

**Appendix L**

**Steinbeck Plaza Outfall Source Tracking**  
**Work Plan and Results**

Below is the Work Plan developed to conduct source tracking to fulfill the Measurable Goal under BMP 2-2.d which reads: “In each of the indicated years perform source tracking on the two highest priority pollutants of concern on a minimum of one outfall, and report on findings and actions taken in the Annual Reports for each of the indicated years.”

### **Work Plan for Source Tracking of Outfall(s) in Year 3 - (BMP 2-2.d)**

1. Obtain Laboratory analytical cost information to determine costs of E.coli and PCR tests. (MBAS Lab E.coli test: \$30, PCR test: \$500)
2. Review past source tracking data to determine sampling plan and sampling points. Manhole STMH5 had the highest E.coli results last year (12,033 MPN) so it was determined that the three tributaries that lead to STM5 (STMH10, STMH7, and 4-STMH20) would be sampled, as well as the Steinbeck Outfall. Six samples will be taken at each sampling point simultaneously (two samples taken at three designated times during the day); one sample for E.coli testing and one sample for orthophosphate testing with field instrument. Samples will also be tested for ammonia via sampling strips. Sampling will occur at 0730, 1200, and 1730.
3. Conduct advance walk-through of the area where sampling will occur to see if there are any access or traffic issues to be prepared for. Walk-thru completed 6/11.
4. Team of four will gather the date of sampling, their pre-labeled sample bottles will be distributed to them as well as ammonia testing strips. Each will go to their respective sampling locations, flow at the sampling point will be determined via stopwatch and known sample volume. Samples will then be taken simultaneously.
5. Samples will be collected, kept on ice, and taken to analytical laboratory at the end of the source tracking event. Lab has confirmed that samples can be analyzed within 24 hrs of sampling.
6. From the sampling results, it will be determined whether to continue source tracking via method above or to take specific samples for PCR testing.
7. Written report summarizing the findings, conclusions, and recommendations from these efforts will be provided for inclusion in the Year 3 Annual Report.

The following is a description of the source tracking work that was done and the results of that work.

### **Previous Source Tracking during Year 2**

On May 5, 2008, preliminary sampling of the urban water runoff was performed for the Steinbeck Plaza storm drain. An automatic sampler was installed in the manhole where several storm water tributaries come together before draining to the main storm water outfall that discharges onto the beach area below the Steinbeck Plaza courtyard. Based on the findings from this preliminary sampling, it was decided to conduct source tracking in the morning hours. On May 14, 2008, a source-tracking event was performed at 12 locations on the storm drain tributary to the Steinbeck outfall to determine the potential sources of both orthophosphate and coliform. Several locations

along the tributary to the Steinbeck outfall were found with elevated levels of coliform, E. coli and/or orthophosphate. Results of this preliminary sampling event are presented in the Year 2 Annual Report.

### **Pollutant Source Tracking in Year 3**

A review of the 2008 source tracking data showed that storm drain manhole STMH5 had the highest E. coli results (approximately 11,000 MPN/100ml). It was determined that the tributary areas leading to storm drain manhole STMH5 (i.e. STMH7 and 4-STMH20) would be sampled, as well as the adjacent tributary at STMH10 and downstream at outfall near Steinbeck Plaza (MDS5).

Sampling locations were selected based on available water in the storm drain system, proximity to businesses that were identified in the previous annual report, and the ability of a sample site to represent a different section of the tributary being studied. Two grab samples were taken at each of the six sampling locations simultaneously; one grab sample was sent to the laboratory for coliform and E. coli analysis and the second sample was analyzed in the field for orthophosphate.

Orthophosphate was analyzed in the field using the portable field meter and laboratory analysis was used for coliform determination via a Colilert 24 media/Quantitray method. This coliform analytical method gives results for both total coliform and E. coli at 1 to 10 and 1 to 100 dilutions. Some samples were also field analyzed for ammonia with test strips. Samples were collected in the morning at 0730, noon at 1200, and evening at 1730.

A team of four people gathered on June 16, 2009 to perform the sampling. Pre-labeled sample bottles supplied by the analytical laboratory were used for the coliform sampling. Samples were collected, kept on ice, and taken to analytical laboratory at the end of each source-tracking sample collection. Analytical results of this sampling event are shown in the following table and graphs.

