205(j) Dissolved Oxygen Monitoring

INTRODUCTION

The purpose of this monitoring is to determine the algal biomass present in one stretch of the Conejo Creek using continuous dissolved oxygen monitoring. Ammonia samples will also be collected over a 24 hour period to determine nitrification rates and assess the oxygen demand in the stream due to nitrification of ammonia. Samples for other nutrients will be collected to supplement the existing information for the creek and determine what nutrient levels correspond to the amount of algal biomass present in the creek at the time of sample collection.

Dissolved oxygen (DO) probes will be installed in two locations along the Conejo Creek between the Hill Canyon WRP and the Camarillo WRP. DO measurements will be collected every 15 minutes over the length of 48 hours at each location. During the first 24 hours of monitoring, samples will be collected at each site for the constituents listed in Table 1. Sample collection will occur at regularly spaced intervals over the 24 hour period. Sample collection at the downstream station will be 5.5 hours after sample collection at the upstream station in an attempt to sample the same parcel of water at both locations.

Table 1. Constituents, Reporting Limits, Holding Times, and Analytical Laboratory

Constituent	Method	Reporting Limit	Holding Time	Laboratory
Ammonia Nitrogen	SM 4500	0.10	28 days	FGL
Nitrite Nitrogen	SM 4110B	0.1	28 days	FGL
Nitrate Nitrogen	SM 4110B	0.1	28 days	FGL
Organic Nitrogen	SM 4500	1.0	28 days	FGL
Phosphorus, Total	SM 4500	0.1	28 days	FGL
Ortho phosphate as phosphate	SM 4500	0.3	48 hours	FGL

Table 2 summarizes contact information should difficulties or questions arise in the field.

Table 2. Contacts

Name	Home Phone	Mobile Phone	Other Contact Info
Ashli Cooper	818-788-4804	818-636-8949	
Michelle Buzbee	805-985-9848	805-216-9848	
Britton Smith	805-730-9110		
Kareem Zayed	805-379-9570	310-666-3482	
Mari Contreras	805-495-3864	805-279-2031	
CC Lynch 24 hour DO meter help line			1-800-333-2252
Kurt Wilkenson, FGL Labs			805-659-0910 work number

SAMPLING LOCATIONS

The upstream monitoring location (UPCC) is located on the Arroyo Conejo Creek approximately 1.4 miles downstream of the Hill Canyon Treatment Plant off Hill Canyon Road. The downstream monitoring location (DWNCC) is located on the Conejo Creek upstream of the bridge crossing at Adohr Road in Camarillo. The downstream station is approximately 6.3 miles downstream of the upstream location. The average velocity in this reach is 1.7 fps. The average travel time for this reach is five and a half hours.

Sampling Locations – Directions

UPCC-Upstream Location

From the office: Take Moorpark Road north. It will turn into Santa Rosa Road. From Santa Rosa Road, turn left onto Hill Canyon Rd (at the sign to the Hill Canyon Treatment Plant). Drive south on Hill Canyon to dirt road turnoff on your right. Drive down road to creek access point. Collect samples mid-stream, mid-depth just downstream of the DO meter.

DWNCC-Downstream Location

From the upstream location: Turn left off Hill Canyon Rd. onto Santa Rosa Road. Take Santa Rosa Rd. past the 101 where it turns into Pleasant Valley Rd. From Pleasant Valley Rd., turn left onto Pancho Rd. and make your first left onto Adohr Rd. Take Adohr Rd. to the Conejo Creek and collect samples near the bridge downstream of the DO meter.

SAMPLING PREPARATION

Sampling preparation consists of the following steps:

- Label Bottles
- Calibrate and prepare field equipment
- Program DO meter for 15 minute intervals
- Review equipment and equipment checklist
- Install DO meter at each location.

Bottle Preparation

Inventory sample bottles upon receipt from the laboratory to assure that adequate bottles have been provided to account for the analytical requirements for each sampling event. Label all bottles before the sampling event. Pre-labeling sample bottles simplifies field activities, leaving only sample collection time, sample number, and sampling personnel names to be filled out in the field. Labels should be placed on the appropriate bottles in a dry environment; attempting to apply labels to sample bottles after filling will cause problems, as labels usually do not adhere to wet bottles. The labels should be applied to the bottles rather than to the caps.

After applying the labels, sort the bottles into separate coolers for the upstream and downstream stations. This will help prevent confusion of the bottles in the field. Table 3 provides a summary of the sampling requirements for each of the constituents.

