

**ALERT Gaging System Maintenance
Agreement 04-01.18**

**Annual Report
December 28, 2004
Revised January 20, 2005**

**Presented To
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ALERT System
Maintenance



OneRain, Incorporated
12/28/04
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Overview

Maintenance activities on the ALERT Gauging Network for 2004 have been completed under Agreement 04-01.18. During the 2004 operating season, OneRain generated 786 maintenance reports for the combined UDFCD / Boulder County network. Of these, a total of 75 (9.5%) service calls were generated: 26 (34.7%) were unscheduled District service calls and 49 (65.3%) were unscheduled OneRain Incorporated service calls; the remaining visits were documented standard maintenance activities.

The overall percentage of service calls decreased during the field season compared to 2003 but remained higher than previous years. The following sites required the most “unscheduled” visits:

- Sand Creek Mouth (site 1810) 6 visits
- Marston Lake (site 1520) 4 visits
- Diamond Hill (site 1420) 3 visits
- Confluence Pond (site 720) 3 visits
- Westwoods / Croke Pump Station (site 120) 3 visits
- Hiwan (site 2210) 3 visits
- Little Narrows (site 4470) 3 visits
- Smoky Hill (site 740) 3 visits
- West Repeater (site 950) 3 visits

The 31 total trips to these 9 sites accounted for 41.3% of all unscheduled 2004 service calls.

Site additions

Eight additional sites were added to the network in 2004. Four sites reside in the Aurora / Sand Creek Expansion area; two were added to Boulder County in the area of the Overland Fire near Jamestown, one in southwest Denver and one at Iliff Pond in Denver.

The following sites were installed from the months of February to August.

1. Fire Station # 13, rain only, ID 1370, (no picture)
2. Aurora Fire Station # 12, rain only, ID 840, see figure 1.
3. Flying J, rain and stage, ID 850, see figure 2.
4. Murphy Creek, rain and stage, ID 870, see figure 3.
5. Shop Creek, rain only, ID 1710, (no picture).
6. Iliff Pond, rain and dual stage, ID 650, see figure 4.

7. Porphory Mountain, rain only, ID 4850, see figure 5.
8. Fairview Peak, rain only, ID 4860, see figure 6.

The Fire Station # 13 rain only site was installed on February 20th, and the Iliff Pond rain and dual-stage site was installed on July 28th. These are traditional ALERT sites consisting of an integrated standpipe containing the transmitter and tipping bucket.

OneRain installed the four sites in the Sand Creek Expansion area on March 30th. These sites are Aurora Fire Station # 12, Flying J, Murphy Creek and Shop Creek. They include a traditional 1mm tipping bucket and top section assembly mounted on top of a standard traffic pole with the electronics contained in a lockable NEMA enclosure. The electronics include a Campbell Scientific CR10X datalogger and a Design Analysis H-264 ALERT Serial Interface transmitter.

The two sites in the Overland burn area in Boulder County, purchased by the Forest Service, consist of a Design Analysis H-340 0.01 inch tipping bucket mounted on a standard traffic pole with the electronics contained in a lockable NEMA enclosure. The electronics include a Blue Water Design CommEngine and a Maxon radio.



Figure 1, Aurora Fire Station # 12, site 840

Note: entire assembly painted to eliminate “shiny” surfaces per industrial park management.



Figure 2, Flying J, site 850



Figure 3, Murphy Creek, site 870



Figure 4, Iliff Pond, site 650



Figure 5, Porphory Mountain, site 4850



Figure 6, Fairview Peak, site 4860

One additional site for monitoring rain and stage (utilizing 2 pressure transducers housed in wellpoints) is to be installed on Sand Creek @ Colfax when plans are approved by CDOT.

Damaged equipment and site reinstallations

Aurora Reservoir weather station (site 900) experienced damage to its sonic wind sensor during a close encounter with a funnel cloud in the area. The unit was replaced in the field and returned for a warranty repair.

Salisbury Park weather station (site 2730) was relocated to allow for construction / landscaping changes. It was moved 400 yards to the east.

