1997 Annual Maintenance Report by Bob Benedict, DIAD Incorporated

The following was excerpted from a January 7, 1998 letter from Bob Benedict to Kevin Stewart, UDFCD.

The 1997 maintenance work on the ALERT Gauging Network under Agreement 97-02.03 has come to a close. During the operating season, DIAD has submitted 748 maintenance reports for the combined UDFCD/Boulder County network, 620 of which documented field activities. Of the 748 reports, 70, or 9.4%, were unscheduled service calls.

There were 7 PT failures during the season, 5 were replaced, one discontinued mid season and one pending replacement in the spring. Sensors 123, 713 and 1723 were standard PT swaps. Sensor 403 was replaced when the standpipe was relocated across the road at the culvert entrance on the east side of Westerly Creek. Both SDI-12 low flow sites in Aurora were abandoned due to poor performance and reliability. Utah Park was converted back to a standard analog PT and the PT at Shop Creek has been taken out of service pending further instructions from Aurora on the data requirements for this site. The replacement of sensor 1803 has been postponed till next spring in order to spare it exposure to an extra winter of extreme temperatures. Several of the old Foxboro signal-conditioning boards were replaced in the field and repaired in house, most had bad power supplies. Sensor 423 at Expo Park stabilized to some degree this season. It is rather temperature dependent and can bake in the hot sun in its current location making calibration checks susceptible to variable readings.

Site damage was moderate this season. PT housings at 2 sites were repaired after incidents with lawn mowing equipment, 320 and 810. Fence posts have been installed at some locations to help avoid such accidents. There were a few missing PT housing caps that were replaced. Conduit was pulled from concrete anchors by vandalism at Niver and has been repaired. The PT housing at Holy dam was clipped by earth moving equipment. The antenna mast was torn off and presumably tossed into the pond at Broomfield. The standpipe at Carr Street was repaired from damage that occurred during 1996. Most all Sierra Misco type standpipes in Denver and some in Boulder County were painted mid season. Graffiti quickly returned to some standpipes brought on by the lure of a fresh canvas.

Anemometer bearings were replaced at Quincy, Hiwan and Blue Mountain weather stations. Fuel Moisture and fuel temperature sensors were added to the weather suites at Hiwan and Blue Mountain. In the process Blue Mountain was upgraded to a Handar 555 DCP.

The Smokey Hill repeater went down in mid July during a storm event due to a controller board problem. The boards were bypassed and the transmitter was placed in manual pass/reject mode. The Controller boards were repaired by High Sierra Electronics and a spare set purchased. This incident revealed additional problems with the repeater control system and a failure of the receive-frequency selector at the UDFCD base. The frequency selector interface is currently under repair. The repeater control system still requires troubleshooting but the possibilities have been narrowed down. Under separate cover DIAD has recommended purchasing a spare repeater control interface.

The addition of a DRUCK DPI 603 pressure tester to DIAD's inventory of test equipment has greatly improved the accuracy and confidence in pressure transducer calibrations this season. Combined with the calibration procedures implemented in the 1996 season we believe Urban Drainage has the best possible calibrations for the given equipment installed. Maintaining a consistent sensor temperature from test to test remains an issue to overcome at some sites. We recommend continuing the 1997 maintenance schedule for the 1998 season. On site servicing of rain gages every 90 days with data analysis directing site visits during the alternate 45 day cycles while continuing to service all stage and weather sites every 45 days.

Under separate cover, DIAD has also recommended replacement transmitters for the 4 remaining EG&G gages in the UDFCD system. This upgrade will bring the last of the traditional UDFCD gauges up to the binary transmission standard. The EG&G transmitters can be used for a few more years in the Boulder Creek system, where they can replace obsolete units.

In Boulder County the entire meteorological sensing scheme was revised and upgraded. Three weather stations were discontinued and converted to rain only sites, 2010, 2030 and 2070. A weather station was installed at Hills Mills above Ward. Two weather suites were relocated to the existing rain gauging sites, 4730 and 4770. The installation of the final weather station at the Broomfield airport radio tower is pending approval of the Broomfield airport administration. Button Rock weather station remains in operation at this time. The RH/AT sensor that was relocated to 4770 failed and was replaced.

A significant effort was put forth early in the season to complete the stream-gauging network in Boulder County. Installations

were completed at 4370, 4380, 4410, 4430, 4440, 4450, 4460, 4470 and 4560. We have been quite pleased with the performance of these installations. Initial RF problems at 4390 and 4440 have been resolved. In Lefthand Canyon 4430 and 4450 require further RF work to get them in consistently. Filter caps were added to the water intake of some PT housings to dampen excessive stream noise.

The frequency conversion to 169.500 at all Boulder County sites was completed this year. The only RF problems remaining are the two Lefthand Canyon stream-gauging sites previously mentioned and an unexplained periodic loss of site 24. Since the Lee Hill repeater still presents a single point of failure for the Boulder County network, designing and implementing a dual primary repeater system has become the next priority. Other activities related to the UDFCD ALERT system include a base-station relocation for Henz Meteorological Services and a complete base-station relocation including receiver and antenna for Aurora.

It is our belief that the reliability and performance of the UDFCD system remains high, and that consistent improvements are being made in the accuracy of hydromet measurements. In 1998, DIAD will be reviewing its maintenance equipment and procedures to continue to improve measurement accuracy while increasing maintenance efficiency. DIAD thanks you for an excellent and professional working relationship, and we hope we have the opportunity to work again with the UDFCD.