Table 3. Sampling Requirements

Parameter	Sample Container	Sample Volume[1]	Sample Type	Immediate Processing and Storage
Nitrite Ortho Phosphate	Polyethylene	1 pint (composited into 1 quart bottle)	grab	Store at 4°C Filtered; Keep cool in field and freeze until analysis (leave 1/7 unfilled)
Total Ammonia	Polyethylene	1 pint	grab	Preserve to ≤pH 2 with H_2SO_4; Store at 4°C
Nitrate Organic Nitrogen Total Phosphorus	Polyethylene	1 pint (composited into 1 quart bottle)	grab	Preserve to ≤pH 2 with H_2SO_4; Store at 4°C

1. Additional volumes may be required for QC analyses.

DO Meter Preparation and Installation

The DO meter will be calibrated and prepared for installation in the field prior to the sampling event. Calibration will be conducted as described in the instructions accompanying the DO meter.

Secure the DO meter to two cinder blocks using cable. Secure the cinder blocks in the bottom of the stream at the sampling locations. Once the meter and cinder blocks have been installed, secure the cable to one bank of the stream. At the upstream station, secure the cable around a sturdy branch or trunk of a tree on the bank. At the downstream station use stakes and/or concrete screws to secure the cable. Run the cable through the DO probe and around the cinder block. Before securing to the other bank, ensure that the sample collection portion of the DO probe is completely submerged in the creek, but is not touching the bottom. Adjust the blocks and/or cable as necessary to properly place the DO meter. Finally, secure the cable to the opposite bank. Try to secure the cable upstream of the location of the DO meter to help counteract the force of the flow on the cinder blocks.

If possible, use a lock, concrete screw, etc. to secure the DO probe to the bank. Place a sign on the bank stating the following:

Water Quality Monitoring being conducted.
Please do not disturb the collection equipment in the stream.
If you have questions, please contact Larry Walker Associates at 805-449-0011.

Approximately an hour after installation, check the operation of the DO meter by downloading the data from the meter into a laptop. Review the data for any appearance of anomalies, fix any observed problems, and reinstall the meter to begin the monitoring period.

Field Equipment

Use the equipment checklist provided in Figure 1 to ensure that all equipment has been collected and is in proper working order for sample collection.

Figure 1. Field Equipment Checklist

- ✔ Sampling Plan
- ✔ Sample Bottles w/ labels
- ✔ Coolers w/ice
- ✔ New powder-free gloves
- ✔ Chain of Custody forms
- ✔ Field Log Forms
- ✔ Pens
- ✔ Watch
- ✔ Camera
- ✔ Tape measure
- ✔ Hip waders
- ✔ First Aid Kit
- ✔ Cellular Phone
- ✔ Field Kit
- ✔ Hammer
- ✔ DO meter
- ✔ Cable
- ✔ Stakes/Other securing equipment
- ✔ Cinder Blocks
- ✔ Locks
- ✔ Business Cards
- ✔ Flashlight/Head Lamp

SAMPLE COLLECTION ACTIVITIES

The following steps will be followed during each visit to a sampling location:

- Check the operation and security of DO meter.
- Collect grab samples for each constituent at mid-depth, downstream of DO meter using clean techniques.

- Collect any required field duplicate samples using the same methods.
- Make sure lids on all bottles are securely tightened after sample collection.
- Record the date, sample time, and sampler initials on the bottle label in waterproof ink.
- Place bottles in the cooler on ice. Make sure bottle lids are above the ice and water so no melted ice can get into the bottles.
- Fill out field log for the sample. Make sure sample time, flow, and location are entered and correspond to the bottle labels.
- Take photographs of the sampling location.
- Wait lag time to collect downstream location sample, then return to upstream location and collect a new sample.

Sampling Procedure

Sample collection will be conducted at the upstream site and the downstream site over a 24 hour period. Sample collection will consist of grab samples collected at each site for each of the constituents listed in Table 1. Samples for all constituents, except ammonia, will be collected for compositing into one sample at the end of the 24 hours. Ammonia samples will not be composited at the end of the sampling period. Labels and field logs for the ammonia samples should clearly identify when the samples were collected, as a time series of ammonia concentrations over the 24 hour period will be developed from this data.

Sample collection at the downstream station (DWNCC) should occur 5.5 hours after the corresponding sample was collected at the upstream station in an attempt to collect samples from the same water parcel at both the upstream and downstream station. The sample collection time schedule is listed below. Should sample collection begin at a time other than that designated in the table below, sample times should be adjusted accordingly so that the downstream station is always collected 5 and half hours after the upstream station.