The Goldsmith at Eastman (site 640) PT was removed during construction and was later replaced. Due to the construction the sensor was out of operation from mid-March to 8 April.

Castle Oaks (site 2750) was removed due to subdivision development to start this winter. It is currently in storage at OneRain’s office in Longmont.

The solar regulator at Hiwan (site 2210) failed and was replaced with a system spare. Later, one of the wires from the regulator to the transmitter separated due to age and handling and was repaired.


The Boulder Jail (site 4550) site is slated for removal and relocation next year due to new building construction at the current site.

PT replacements and discussion

Overall, pressure transducer fallout was rather typical for the 2004 field season. Although a total of 13 PTs were replaced, four of these were identified in 2003 as requiring replacement:

1. Ralston Reservoir (site 110). The Foxboro PT at this site failed after 11 years.
2. Hidden Lake (site 1300). The Druck PT at this site failed after 2½ years.
3. Bridge (site 4420). The Druck PT at Bridge was in service for over seven years, but had required recalibration twice in 2003.
4. Lower Left Hand (site 4450). The Druck PT at Lower Left Hand was in service nearly seven years, and also had needed recalibration twice in 2003.

Of the remaining eight, seven failed during the 2004 flood season and one fell to construction damage:

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1. Westwoods / Croke Pump Station (site120). The Druck PT at this site was in service for just over two years. It required a new signal conditioning module as well.
2. Goldsmith at Eastman (site 640). The Druck PT at this site was damaged during construction activities. It had been in service for over six years.
3. Confluence Pond (site 720). Both transducers failed at this site. The Druck PT in the pond (724) was in service for 4½ years.
4. The Druck PT in the Confluence Pond ditch (723) was in service for 2½ years and also needed a new signal conditioning module.
5. Sand Creek Park (site 1800). The Druck PT at Sand Creek Park was in service nearly six years and required a new signal conditioning module as well.
6. Niver Detention (site 1900). The Druck PT at this site was in service just over two years.
7. Cold Spring Gulch (site 2240). The Druck PT at Cold Spring Gulch went suddenly after about 10 years in operation. This was an unusual failure as the device was found with a hole in the membrane.
8. Little Narrows (site 4470). This PT was in service for only one year and two months.

New signal conditioning modules were also installed at Expo Park (420), Maple Grove Reservoir (1000) and Englewood Dam (1600) to correct drift problems.

There are several transmitters (3206) in the system with on-board signal conditioning that complicate the process of isolating problems. However, the built in circuitry can be bypassed and substituted with a discrete signal conditioning module to isolate and diagnose a problem. If the on-board circuit is at fault the transmitter can be modified by OneRain staff and put back in operation with a new signal conditioning module.

Repeater upgrade update

The performance of the 50386 repeaters continues to improve. Following the changes made from July through September, the updated repeaters were redeployed in a staggered sequence to help isolate and monitor individual unit performance. The problem with the units locking up appears to have been corrected. However, the binary bit shift problem has not been eliminated but it has been reduced (based on the limited data sample since redeployment). At this time only Smoky Hill, Blue Mountain, Chokecherry and Lee Hill units have been physically modified, their firmware updated, and returned to service. During the final maintenance round of 2004 the remaining units (Gold

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Hill, Louisville and Eagle Ridge) were removed from the field and returned to the vendor for the needed updates. After seeing the first four modified 50386 repeaters in operation OneRain is confident that they will perform adequately during the 2005 season. However, our staff will continue to closely monitor the operation of these devices.

Miscellaneous activity of note

Smoky Hill Repeater

After several meetings with NexTel staff and verbal assurances that the tower extension and co-location of the Smoky Hill repeater on the tower would be acceptable, the request was denied. Therefore OneRain will not be relocating to the tower. OneRain will continue to explore alternate locations for this repeater to improve reception at the Longmont facility.

