

CALTRANS
BMP RETROFIT PILOT PROGRAM



DISTRICT 7, LOS ANGELES

QUALITY ASSURANCE/QUALITY CONTROL
SUMMARY

June 2001

ASSESSMENT OF QUALITY ASSURANCE/QUALITY CONTROL RESULTS

A complete analysis of the Quality Assurance/Quality Control (QA/QC) data can be found in the *Third Year 2000/01 Report Best Management Practices Operations, Maintenance and Monitoring*. The overall Quality Assurance program included all phases of the sampling and testing process. The three major elements of the program consisted of testing and verification of performance of the field sampling equipment, evaluation of field-related blanking processes, and analytical precision and accuracy associated with laboratory activities.

Volumetric field flow tests were performed in September 2000 on flow monitoring equipment at the Sand Filter and Multi-Chambered Treatment Train effluent locations in District 7. Tests were conducted to calibrate the flow monitoring. These field flow tests used potable water from a portable 500-gallon water tank. The heights of the floats in the sump were measured, and the pumps were checked to ensure they were operational. Potable water was pumped into the sump from the water tank. The depth of water was monitored while the pumps were turned on, and then off. The water level measurements and the dimensions of the sump were used to calculate the amount of flow during one pump cycle. Final total volume, as read from the flow monitoring equipment, was compared with the actual total volume calculated using the sump dimensions.

Only percent recoveries within $\pm 10\%$ were accepted. If values were outside this range, the flow meter was adjusted until the flow meter read to within $\pm 10\%$ of the actual volume pumped out. Conducting the test again checked the repeatability of that result. If the range was not achieved a second time, the procedure was repeated.

Flow meter calibrations were conducted at all sites, prior to the start of the wet season. Bubbler and area velocity flow meters were calibrated using a calibration pail filled with 11 inches of water and a three-foot length of new bubbler tubing from the flow meter to the pail. "Calibrate bubbler" was selected from the calibration menu in the flow meter, and the depth of the bubbler line was read using the demarcations in the pail. If the depth of water measured by the flow meter varied more than 0.10 inch from the depth of water observed, then the observed depth was entered, using the flow meter keypad. After the flow meter was calibrated, the water was drained to a depth of 2 inches and level adjusted, if necessary. The remaining water was then slowly drained from the pail until empty. As the water drained out, the depth of water was read and compared to the flow meter reading. If the reading was not within ± 0.10 inch, then the procedure was repeated two more times. If none of the three readings were within ± 0.10 inch, the flow meter was replaced by one which did calibrate correctly, and the original flow meter was repaired. At the start of the wet season, all flow meters used in District 7 were within calibration.

A thorough blanking program was conducted to identify potential sources of contamination in sampler intake hoses, strainers and clamps, composite bottles, and laboratory sample containers. Analyses were conducted to test for pH, specific conductance, hardness, TSS, $\text{NO}_3\text{-N}$, TKN, total phosphorous, copper, lead, zinc, and TPH-Diesel, TPH-Heavy Oil and TPH-Gasoline. The tubing and strainer blanks were run before installation at the start of the wet season. After the first round of bottle blanks,

TOC, DOC, hardness, arsenic, cadmium, chromium, and nickel were added to the suite of analytes tested for in blanks. In all, 13 rounds of bottle blanks were run, with 68 bottles actually blanked. Composite bottles were not released for use unless blanks showed no contamination (i.e., blank results less than Reporting Limits). Blank analyses were also run on laboratory filter papers to test for arsenic, cadmium, chromium, copper, nickel, lead, and zinc contamination. The required five percent of filter papers from a single lot were tested resulting in no constituents being detected above their respective reporting limits. Therefore, no filter blank contamination was encountered.

In terms of laboratory performance, data quality assessment was based upon review of holding times, laboratory method blanks, laboratory control samples, laboratory duplicates, matrix spikes and matrix spike duplicates (MS/MSD), surrogate spikes, reporting limits, and field duplicates. A total of 5478 constituents were measured among 295 samples. No constituent results received rejected qualifiers. The following discussion summarizes all qualification based on laboratory performance.

Holding time violations, which were the most common problem encountered, resulted in J qualification of detected results and UJ qualification for non-detects. All holding time violations occurred in methods with holding times of 48 hours or less. These occurrences were attributed to delay in terminating sampling based on additional rainfall that was forecast, and to transport of samples from the field to the laboratory during congested traffic conditions.

Summary of Constituent Qualification Caused by Holding Time Violations

Constituent	Total Measured	Total Qualified	Qualifiers	Percent Qualified
NO3-N	200	19	J/UJ	9.5
Ortho-P	200	19	J/UJ	9.5
pH	208	16	J	7.7
Turbidity	22	1	J/UJ	4.5
All Constituents	5478	55	J/UJ	1.0

No constituents were detected above their respective reporting limits in all method blanks; therefore, no constituents received qualification due to method blank contamination.

Laboratory Duplicate samples with a relative percent difference (RPD) greater than the Caltrans specified limit resulted in a “J” qualification of detected results and “UJ” qualification of non-detects in associated samples.

Summary of Constituent Qualification Caused by Laboratory Duplicate RPD

Constituent	Total Measured	Total Qualified	Qualifiers	Percent Qualified
Ortho-P	200	7	J/UJ	3.5
Pb	412	14	J/UJ	3.4
TSS	214	3	J/UJ	1.4
All Constituents	5478	24	J/UJ	0.44

All laboratory control sample recoveries were within Caltrans specified limits. No constituents were qualified due to laboratory control sample outliers. Similarly, all MS/MSD recoveries and RPDs were within Caltrans specified control limits. No constituents were qualified due to MS/MSD outliers. Finally, all surrogate recoveries were also within Caltrans specified control limits. No constituents were qualified due to surrogate outliers.

If a constituent value was reported below the reporting limit and had a Numerical Qualifier "=", that value received a J qualifier.

Summary of Constituent Qualification Caused by Detected Result Values Reported below the Reporting Limit

Constituent	Total Measured	Total Qualified	Qualifiers	Percent Qualified
Ni	412	2	J	0.49
All Constituents	5478	2	1.1 J	0.037

There are no review criteria for field duplicate analyses comparability. It is expected that the results may have more variability than laboratory replicates, which measures only laboratory performance. It is likely that the variance in the RPD observed in these samples is due to the heterogeneity of the samples.

Summary of Field Duplicate Constituents Exceeding 50 % RPD

Constituent	Number of Analyses
As (dissolved)	1
As (total)	1
Cd (total)	3
Cr (dissolved)	3
Cr (total)	1
Cu (total)	1
Ortho P (dissolved)	1
Ni (dissolved)	2
Ni (total)	1
Pb (dissolved)	2
Pb (total)	1
TSS	1
Zn (dissolved)	1
Zn (total)	2
Total	20

Total number of constituents analyzed in field duplicates = 198

Percent constituents in field duplicates exceeding 50% RPD = 10 percent

Overall, data quality review indicates that laboratory results met the overall quality objectives of the program. No constituent results were rejected due to laboratory quality control problems. All constituent results are appropriate for use in the BMP performance evaluation. Any constituent reported as non-detect (Numerical Qualifier "<") received an overall qualification of "U" in the absence of laboratory quality control qualification.