Table 4. Sample Collection Time Schedule

Sample #	UPCC	DWNCC
1	11:00 am	4:30 pm
2	3:30 pm	9:00 pm
3	8:00 pm	1:30 am
4	12:30 am	6:00 am
5	7:00 am	12:30 pm

Each location will be visited a total of five times to collect samples. Three bottles need to be filled for each trip to the sample location: one for ammonia, one for nitrite and orthophosphate, and one for nitrate, organic nitrogen, and total phosphorus.

At the upstream station, a field duplicate will also be collected. Grab sample field duplicates should be collected immediately following the collection of normal grab samples. Field

duplicates should be submitted “blind” to the laboratory using the bogus site name "Station 22". Collection of the duplicate for all constituents, except ammonia, will require an extra bottle to be filled during each trip to the upstream sampling location. For ammonia, the duplicate will be collected during the second trip to the sampling location. The following table summarizes the number of bottles to be filled during each trip to each sampling location.

Table 5. Bottle Filling Schedule

	UPCC				DWNCC			
Sample #	**Total # bottles**	**NO2, Ortho-P**	**NO3, Org N, Total P**	**NH3**	**Total # bottles**	**NO2, Ortho-P**	**NO3, Org N, Total P**	**NH3**
1	5	2	2	1	3	1	1	1
2	6	2	2	2	3	1	1	1
3	5	2	2	1	3	1	1	1
4	5	2	2	1	3	1	1	1
5	5	2	2	1	3	1	1	1

In addition to the constituents listed in Table 1, take flow measurements and photographs and make observations at each sampling site each time the site is sampled. General receiving water observations including color, odor, floating materials, etc. as well as observations of contact and non-contact recreation should also be made. All comments on field observations should be recorded in the field log (Figure 2).

Clean Sampling Techniques

Samples will be collected using “clean sampling techniques” to minimize the possibility of sample contamination. Sampling methods will generally conform to EPA “clean sampling” methodology (USEPA 1995a; Method 1669: Sampling Ambient Water for Trace Metals). Although these methods are specific to metals, the techniques may be applied to collection of other water quality samples.

For this program, clean techniques must be employed whenever handling the composite bottles, lids, or grab sample bottles.

Clean sampling techniques are summarized below:

- Samples are collected only into rigorously pre-cleaned sample bottles.
- At least two persons, wearing clean powder-free nitrile gloves at all times, are required on a sampling crew.
- One person (“dirty hands”) touches and opens only the outer bag of all double bagged items (such as Hg sample bottles, tubing, and Teflon lined composite bottle lids), avoiding touching the inside of the bag.
- The other person (“clean hands”) reaches into the outer bag, opens the inner bag, and removes the clean item (sample bottle, tubing, lid, etc.).
- After a grab sample is collected, or when a clean item must be re-bagged, it is done in the opposite order from which it was removed.

- Clean, powder-free nitrile gloves are changed whenever something not known to be clean has been touched.
- For this program, clean techniques must be employed whenever handling the composite bottles, Teflon lined composite bottle lids, suction tubing, or grab sample bottles for metals, organics or bacteriological samples.
- To reduce potential contamination, sample collection personnel must adhere to the following rules while collecting samples:
    1. No smoking.
    2. Never sample near a running vehicle. Do not park vehicles in immediate sample collection area (even non-running vehicles).
    3. During wet weather events avoid allowing rain water to drip from rain gear or any other surface into sample bottles.
    4. Do not eat or drink during sample collection.
    5. Do not breathe, sneeze or cough in the direction of an open sample bottle.

Sample Collection

All samples will be collected as grab samples. Collect the samples by directly submerging sample bottles at mid-stream and mid-depth at the location of greatest flow. Samples will be collected by wading to mid-stream directly downstream of the DO meter and filling bottles by direct submersion of the sample bottle to approximately mid-depth. Collect samples sufficiently downstream of the DO meter to avoid disturbing the sediment and water around the probe. Clean powder-free nitrile gloves will be worn for collection of all grab samples. Grab samples will be collected directly into the appropriate sample bottles (containing the required preservatives) as outlined in Table 3. The grab sample technique to be employed is described below.

Direct Submersion: Hand Technique

Where practical, all grab samples may be collected by direct submersion to mid-stream, mid-depth using the following procedures.