Blue Mountain Rehabilitation


The District has issued a work order to OneRain for the repair and upgrade of the Blue Mountain site. This upgrade is planned for implementation before spring startup. It will consist of removal of the existing standpipe and mast extension, installation of a new 20-foot Rohn-45 tower and NEMA 4X control housing, and re-installation of the existing instrumentation.

Repeater Switch

The AutoSwitch application has passed its initial tests and is currently in continued testing and development. OneRain originally estimated that the installation would be complete by the end of this year, but was perhaps overzealous in making that claim. AutoSwitch does execute the repeater commands correctly and it receives and processes the response. The user interface is undergoing some further improvements to make it more intuitive, and documentation is being upgraded. Once the installation time is set the on-site integration at Diamond Hill will be complete within one day.

Narrow Banding

The District's narrow-banding effort is progressing. OneRain deployed 14 HSE 3206 transmitters in 2004, leaving five Sierra-Misco 5050s still in service (one rain/stage and four rain only) within the combined (UDFCD / Boulder County shared) system. These sites are: Louisville 'D' Way (site 1100), Side Creek Park (site 830), Guy Hill (site 310), Magnolia (site 4090), and the Justice Center (site 4360). An additional 5050 was used as a spare at the Boulder Jail (site 4550) for most of the year due to a problem with that transmitter and a lack of additional 3206s as spares.

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Frequency Licensing

During the course of this year OneRain renewed all but one of the District's call signs. Please see Appendix A: Licensing Summary.

To date, OneRain has received confirmation for renewed licensing on 135 sites under 25 different call signs. Twenty three of these call signs were originally licensed from 7/29/00 through 7/29/04. These have been renewed and extended for 10 more years, to 7/29/14. One call sign, WPPA516, was licensed from 9/23/00 through 9/23/04. Because the renewal was so close to the others we were able to renew it at the same time. Both WPPA516 and WPPA678 have been renewed and their licenses extended to 9/23/14 and 9/24/14, respectively. One other call sign, WPQI652, is currently licensed until 7/28/05. As the renewal date approaches, OneRain will process the renewal for it as well.

Since the last renewal process there have been 27 sites added to the network, as well as four sites that did not renew during the last round of renewals (including Diamond Hill), and that are currently not covered under any licensed call sign. A proposal for these sites was prepared and presented to the Federal Coordinator with the Hydrologic Radio Frequency Coordination Group (HRFCG). Upon their approval, we can expect to make our application to the FCC for enough new call signs to accommodate the 31 sites.

Maintenance Procedure Review

For the past six years OneRain has conducted maintenance on the UDFCD warning system without significant change to the routine activities. Maintenance on this system has been predominantly of the preventive and breakdown variety. OneRain proposes to review the effectiveness of these methods over the course of the 2005 season.


The District's Automated Flood Warning System (AFWS) will perform better and at a lower cost when predictive measures are used to plan maintenance activities.

This review aims to study and evaluate the above hypothesis.

Below are a list of definitions relating to OneRain's view of maintenance activities.

Types of Maintenance

Maintenance is any activity that serves to prolong the useful life of a piece of capital equipment and helps to ensure its continued trouble-free operation. There are several approaches to accomplish this end.

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Breakdown Maintenance

With no continuous activity, breakdown maintenance could appear to be very inexpensive because the costs associated with manpower are minimal. However, emergency work orders, overnight parts shipments, and hurried work can all lead to high expenses in conditions where QA/QC is difficult. This type of maintenance cannot be avoided on an exception basis, but as a general maintenance approach it presents high performance risks and could end up being extremely costly.

Preventive Maintenance

This is maintenance activity repeated at predetermined frequency. The frequency may be based on calendar days or on other parameters such as significant meteorological events. Existing problems do not direct preventive maintenance. Key to planning preventive maintenance is deciding which activities to include on each interval. The purpose of preventive maintenance is two-fold, to:

1. mitigate some of the breakdown maintenance activities
2. optimize reliability across the system at any given time.