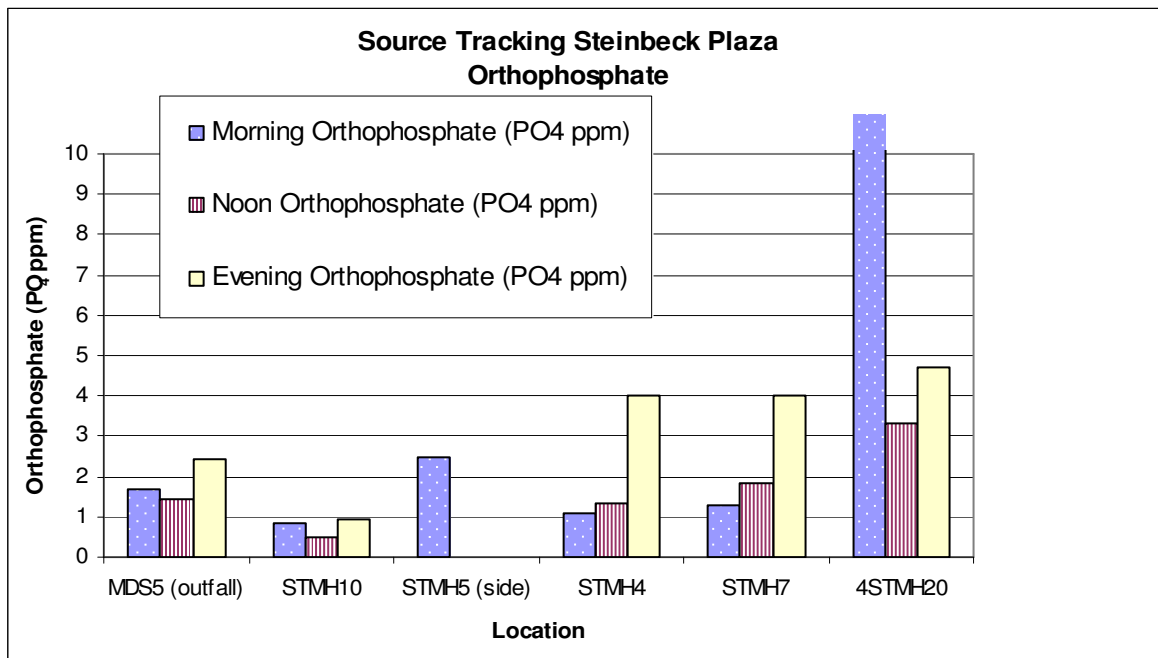
Based upon the coliform analytical results, it was determined to perform additional sampling and analysis to determine if the coliform was anthropogenic. A polymerase chain reaction (PCR) analysis was performed on three grab samples collected at storm drain manholes STMH7, STMH10, and 4STMH20. The testing was done to check for the presence of Human Specific Bacteroides, an anaerobic bacteria found in the guts of humans. The samples were submitted to the County of Santa Cruz Public Health Lab. The PCR analysis determined that all samples were “non-detect” for these bacteroides. The E.coli present was not from human waste.

**Analytical Results for Source Tracking Sampling Event on June 16, 2009**

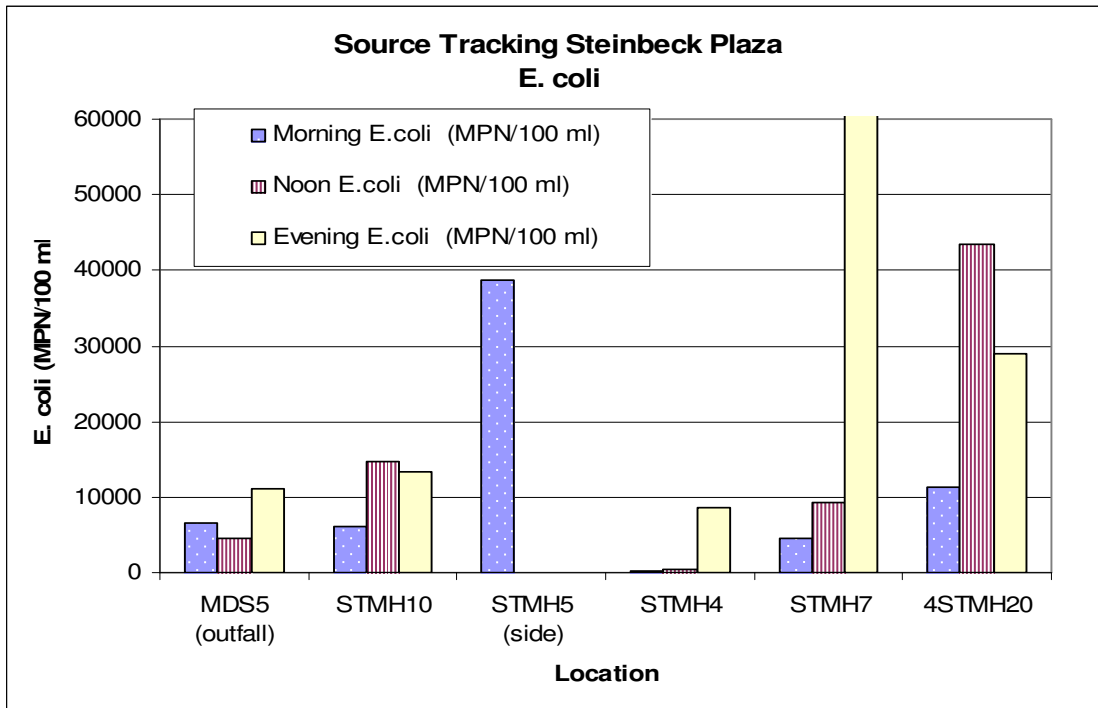
Time	Station	Orthophosphate as phosphate (PO4---PO4 ppm)	Coliform (MPN)	E. coli (MPN/100 ml)	Total Cu	Total Zn	Ammonia (ppm)	Notes
815	MDS5 (outfall)	1.69	>48392	6,511	---	---	0	
807	STMH10	0.82	>241960	6,127	---	---	0	
815	STMH5 (side)	2.47	>241960	38,732	87	404	0	
830	STMH4	1.08	25,993	148	---	---	0	
810	STMH7	1.28	>241960	4,638	---	---	0	
845	4STMH20	>10	>241960	11,300	398	1,290	0.25	
1215	MDS5 (outfall)	1.43	>241960	4,500	---	---	0	
1210	STMH10	0.49	>241960	14,670	---	---	0	
1230	STMH5 (side)	---	---	---	---	---	---	No flow
1215	STMH4	1.32	>241960	510	---	---	0	
1213	STMH7	1.81	>241960	9,320	193	748	0	
1230	4STMH20	6.6	>241960	43,520	216	874	0.5	
1735	MDS5 (outfall)	2.43	>241960	11,060	---	---	0	
1740	STMH10	0.92	>241960	13,360	---	---	0	
1740	STMH5 (side)	---	---	---	---	---	---	No flow
1740	STMH4	>2.72	>241960	8,570	---	---	0.25	
1740	STMH7	>2.75	>241960	68,670	---	---	0.25	
1800	4STMH20	4.7	>241960	29,090	---	---	0.5	

