City of Monterey
Urban Watch Monitoring Program

PROGRAM OVERVIEW

The City of Monterey Urban Storm Drain Monitoring Program was initiated in June 1997 and was a collaborative effort between the Coastal Watershed Council, the City of Monterey and the Water Quality Protection Program of the Monterey Bay National Marine National Marine Sanctuary. The purpose of this project was twofold: (1) to use trained volunteers to monitor dry weather storm drain summer activity in selected outflow areas from June through October, 2000; and (2) to identify common pollutants/contaminants within the storm drains in the study area. Working with staff from the City of Monterey Public Works Department, five sampling sites were selected based on drainage basin and safe access for volunteers. The five sampling sites were referred to as: (1) *Steinbeck Plaza* located at the western end of Prescott Street on Cannery Row; (2) *Twin 51* located near the recreation trail at Heritage Harbor; (3) *San Carlos* near the Breakwater; (4) *Del Monte* on Major Sherman Lane south of Highway 1, Del Monte Shopping Center and Don Dahvee Park; and (5) *Monte Vista* on the corner of Soledad Dr. and Via Esperanza. This outfall drains a small strip mall and residential areas.

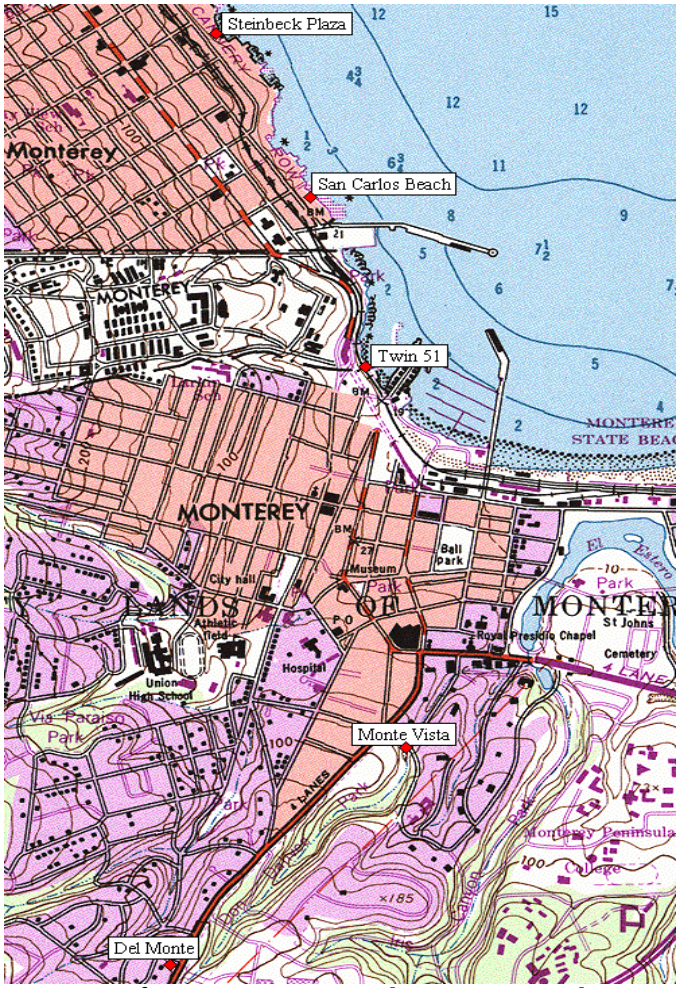

Figure 1. Locations of monitoring sites in the Monterey Urban Watch Program

The program used the "Urban Watch" monitoring kit manufactured by the LaMotte Company and designed in association with the City of Ft. Worth, Texas. The Urban Watch monitoring kit is designed to provide a method for volunteers to monitor dry-season storm drain discharges. The kit was developed according to National Pollutant Discharge Elimination System (NPDES) Phase I dry weather monitoring requirements and is designed to detect illegal stormdrain connections and discharges.

Following a one day training, volunteers were instructed to conduct sampling on a 10-12 day schedule. Volunteers were divided into two teams with three members each. Volunteers conducted sampling twice within a 24-hour period with at least 4 hours between each sampling event. Parameters monitored included detergents, phenols, ammonia nitrogen, chlorine, turbidity, pH, water and air temperature, odor, and color. Volunteers also noted if there was oil sheen, sewage, trash, and surface scum present, as well as any other observations of note. Table 1 includes information on each of the parameters monitored and method used for monitoring.