Predictive Maintenance

By monitoring certain aspects of gage and telemetry performance, the maintenance planner can analyze trends in performance and be aware of irregularity before it affects operations. Effective predictive maintenance will use many techniques. Some of these will be field activities and some will be based solely on the telemetered data. Because OneRain is building a centralized, enterprise data collection system, sensor data are available to complete performance analyses supporting predictive maintenance activities up and down the Front Range.

Project Maintenance

Project work is also an integral part of maintenance strategy. A maintenance project will be an addition or modification to an existing system that serves to improve operational performance or make long term maintenance easier and less costly. Project maintenance serves to improve the reliability of an existing system or piece of equipment.

Current Maintenance Activities

In general OneRain performs preventive maintenance on the UDFCD system according to the following planned schedule:

Table 1: Preventive Maintenance Schedule

Round	Start	Finish	Activities
Start-up	1 March	1 April	Install precip & stage sensors Inspect weather sensors and repeaters
2 nd Round	1 May	15 May	Inspect stage and weather sensors
3 rd Round	15 June	1 July	Inspect precipitation sensors
4 th Round	1 August	15 August	Inspect stage and weather sensors
Shut-down	1 October	15 November	Remove precip & stage sensors Inspect weather sensors and repeaters

In order to help assure that the field transmitters are delivering data reliably and within reasonable bounds of quality, OneRain’s staff periodically checks the data received directly at the DIADvisor base station in Longmont and the data in the District’s database via the <http://alert.udfcd.org> website. In addition, OneRain conducts a rain and stage gage analysis after every event during which ten (10) or more rain gages accumulate one inch of rainfall within seven (7) days. This analysis helps to identify gages that may be under- or over-reporting rainfall. These outliers are then identified for unscheduled breakdown maintenance.

The equipment in the District’s gaging system is listed below. This does not include the 21 transmitters and one repeater maintained by Boulder County.

Table 2: Gaging System Components

Component	Quantity
Transmitter	139
Repeater	6
Rain Sensor	129
Stage Sensor	76
Wind Sensor	16
Relative Humidity Sensor	16
Temperature Sensor	16
Solar Radiation Sensor	1
Barometric Pressure Sensor	4
Fuel Moisture & Temperature	2

OneRain proposes to evaluate these maintenance procedures for the equipment listed in Table 2 above over the course of the 2005 season. The strengths of the existing processes are many:

- **Clogged funnels.** This breakdown happens on a random, unpredictable interval. It is possible to identify a clogged funnel by comparing the tips to radar data or to nearest neighbors, but this would be after the fact. The best way to address this debris is to visually inspect before the rain event occurs.
- **Routine Activities.** By following the prescribed routine of maintenance activities anything out of the ordinary will stand out quickly to the maintenance technician. This also ensures that a site won't be forgotten; only to be remembered when it has failed.
- **Maintenance Transmissions.** The process of sending test tips and pressure transducer calibration transmissions during a site visit gives the system operator assurance that the maintainer is doing his job properly. This generates records in the database of maintenance activities that supports the computerized maintenance management system (CMMS), in this case Maintenance Tracker.

- **Site Changes.** Pressure transducers can lose hydraulic contact due to changes in stream flow, vegetation can grow over rain gages, construction projects can interfere with weather sensors, and so on. These changes are less likely to be identified through data analysis than through routine visual inspection.

The following is a list of weaknesses with the existing maintenance processes:

