BROWN AND CALDWELL

MEMORANDUM

To:	Dave Archard	Copy:	Dan Davis, John LaGorga, File
From:	Dan Gilbert	Date:	April 9, 2003
Subject:	Onondaga County M5 Dye Study MGD Meter Evaluation	File:	22517.011

During the summer of 2002 Brown and Caldwell (BC) performed assessment monitoring for Onondaga County. Assessment monitoring included installing an alternative flow meter in a 72-inch combined interceptor sewer (location M5) and comparing the results of this alternative meter to the previously installed flow meters. The ADFM flow meter, manufactured by MGD Inc., was chosen as the alternative meter because it is considered a technologically-advanced meter. It was also chosen because its manufacturer claims that it will measure flow more accurately than other meters for larger diameter pipes (greater than 36 inches).

A dye-dilution study was also performed by BC to assess the performance of the ADFM in measuring sewer flow. The study was performed by continuously injecting non-toxic fluorescent dye at a known rate and known concentration into the sewer flow then measuring its concentration at the downstream metering location. The concentration of the dye in the downstream waters is directly proportional to the sewer flow rate; therefore the sewer flow rate was directly calculated. Ideally, as many as 3 to 5 flow rates would be tested and would include wet-weather as well as dry-weather flows. Due to time and budget constraints, this study could only be performed for a single dry-weather flow rate.

The dye study was performed on August 22, 2002. The dye was injected approximately 500 feet upstream of the meter location and seven samples were taken at the meter location between 11:26 and 11:33 AM. The samples were analyzed to determine the dye concentration and corresponding sewer flow rate. The results are shown in Table 1 and in Figure 1. These results showed a greater difference between the ADFM and the dye-measured flow at the beginning of the study, whereas the data were in agreement from 11:38 AM until the end of the study. The reason for the initial discrepancy was due to the fact that the dye concentration had not yet reached equilibrium. As the dye concentration reached equilibrium, the flow measurements become more accurate. Since the last five flow data values represent steady state conditions, these were used in determining the average percent difference shown in Table 1.

This study showed the AFDM meter was able to measure flow to within approximately 2% of the dye-dilution method. This study cannot conclude on the overall accuracy of the meter to measure a wide variety of flows since additional flow conditions were not tested; however, the performance of the meter at the measured flow condition was excellent.

Table 1: Comparison of Flow Measured by Dye Study and ADFM Meter

Sample	Time	ADFM Measured Flow (mgd)	Dye-Dilution Measured Flow (mgd)	Difference
1	11:26 AM	25.3	27.6	9%
2	11:33 AM	24.8	26.4	6%
3	11:38 AM	24.7	24.4	-1%
4	11:41 AM	24.7	24.4	-1%
5	11:44 AM	24.1	23.6	-2%
6	11:48 AM	24.2	24.0	-1%
7	11:50 AM	24.3	23.6	-3%
Average (Steady-state) 1)				**-2%**

1) Average shown for the steady-state condidions of the dye study.
Steady-state observed from 11:38 to 11:50 am.

Figure 1: Flow Measured by ADFM Meter and Dye Study