Samples were randomized by maintaining a flexible bi-monthly schedule with the volunteers. Volunteers sampled both on weekdays and weekends. Scheduling of field time was left up to the teams. Samples were taken a minimum of 4 hours apart within a 24-hour period.

VOLUNTEER TRAINING

Coastal Watershed Council staff Susanna Danner and Donna Meyers provided a six-hour hands-on training for volunteers on June 17, 2000. Topics emphasized by CWC included monitoring concepts, sampling procedures, the meaning of each parameter monitored, use of kits in the field, and safety procedures. Volunteers were placed in teams according to general skill level and time availability. An experienced monitor from the Coastal Watershed Council or the City of Monterey went out with each team until staff felt that the groups had a good understanding of the sampling and analytical skills outlined in the training packet given to them.

Table 1: Water Quality Parameters
Urban Watch Monitoring Program

Parameter	Possible Sources	Associated Problems	Method/Accuracy
Temperature	illegal discharges	affects rates of chemical and biochemical reactions in water.	Method - Digital thermometer Accuracy - 1% full scale
Turbidity	microorganisms, sediment, erosion	interferes with fish and aquatic life	Method - Visual Octa-Slide Viewer against turbidity standard slide bar
pH	aerosols and dust in air, mineral substances, sewer overflows, animal wastes, pesticides & fertilizers, photosynthesis	interferes with fish and aquatic life	Method - Electrometric pH probe calibrated Accuracy ??0.2 pH units
Detergents	illegal or unintended discharges, car washing, cleaning of screens and grills, leaking sanitary sewers	can be toxic to many aquatic insects, plants, and fish; can lower dissolved oxygen available to aquatic life	Method - solvent extraction/ bromphenal blue indicator Accuracy ??0.1 ppm
Copper	illegal discharge into the storm drain system; also can occur naturally in surface waters	concentrations over 0.025 parts per million are toxic to most freshwater fish	Method - Diethyldithiocarbamate Octa-Slide Comparator against color standard Accuracy ??10%
Phenols	disinfectants, toothpaste, mouthwashes from domestic wastewater	interferes with fish and aquatic life	Method - Aminoantipyrine Octa-Slide Comparator against color standard Accuracy ??10%
Chlorine	illegal or unintended connection to a stormdrain or draining of a swimming pool	toxic to aquatic life, can create a "sterile" environ-ment	Method - DPD Octa-Slide Comparator against color standard Accuracy ??10%
Ammonia Nitrogen	illegal connections to stormdrain systems, poorly functioning septic systems, wildlife	at certain concentrations can be toxic to aquatic organisms	LaMotte Code 5864 Colo-Ruler against a color standard
Color	dyes or chemicals	interferes with aquatic insects	Method - Visual Borger Color System
Odor	illegal discharge or product of decomposition; "clean" drainage water should have no distinctive odor	can indicate presence of contaminants	Scent
Oil sheen	hydrocarbons such as oil, gasoline, and grease; leaking underground petroleum storage tanks	toxic to aquatic organisms	Method - Visual
Trash, sewage, scum	illegal connections to storm drain systems, poorly functioning septic systems, illegal dumping	interferes with fish and aquatic life	Method - Visual

QUALITY ASSURANCE/QUALITY CONTROL PROGRAM

The Quality Assurance/Quality Control (QA/QC) program included the following components:

- Training on monitoring concepts, safety, sampling methods, and hands-on use of equipment.
- Training in use of data sheet and data entry for volunteers.
- Calibration of the pH meter within 24 hours of use.
- Continued supervision until the trainer was confident in the volunteers' sampling and analysis skills.
- Weekly follow up and review of data sheets to determine inconsistency in data.
- CWC prepared a Standard Operation Procedure for volunteers to review and use in the field during each monitoring event.

RESULTS

I. Quantitative Parameters

Over the period of June through October 2000, monitoring took place on eight dates. Each site was visited twice within a 24-hour period on each date. Therefore, a total of 80 events were monitored.

Please see attached tables for averages, maximum values, and frequency of parameters encountered.

Detergents

The highest frequency and concentration of detergents were detected at the Steinbeck Plaza outfall. The highest concentration found was at the Steinbeck outfall where the measurement on 08/31/2000 was 2.1 ppm. Detergents were found during 40% of 80 total visits to all sites. Detergents were not detected at the Del Monte site.