- **Infant mortality – unnecessary go-backs.** Sites that are operating without trouble for a given period of time will likely continue to do so. However, if a technician, during routine preventive maintenance, reassembles the station incorrectly or bumps a connector or leaves a wrench behind, the site could fall into a state of improper operation. Depending on the fault, infant mortality can usually be identified within 24 hours. However, this means a second site visit that was not required.
- **Redundant Activities – too many.** Many sites throughout the District’s system have both rain and stage sensors. This fact puts those sites on all five scheduled maintenance rounds.
- **Data Metrics – not using automation.** OneRain currently uses DIADvisor and the <http://alert.udfcd.org> website to diagnose potential problems with gages. These tools rely heavily on a human for data interpretation and analysis through intuition. Using the UDFCD website the user can pick out sites that may be under-reporting by visually comparing rainfall amounts at adjacent sites. Even post-event this leaves much room for error. DIADvisor does a good job of picking out sensors that have not recently reported or that meet alarm criteria. However, meteorological sensors that are reporting illogical values are only identified when a person makes a judgment call about the nature of data variation.
- **Meteorological Cross Checks – not using.** There are reliable formulae that the District and its contract meteorologists use for predicting rainfall based on conditions in the mountains to the west. This keeps select staff attuned to temperature, humidity, barometric pressure, and wind sensors throughout the system. However, any problems with those sensors will only be identified when a rainfall event is imminent or in progress. This is too late for maintenance technicians to address purposed sensor issues.
- **Maintenance Transmissions – too many, no efficient cleanup.** During preventive maintenance trips OneRain’s field staff conducts routine activities to verify the operation of all field deployed equipment. Test transmissions are sent from each site to check signal strength, repeater path, sensor count verification, gage calibration and proper message

encoding. Operational data is used for accumulation analyses, flow modeling, rainfall intensity studies, and other purposes. DIADvisor has an “out of service” condition for sites and sensors that, when used, will keep test data from contaminating the operational and historical data record. However, taking sites out of and restoring them to service requires additional technician time. In addition, the UDFCD uses NovaStar as their primary base station, and test data received there are either tolerated or must be edited out post hoc. For data to be used in future studies it is most efficient to minimize these transmissions.

Future Maintenance Activities

OneRain has a host of tools currently in use and under development for the purpose of addressing the weaknesses stated above. In addition, there are procedures that can be investigated in the near term for improved operation of the District’s AWS.

By using historical data OneRain can identify problem sites that should have a higher PM frequency. For example, Upper Sloan and Genesee Village (sites 1400 and 2310) have frequent clogging problems from bird, tree, or floating stream debris and would be candidates for visits on a more frequent interval than are currently scheduled. At the same time Van Bibber Park (site 300) has never been clogged significantly and could be visited less frequently.

Sites would be better served and maintained using a running priority list. Sites should be assigned a rating in a variety of categories such as timer-based availability, event-based availability, radar correlation, nearest neighbor correlation, sensor mean time between failures (MTBF), and other historical behavior (funnel clogging, channel erosion, grounding issues). The majority of maintenance activities should still be of a planned nature. However, these scheduled visits should be based on predictive rather than preventive measures. As stated earlier this study aims to evaluate the following hypothesis:

The District’s Automated Flood Warning System (AFWS) will perform better and at a lower cost when predictive measures are used to plan maintenance activities.

The above hypothesis, if demonstrably true, will help increase the value of the system. The data from ALERT systems are being used for more purposes, by more agencies all the time. There is demand to put them on the web and use them to drive alarms and paging. By cross checking sensors, reducing the amount of test data and reducing the possibility of infant mortality, the system’s overall data quality will improve making it more useful to a wider audience.

Table 3 below shows an initial list of reports that OneRain intends to evaluate over the course of the 2005 season. With these both the District and the

AFWS maintainers will have quantified information on a routine basis with which to check the status of the system. In addition, these reports will further maintain information about the historical performance of the system's components.

Table 3: Proposed 2006 Report Program

Report Period	Type of Report
Weekly	Repeater loading trends
Weekly	Percent availability of timer reports (# received / # expected)
Weekly	Wind sensor trends
Weekly	Weather sensor comparisons (among weather stations)
Post-storm	Repeater loading trend
Post-storm	Rain gage - radar correlation analysis
Post-storm	Rain gage nearest-neighbor correlations
Post-storm	Watershed radar rainfall volumes
Monthly	List of problem sites with recommended solutions and priorities. This report includes data from MTBF analyses and other historical site or sensor specific problems.

The aim of this study over the course of 2005 is to improve the availability of each device, but, more to the point, it will move the system closer to a quantitative platform. It is OneRain's goal to deliver performance-based reliability in future years, with up-time and reliability guarantees as the basis of our service value, rather than the number of visits and effort.

