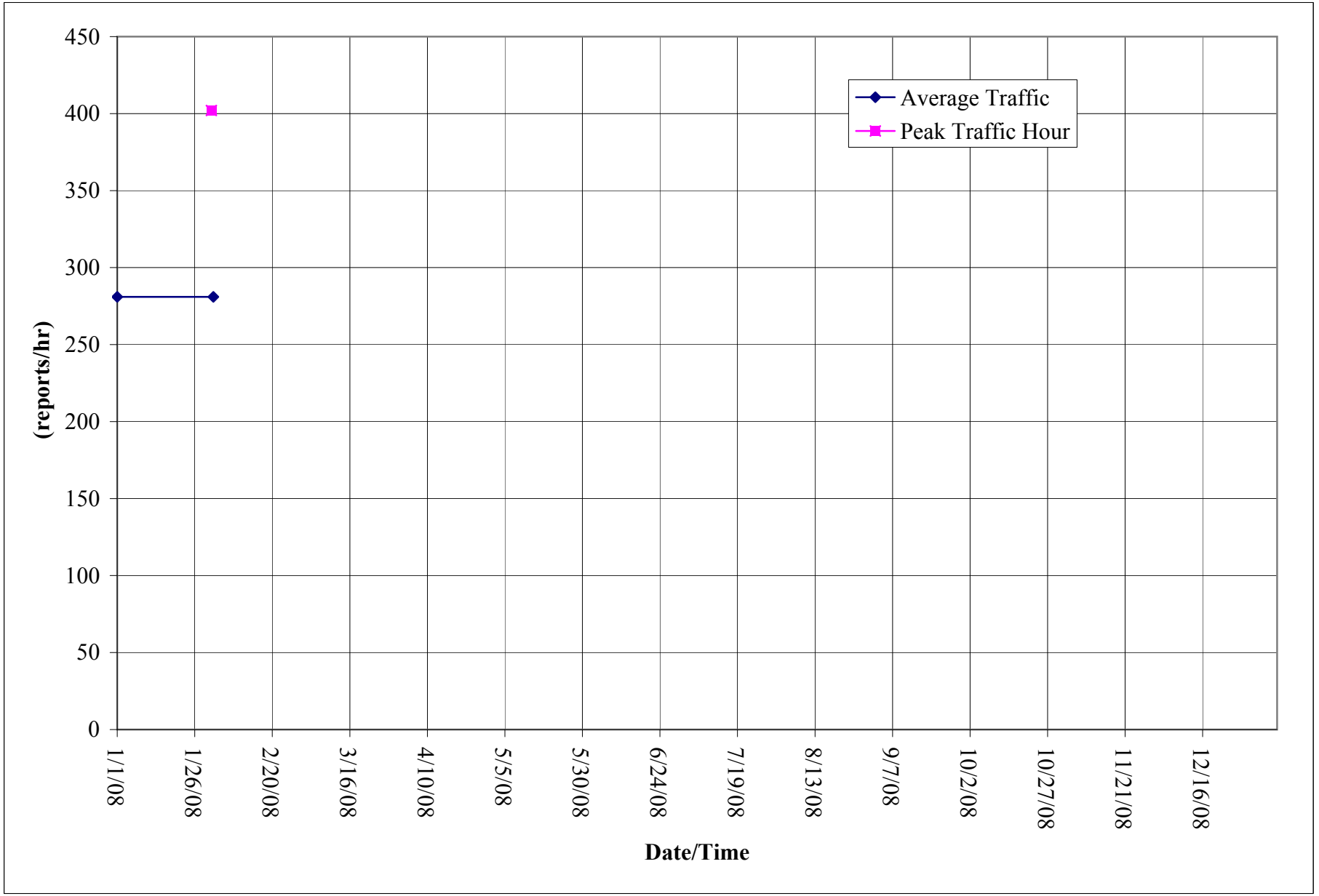
			systemwide average (days) 0.5174		rage 88%
Rain Sensors	**Description**	**Rcvd**	**Average Timer Interval**	**Expected**	**Performance**
1350	Chatfield COE	6	0:19	62.00	10%
200	Leyden Reservoir	8	0:00	62.00	13%
500	Havana Park	9	0:00	62.00	15%
1460	Stapleton	30	0:00	62.00	48%
2190	Squaw Mountain	39	18:20	62.00	63%
1810	Sand Creek at mouth	41	18:00	62.00	66%
140	Blue Mountain	43	16:41	62.00	69%
4150	Gold Hill	48	14:08	62.00	77%
4060	Lakeshore	49	14:28	62.00	79%
4470	Little Narrows	50	13:55	62.00	81%
4530	Winiger Ridge	51	14:02	62.00	82%
1660	SPR at Henderson	52	14:18	62.00	84%
4130	Swiss Peaks	52	12:46	62.00	84%
4220	Fling's	52	13:55	62.00	84%
4240	Sunset	53	13:38	62.00	85%
4560	Lyons Diversion NSV	53	13:53	62.00	85%
4860	Fairview Peak	53	13:40	62.00	85%
4010	Cresent	54	13:24	62.00	87%
4140	Logan Mill	54	13:08	62.00	87%
4170	Pine Brook	54	13:38	62.00	87%
4570	St. Antons	54	13:14	62.00	87%
1440	Elbert	55	13:20	62.00	89%
2930	Spring Valley Rd - DougCnty	55	13:10	62.00	89%
4180	Gold Lake	55	12:39	62.00	89%
4360	Justice Center	55	13:20	62.00	89%
4510	Pinewood Springs	55	12:57	62.00	89%
4290	Red Hill	56	12:52	62.00	90%
5770	Hayman	56	12:29	62.00	90%
2210	Hiwan G.C.	57	12:00	62.00	92%
4090	Magnolia	57	12:51	62.00	92%
4490	Apple Valley	57	12:36	62.00	92%
4730	Sugarloaf	57	12:53	62.00	92%
4750	Louisville Lake	57	12:51	62.00	92%
4810	Shanahan Ridge	57	12:24	62.00	92%
4850	Porphory Mtn	57	12:39	62.00	92%
1420	Diamond Hill	58	12:40	62.00	94%
2730	Salisbury Park	58	12:13	62.00	94%
4030	Red Garden	58	12:38	62.00	94%
4040	Martin Gulch	58	12:27	62.00	94%
4080	Twin Sisters	58	12:37	62.00	94%
4190	Slaughterhouse	58	12:37	62.00	94%
4260	Taylor Mountain	58	12:35	62.00	94%
4270	Cannon Mountain	58	12:35	62.00	94%
4300	Big Elk Park	58	12:37	62.00	94%
4330	Indian Ruins	58	12:35	62.00	94%
4830	SBC @ San Souci	58	12:24	62.00	94%
700	Toll Gate @ 6th	59	12:25	62.00	95%
750	Quincy Reservoir	59	11:59	62.00	95%
920	Aurora Town Hall Wx	59	12:25	62.00	95%
2220	Evergreen Lake	59	12:22	62.00	95%
2330	Morrison	59	12:24	62.00	95%
2820	Haskins Gulch Conf	59	12:13	62.00	95%
2940	Willow Creek - DougCnty	59	12:12	62.00	95%
2990	Tomah Rd-Douglas Cnty	59	12:00	62.00	95%