Phenols

Phenols were not detected at any site during the monitoring period.

Ammonia Nitrogen

Ammonia nitrogen was detected on 44 of 80 total visits to all sites (55%). Ammonia nitrogen was detected most often at Steinbeck Plaza (11 of 16 visits). Ammonia nitrogen was found frequently at the Del Monte and Twin 51 sites (9 of 16 visits). The highest concentration reported was from the Steinbeck site on 08/31/2000, and measured 3.5 ppm.

Copper

Copper was found 5 times during all visits (6%). Concentrations detected were highest at Steinbeck Plaza.

Chlorine

Chlorine was detected once (0.2 ppm) during the monitoring period, at the Del Monte site on 09/28/2000.

Turbidity

Turbidity was consistently low for most sites, with the exception of one medium turbidity measurement on 08/04/2000 at Steinbeck Plaza.

II. Qualitative Parameters

Odors

Odors were noted on 3 of 80 total visits. On 07/24/2000, a sulfur smell was noted at Steinbeck; during the following visit to that site, on 07/25, a sewage smell was noted. On 08/16/2000, a sweet smell was noted at Monte Vista.

Color

Most samples were colorless, with the exception of those collected at Steinbeck Plaza on 08/04/2000 and 08/31/2000, which were tea-colored.

Oil sheen

Oil sheen was reported during 11 of 80 total visits, or 14% of visits. Oil sheen was found most frequently at Steinbeck Plaza. Oil sheen was not found at Twin 51.

Sewage

Sewage was noted on 9 of 80 monitoring events (45%). Sewage was found most frequently at the Steinbeck Plaza site. Sewage was not noted at the San Carlos site.

Surface scum

Surface scum was reported from all sites. Surface scum was noticed most frequently at Steinbeck Plaza. Surface scum was reported 19 times, or 24% of 80 total monitored events at all sites. In many cases, algae were reported to be a component of the surface scum.

Trash

Trash was noticed at all sites with great frequency. Trash was reported on 59 of 80 total visits to all sites (74%). The highest frequency was noticed at Steinbeck Plaza where the volunteers noticed trash 15 of the 16 total visits to the site. The lowest frequency of trash was at the Del Monte site, where volunteers noted trash on 9 of the 16 total visits to the site.

III. Additional Data

Please refer to attached data summary tables.

CONCLUSIONS

Results from the data collected showed that ammonia nitrogen and detergents were the most common contaminants entering storm drains within the study area. Of the total 80 monitored events for all sites and visits, ammonia nitrogen was found 44 times (55%), detergents were found 32 times (40%), copper

was found 5 times (6%), and chlorine was found 1 time (0.1%). Phenols were not detected at any site during the monitoring period.

Steinbeck Plaza continues to be the site at which pollutants are most frequently detected. It is to be noted that average detergent concentrations at this site have decreased from 1999 levels. During the 1999 monitoring period, detergent concentration averaged 1.4 ppm. In 2000, the average detergent level detected at Steinbeck Plaza dropped to 0.5 ppm.

The 1999 Urban Watch Monitoring Program continued piloting the Urban Watch kit first used in the City of Monterey in summer 1997. The kit was developed for use by volunteers to monitor dry-weather storm drain flow. The kit is easy to use and provides consistent data throughout the monitoring period. It is recommended that project organizers develop a relationship with a certified lab to run QA/QC checks on the equipment. It is also recommended that when positive results are found for constituents that the volunteers collect an additional sample for processing by a lab. Program coordinators would then inform the City of Monterey of findings as soon as they are recorded.

The data results continue to show the need for a targeted public outreach program for urban runoff control within the city limits. The restaurant survey and outreach program conducted by the Sanctuary in 1998 was a good first step towards this goal. Other ideas include working with local newspapers to publish weekly monitoring results from the storm drain monitoring program, and collaborating with the Chamber of Commerce and other business associations to promote clean water practices.

It is recommended that the City of Monterey continue the Urban Watch monitoring program into a fifth season to augment the data presented here. Assessing upstream sources of illicit discharges and pollutant sources is advised. It is also recommended that the outreach program targeting local businesses and residents be expanded to further reduce detergent concentrations entering the Monterey Bay National Marine Sanctuary.