Conclusion

OneRain Incorporated thanks the District's ALERT administrator, Kevin Stewart, for his ongoing assistance. We value our long history of service with and to the UDFCD, and we hope to have the opportunity again to support the ALERT network during the 2005 season.



Appendix A: Licensing Summary

135 Sites were renewed in 2004 : under 25 Call Signs.

Call Sign	# of Sites	Effect Date	Expire Date	Associated Sites													
				ID	Site Name	ID	Site Name	ID	Site Name	ID	Site Name	ID	Site Name	ID	Site Name		
1 WPDY876	4	10/19/04	07/29/14	1720	Cherry Crk @ Steel	1800	Sand Creek Park	1810	Sand Creek Mouth	1900	Niver Detention						
2 WPDY880	5	10/19/04	07/29/14	1610	Holly Dam	1620	Slaughterhouse	1630	S Platte @ Dart	1700	Cherry Crk @ Champa	1710	Shop Creek				
3 WPDY884	5	10/19/04	07/29/14	1600	Englewood Dam	2270	Cub Crk. Below Blue	2280	Kinney Peak	2360	Indian Hills	2370	Red Rocks				
4 WPDY888	5	10/19/04	07/29/14	2240	Cold Spring Glch	2250	Rosedale	2260	Brook Forest	2330	Morrison	2350	Idledale				
5 WPDY892	6	10/19/04	07/29/14	1420	Diamond Hill	2210	Hiwan	2220	Evergreen Lake	2230	Bear Creek @ Cub	2310	Genesee Village	2340	El Rancho		
6 WPDY896	4	10/19/04	07/29/14	1100	L'ville Dwy "D"	1110	Gunbarrel	1200	Broomfield #3207	1400	Upper Sloan						
7 WPDY900	5	10/19/04	07/29/14	820	ETG @ Buckley	830	Side Creek Park	1000	Maple Grove Res	1020	Noite Pond	1040	Lena @ Hwy 6				
8 WPDY904	6	10/19/04	07/29/14	720	Confluence Pond	730	No Name @ Quincy	750	Quincy Reservoir	760	Mission Viejo Pk	800	Sable Ditch	810	Grandby Ditch		
9 WPDY908	6	10/19/04	07/29/14	610	Harvard/Jackson	620	Quincy/Highline	630	Temple Pond	640	Goldsmith/E'man	700	Tollgate at 6th	710	Horseshoe Park		
10 WPDY912	6	10/19/04	07/29/14	500	Havana Park	510	Virginia Court	520	Jewell Detention	530	Denver FS #19	540	Parker & Miss.	600	Harvard Gulch Pk		
11 WPDY916	6	10/19/04	07/29/14	330	Van Bibber @ 93	400	Montview Park	410	Kelly Dam	420	Expo Park	430	Utah Park	440	Aurora FS#7		
12 WPDY920	6	10/19/04	07/29/14	200	Leyden Reservoir	210	Leyden Conf.	220	Upper Leyden	300	Van Bibber Park	310	Guy Hill	320	Sports Complex		
13 WPDY924	6	10/19/04	07/29/14	100	Carr St	110	Ralston Res	120	Croke Pump Stn	130	Simm St	140	Blue Mountain	150	Nott Creek		
14 WPDY928	4	10/19/04	07/29/14	1010	Denver West	1030	SERI	1050	Fairgrounds	1060	Apex						
15 WPNX996	4	10/19/04	07/29/14	1640	S Platte @ Union	1650	S Platte @ 19th	1660	S Platte @ Henderson	1920	Brighton						
16 WPNX997	6	10/19/04	07/29/14	2710	Highlands Ranch	2730	Salisbury Park	2750	Castle Rock	2810	Pine Cliff Rd.	2820	East Plum Creek	2830	Castle Oaks		
17 WPNX999	6	10/19/04	07/29/14	4010	Crescent Rain	4020	Rio Grande Rain	4030	Red Garden	4040	Martin Gulch	4050	Walker Ranch	4060	Lakeshore		
18 WPNY201	6	10/19/04	07/29/14	4070	Bear Peak	4080	Twin Sisters	4090	Magnolia	4100	Filter Plant	4110	Betasso	4730	Sugarloaf		
19 WPNY218	6	10/19/04	07/29/14	4190	Slaughterhouse	4200	Lazy Acres	4220	Flings	4230	Golden Age	4240	Sunset	4250	Geer Canyon		
20 WPNY219	6	10/19/04	07/29/14	4260	Taylor Mountain	4270	Cannon Mountain	4290	Red Hill	4300	Big Elk Park	4310	Johnny Park	4770	Cal-Wood Ranch		
21 WPNY220	6	10/19/04	07/29/14	4330	Indian Ruins	4340	Riverside	4350	Conifer Hill	4360	Justice Center	4370	Gross	4790	Button Rock		
22 WPNY221	3	10/19/04	07/29/14	4560	Lyons Diverson	4710	Hills Mill	4750	Louisville WTP								
23 WPNY222	6	10/19/04	07/29/14	4450	Lower Lefthand	4460	S St. Vrain at Berry Rd.	4470	Little Narrows	4480	Buttonrock Outlet	4520	Eagle Ridge Rptr.	4540	Louisville Rptr.		
24 WPPA516	6	10/19/04	09/23/14	4380	Eldorado Springs	4390	Boulder Falls	4400	Orodel	4410	Fourmile	4430	Rowena	4440	James Creek		
25 WPPA678 *	6	11/23/04	09/24/14	4420	Bridge	4490	Apple Valley	4510	Pinewood Spring	4530	Winiger Ridge	4570	St. Antons	8010	Lee Hill Rptr.		