4050	Walker Ranch	59	12:10	62.00	95%
4100	Filter Plant	59	12:24	62.00	95%
4110	Betasso	59	12:25	62.00	95%
4230	Golden Age	59	12:22	62.00	95%
4250	Geer Canyon	59	12:23	62.00	95%
4340	Riverside	59	12:23	62.00	95%
4350	Conifer Hill	59	12:23	62.00	95%
4520	Eagle Ridge	59	12:24	62.00	95%
4710	Ward C-1	59	12:13	62.00	95%
4790	Button Rock	59	12:12	62.00	95%
4840	SBC@S Boulder Ditch	59	12:10	62.00	95%
740	Smoky Hill	60	12:12	62.00	97%
1540	Sanderson at Xavier	60	12:10	62.00	97%
1570	Brighton Ditch Wx	60	12:00	62.00	97%

1640	SPR at Union Ave.	60	12:12	62.00	97%
4020	Rio Grande	60	11:58	62.00	97%
4070	Bear Peak	60	12:10	62.00	97%
4160	Sunshine	60	11:58	62.00	97%
4310	Johnny Park	60	12:11	62.00	97%
4770	Cal-Wood Ranch	60	12:12	62.00	97%
4820	Doudy Draw	60	12:10	62.00	97%
1480	Third Creek at DIA	61	12:00	62.00	98%
1700	Cherry Cr @ Champa	61	12:00	62.00	98%
1920	Brighton	61	12:00	62.00	98%
2710	Highlands Ranch WTP	61	12:00	62.00	98%
2750	Castle Rock	61	12:00	62.00	98%
2920	West Cherry Head-Douglas Cnty	61	12:00	62.00	98%
4200	Lazy Acres	61	11:59	62.00	98%
900	Aurora Reservoir	64	11:36	62.00	103%
1520	Marston Lake North	65	11:34	62.00	105%
2320	Choke Cherry Resvr	226		62.00	

Rain Event Performance

Analyze Rain Sensors

		Reports Received	239										
	Systemwide Avg	Total Tips	247										
	97%	Data Loss	3.24%										
Rain Sensor	**Perf**	**1-tips**	**2-tips**	**3-tips**	**4-tips**	**5-tips**	**6-tips**	**>6-tips**	**Rcvd**	**Exp**	**Miss**	**Hold-off**	**Bucket**
1640	60%	2	0	1	0	0	0	0	3	5	2	0	0.0393701
2190	67%	1	1	0	0	0	0	0	2	3	1	0	0.0393701
750	77%	8	1	1	0	0	0	0	10	13	3	1	0.0393701
4570	83%	4	1	0	0	0	0	0	5	6	1	0	0.0393701
2990	92%	11	1	0	0	0	0	0	12	13	1	0	0.0393701
4040	100%	13	0	0	0	0	0	0	13	13	0	0	0.0393701
4310	100%	12	0	0	0	0	0	0	12	12	0	0	0.0393701
2820	100%	10	0	0	0	0	0	0	10	10	0	0	0.0393701
4530	100%	10	0	0	0	0	0	0	10	10	0	0	0.0393701
1420	100%	9	0	0	0	0	0	0	9	9	0	0	0.0393701
4150	100%	9	0	0	0	0	0	0	9	9	0	0	0.0393701
4130	100%	8	0	0	0	0	0	0	8	8	0	0	0.0393701
5770	100%	8	0	0	0	0	0	0	8	8	0	0	0.0393701
4510	100%	6	0	0	0	0	0	0	6	6	0	0	0.0393701
1810	100%	5	0	0	0	0	0	0	5	5	0	0	0.0393701
4060	100%	5	0	0	0	0	0	0	5	5	0	0	0.0393701
4190	100%	5	0	0	0	0	0	0	5	5	0	0	0.0393701
