Appendix 3

Determination of TSS and POC Blank Corrections for the ACT 2006 Turbidity Sensor Verification

As part of the field deployment test for this turbidity sensor verification study, each test site determined TSS and POC concentrations on between 40 – 60 samples. Sampling and analytical methods for these parameters are outlined in the document, *Protocols for the ACT Verification of In Situ Turbidity Sensors* (ACT PV06-01), which can be downloaded at (www.act-us.info/evaluation_reports.php). While ACT makes no claim that data derived from *in situ* turbidity sensors should directly correlate with total suspended solids (TSS) or particulate organic carbon (POC), these parameters were designated as useful ancillary data to characterize the abundance, and to a course extent, the type of particulate matter present in the test environments during the performance evaluation. Therefore, considerable effort was made to ensure and report the highest quality TSS and POC data possible. ACT applied site specific blank corrections to the raw data for both parameters in order to adjust the values to reflect truer, mean values. Toward this end, we also derived more conservative estimates of variance (as standard deviation) about these corrected means.

Total Suspended Solids Corrections

Each mean TSS value was corrected using derived estimates from procedural blanks intended to serve as a measure of mass loss of filter material combined with mass carry over due to potential cross-contamination. All sites maximized the volume they could filter within the 30 minute time allotted for sample processing in an effort to maximize signal to noise ratios. ACT has recorded evidence that GF/F filters lose mass during filtration, and this mass loss is due to water in general. Overall, blanks at ACT's seven partner sites were -0.0001 ± 0.0006 g with a median of -0.0002 g (n = 128). This represents a very small negative offset, but was important to consider in samples with very low TSS. Although the blanks from all seven sites fell within the same confidence belt, we felt that the blank corrections should be specific to each ACT site to incorporate any subtle between-site differences in particle characteristics, equipment, and processing. Corrections, then, were as follows:

Corrected TSS Average = Uncorrected TSS Average – Overall Site Blank TSS Average

The reported standard deviations follow the formal method of combining accumulative indeterminate errors. The samples themselves were prone to the same level of contamination as the blanks. Therefore, the overall error should reflect the combination of the error found in the sample and in the blanks. Our approach subtracts out the error introduced through sample collection and processing, and the variance calculated in this way reflects the error inherent in both the field and in the lab.

$$Corrected\ TSS\ sd = ((sd_{sample})^2 + (sd_{blank})^2)^{0.5}$$

Thus, the variances reported here are slightly larger, but they are more conservative estimates of the error in each estimate of TSS. We feel that this approach results in the best possible estimate of TSS values and variance for the verification.

Particulate Organic Carbon Corrections

Recent literature (Gardner et al. 2003) has demonstrated that dissolved organic carbon (DOC) may create artificially high filter blanks. This potential for contamination may be caused by DOC adsorbing to the glassfiber filter matrix. Therefore, all POC samples were blank corrected by "dunking" a number of pre-combusted 25 mm Whatman GFF filters in seawater filtrate from that days POC collection. Excess water was removed by placing each wet blank on a filtration-manifold with the vacuum on. The wet blanks were stored and processed as ordinary POC samples.