* WPPA678 not initially renewed with above stations as it was considered a Boulder County Call Sign.
FCC called regarding renewal of WPPA678 on 9/21/04. UDFCD was / is Licensee for WPPA678.

Six Sites will be renewed in 2005 : under one Call Sign.

Call Sign	# of Sites	Effect Date	Expire Date	Associated Sites											
				ID	Site Name	ID	Site Name	ID	Site Name	ID	Site Name				
1 WPQI652	6	07/28/00	07/28/05	4130	Swiss Peaks	4140	Logan Mill	4150	Gold Hill	4160	Sunshine	4170	Pinebrook	4180	Gold Lake

There are currently 31 Sites operating that are not listed under a Call Sign. Paperwork has been submitted to a Federal Coordinator to coordinate the approval of these 31 Sites by the Federal Interagency Hydrologic Radio Frequency Coordination Group. Upon approval by this group, application will be made to the FCC for licensure under six Call Signs. The FCC allows up to six Sites to be registered under one Call Sign. Radio licenses now remain current for 10 years.

# of Sites	ID	Site Name	ID	Site Name	ID	Site Name	ID	Site Name	ID	Site Name	ID	Site Name
6	650	Iliff Pond	840	Aurora FS #12	850	Flying J	860	Sand Creek @ Colfax	870	Murphy Creek	900	Aurora Res. Wx
6	1300	Hidden Lake	1310	Little Dry Crk @ 64th	1320	SPR @ Mausoleum	1330	Roslyn	1340	Sanderson Gulch	1350	Chatfield Dam
6	1360	Denver ZOO	1370	FS #13	1440	Elbert Wx	1480	DIA @ Third Creek	1500	Powers Park	1520	Marston Lake
6	1530	Bear Creek @ Lowell	2190	Squaw Mountain	2320	Choke Cherry Res	2840	Sulphur Gulch	4550	Boulder Jail	4810	Shanahan Ridge
6	4820	Doudy Draw	4830	SBC @ San Souci	4840	SBC @ Canon Ditch	8000	Blue Mountain Rptr	8005	Smoky Hill	8015	Gold Hill Rptr
1	9100	Diamond Hill Control Station										