2330	100%	4	0	0	0	0	0	0	4	4	0	0	0.0393701
2920	100%	4	0	0	0	0	0	0	4	4	0	0	0.0393701
4010	100%	4	0	0	0	0	0	0	4	4	0	0	0.0393701
4070	100%	4	0	0	0	0	0	0	4	4	0	0	0.0393701
4140	100%	4	0	0	0	0	0	0	4	4	0	0	0.0393701
4160	100%	4	0	0	0	0	0	0	4	4	0	0	0.0393701
4180	100%	4	0	0	0	0	0	0	4	4	0	0	0.0393701
4350	100%	4	0	0	0	0	0	0	4	4	0	0	0.0393701
4710	100%	4	0	0	0	0	0	0	4	4	0	0	0.0393701
700	100%	3	0	0	0	0	0	0	3	3	0	0	0.0393701
1700	100%	3	0	0	0	0	0	0	3	3	0	0	0.0393701
2930	100%	3	0	0	0	0	0	0	3	3	0	0	0.0393701
2940	100%	3	0	0	0	0	0	0	3	3	0	0	0.0393701
4030	100%	3	0	0	0	0	0	0	3	3	0	0	0.0393701
4090	100%	3	0	0	0	0	0	0	3	3	0	0	0.0393701
4200	100%	3	0	0	0	0	0	0	3	3	0	0	0.0393701
4220	100%	3	0	0	0	0	0	0	3	3	0	0	0.0393701
4290	100%	3	0	0	0	0	0	0	3	3	0	0	0.0393701
4830	100%	3	0	0	0	0	0	0	3	3	0	0	0.0393701
1520	100%	2	0	0	0	0	0	1	2	2	0	0	0.0393701
1570	100%	2	0	0	0	0	0	0	2	2	0	0	0.0393701
1660	100%	2	0	0	0	0	0	0	2	2	0	0	0.0393701
2730	100%	2	0	0	0	0	0	0	2	2	0	0	0.0393701
2750	100%	2	0	0	0	0	0	0	2	2	0	0	0.0393701
4020	100%	2	0	0	0	0	0	0	2	2	0	0	0.0393701
4080	100%	2	0	0	0	0	0	0	2	2	0	0	0.0393701
4110	100%	2	0	0	0	0	0	0	2	2	0	0	0.0393701
4170	100%	2	0	0	0	0	0	0	2	2	0	0	0.0393701
4240	100%	2	0	0	0	0	0	0	2	2	0	0	0.0393701
4250	100%	2	0	0	0	0	0	0	2	2	0	0	0.0393701
4300	100%	2	0	0	0	0	0	0	2	2	0	0	0.0393701
4360	100%	2	0	0	0	0	0	0	2	2	0	0	0.0393701
4730	100%	2	0	0	0	0	0	0	2	2	0	0	0.0393701
4810	100%	2	0	0	0	0	0	0	2	2	0	0	0.0393701
4840	100%	2	0	0	0	0	0	0	2	2	0	0	0.0393701
140	100%	1	0	0	0	0	0	0	1	1	0	0	0.0393701
920	100%	1	0	0	0	0	0	0	1	1	0	0	0.0393701
1460	100%	1	0	0	0	0	0	0	1	1	0	0	0.0393701
2320	100%	1	0	0	0	0	0	0	1	1	0	0	0.0393701
2710	100%	1	0	0	0	0	0	0	1	1	0	0	0.0393701
4100	100%	1	0	0	0	0	0	0	1	1	0	0	0.0393701
4340	100%	1	0	0	0	0	0	0	1	1	0	0	0.0393701
4770	100%	1	0	0	0	0	0	0	1	1	0	0	0.0393701
4790	100%	1	0	0	0	0	0	0	1	1	0	0	0.0393701
	Total Tips	**233**	**4**	**2**	**0**	**0**	**0**	**1**	**239**	**247**	**8**	**1**	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250
200
150
100
50
0
(reports/hr)
Average Traffic
Peak Traffic Hour
1/1/08
1/26/08
2/20/08
3/16/08
4/10/08
5/5/08
5/30/08
6/24/08
7/19/08
8/13/08
9/7/08
10/2/08
10/27/08
11/21/08
12/16/08
Date/Time