## Conclusions

The analytical results for this source-tracking event do not show a clear and consistent pattern that can correlate to a potential anthropogenic source. Orthophosphate concentrations are elevated above the attention level of 0.12 ppm as PO<sub>4</sub> along all tributaries to the Steinbeck outfall. The orthophosphate levels are especially elevated in the tributaries along Cannery Row south of the outfall (STMH4, STMH7, and 4STMH20). Whereas the orthophosphate levels seem to increase during the day at STMH4 and STMH7, all three samples collected from manhole 4STMH20 in the alley behind Bullwhackers Restaurant are elevated significantly above 0.12 ppm as PO<sub>4</sub> for the entire day.



*E. coli* concentrations are elevated above the attention level of 400 MPN/100ml along all tributaries to the Steinbeck outfall except STMH4 in the morning. Whereas the *E. coli* concentrations are especially elevated in STMH7, the concentrations decrease significantly at downstream sampling location STMH4. Also, the *E. coli* levels seem to increase during the day at STMH4 and STMH7; all three samples collected from manhole 4STMH20 in the alley behind Bullwhackers Restaurant are elevated significantly above 400 MPN/100ml.



Efforts to determine potential sources of these pollutants are still in progress. The investigative work conducted to date indicates that neither the Monterey Animal Hospital nor the Case de Amigos Animal Hotel are potential sources of these pollutants. Although initial investigative findings implicated Willy’s Smokehouse, it is unlikely to be a source of these pollutants because Willy’s is no longer operational. Other sources will continue to be investigated as a result of having conducted this source-tracking event.

The City has an ongoing enforcement action with respect to floor washing practices at the Trailside Café. In addition, on the date of the second sampling, further source tracking led to some pavement washing at the Sea Harvest fish market and detergents were being used. The owner was told that this is an illegal activity.

The following are recommendations:

1. Manhole 4STMH20 and adjacent storm drainpipes be cleaned out and visually inspected for potential illicit connections.
2. Additional source tracking be performed taking flow weighting into account.
3. Additional analysis be performed to determine why the concentrations increase during certain times in the day.

The results of this ongoing investigation will be reported on in the Year 4 Annual Report. When sources of these pollutants have been verified, the City of Monterey will work to keep these pollutants out of the storm drainage system. In order to prevent storm drain contamination, Manhole 4STMH20 has had the existing “sewer” manhole lid replaced with a lid labeled “storm drain”. The new replacement lid is a bolted down lid with a compression seal. Further monitoring/source tracking of the area will continue until an explanation is found.

### Steinbeck Drainage Source Tracking Results

Showing Orthophosphate as Phosphate (PO4-PO4 ppm) 6-30-09 8am



### Steinbeck Drainage Source Tracking Results

Showing E. Coli (MPN/100ml) 6-30-09 8am