1. Wear clean gloves when handling bottles and caps;
2. Pre-label sample containers (site code, location, date, time, analysis);
3. Remove lid with clean hand and keep lid facing down to avoid contamination;
4. Submerge bottle to mid-stream/mid-depth, let bottle fill, and replace lid;
5. Place sample on ice and fill out COC form;
6. Collect duplicate samples if needed using the same protocols described above.

If at any time the collection of sampling by wading appears unsafe, do not attempt to collect mid-stream, mid-depth measurements. If in-stream field measurement is not safe, collect field measurements from a stable, unobstructed area at the creek's edge.

Field Observations

Standard receiving water observations including odor, color, floating material, etc., together with beneficial use observations such as, fishing or contact or non-contact recreation, will be made during the collection of monthly water quality samples. Observations will be made about the quantity and type of algae present in the stream. Photographs will be taken to supplement observations recorded on the field log and to provide evidence of observations.

Flow Measurement

Flow measurement will be recorded or estimated at each sampling collection point during each monitoring event. Where flow measurement equipment is not available, depth, width, and velocity will be estimated to provide an estimate of flow. Depth will be estimated by using the average of several depth measurements taken along the channel. Width will be measured by extending a tape measure from one edge of the water to the other. Velocity will be estimated by measuring the time it takes a floating object (e.g. stick, orange) to travel a known distance.

POST-SAMPLING ACTIVITIES

Composite Sample Splitting

After the monitoring is completed, the individual grabs collected from each station for all constituents, except ammonia, will be composited into one sample for submittal to the lab. Compositing will be conducted by determining the highest flow measured during the sample period. Then calculate the ratio between the flow for each sample collection period and the highest flow measured. Combine the individual samples into the composite bottle using the flow ratios determined. Following is an example of the compositing process:

After compositing is completed, there should be one composite sample for the upstream station, one composite sample for the downstream station, and one composite sample for the duplicate for nitrite and ortho-phosphate, and one composite sample for each location and the duplicate for nitrate, organic nitrogen, and total phosphorus.

Chain-of-Custody

Chain-of-custody (COC) forms will be filled out for all samples submitted to each laboratory. Sample date, sample location, sample collection person(s), and analysis requested shall be noted on each COC. An example COC form is attached.

Transport to Lab

Samples will be stored in coolers with ice and composited after sample collection is completed. After compositing, samples will be delivered to FGL. Samples will be analyzed according to the methods listed in Table 1. Table 1 also provides reporting limits and holding times. Samples should be delivered to FGL by 5:00 pm.

Directions from LWA to **FGL**:

1. Take the US-101 North/Ventura Fwy towards Ventura
2. Take the CA-126 East exit towards Santa Paula
3. Merge onto Santa Paula Fwy
4. Santa Paula Fwy becomes CA-126 East
5. Take the Peck Road exit
6. Turn right onto Corporation Street
7. Lab is located at 853 Corporation Street

Laboratory Address and Phone Number:

FGL Environmental
853 Corporation Street
Santa Paula, CA 93061
(805) 659-0910

DO Meter

After DO monitoring is completed at the Conejo Creek sites (48 hours after installation), the data in the DO meters should be downloaded and the two meters installed on locations (to be determined and time permitting) on Revolon Slough and the Arroyo Simi. After completion of the monitoring at these additional sites, the data from the probes needs to be downloaded and the DO meters returned to CC Lynch. The probes must be shipped to reach CC Lynch by Monday, June 12, 2000. The probes should be shipped to (via overnight FedEx by Saturday, June 10):

CC Lynch & Associates, Inc.
300 Davis Avenue
Pass Christian, MS 39571
1-800-333-2252

Figure 2. Field Log

GENERAL INFORMATION

Station ID_____ Date_____ Time: Arrival_____

Departure_____

Site:_____ Sampler's Name(s)_____

_____

_____

OBSERVATIONS

Condition of DO Meter:_____

Weather:_____

Floating material or debris:_____

Oil (extent):_____

Water color or odor:_____

Beneficial Use Obervations

Contact Recreation (wading, swimming):_____

Non-contact Recreation (fishing, other):_____

Wildlife and Aquatic Life (fish, birds, etc.):_____

Other observations:_____

Photograph No. (if taken):_____

FLOW MEASUREMENT

Measured flow: flow_____

Estimated flow: average depth_____ estimated width of flow_____estimated velocity_____

ALGAE OBSERVATIONS

Approximate % coverage: _____

Type of algae (circle)

free floating

attached

mat on substrate

filamentous - entirely submerged or on surface

Color of algae: _____