

# CWIP

**Sampling Guidelines,  
Protocols, and Procedures for  
the Port Antonio Water Quality  
Monitoring Program**

# Coastal Water Quality Improvement Project

USAID Contract No. 532-C-00-98-00777-00

## **SAMPLING GUIDELINES, PROTOCOLS, AND PROCEDURES FOR THE PORT ANTONIO WATER QUALITY MONITORING PROGRAM**

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Government of Jamaica's  
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And the

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## **Preface**

The Coastal Water Quality Improvement Project (CWIP) is a five-year bilateral initiative between the Government of Jamaica's National Environment and Planning Agency (NEPA) and the United States Government through its Agency for International Development (USAID). Five distinct, but interrelated activities, associated with coastal water quality improvement, are being carried out contributing to the achievement of the USAID Strategic Objective 2 (SO2) - Improved quality of key natural resources in selected areas that are both environmentally and economically significant. CWIP is being implemented by Associates in Rural Development, Inc. (ARD) with assistance from Camp, Dresser & McKee, Inc. (CDM) and the Construction Resource and Development Centre (CRDC).



# Instructions to CASE

## Before the Day of the Sampling Exercise

1. At least three weeks before the sampling exercise review sampling program with program partners with reference to information already derived and program objectives, to determine sampling strategies including number of points to be sampled and parameters to be analyzed. All proposed changes should be documented.
2. Set a tentative date for the sampling exercise, preferably a minimum of two weeks in advance.
3. Contact the analytical laboratories involved to agree on the date for the sampling exercise. Initially, DBML will serve as the principal analytical lab with the CASE's lab providing inter-laboratory/calibration services. As the laboratory capacity at CASE strengthens, CASE's lab will assume the role as principal analytical lab with the NEPA lab performing inter-laboratory/calibration services.
4. Determine the number of boats required and contact the boat supplier(s) to confirm boat availability for the selected date. Until the program is reassessed as to the number of sampling points, two boats will be needed to minimize sampling time. If boats are available, proceed to step 4, if not, either contact other suppliers or return to step 2.
  - a) Organize the student/community samplers. A minimum of six participants are required per boat as follows: i) One sampler; ii) One recorder; iii) One additional volunteer to benefit from in-service training. This volunteer would actively participate in future exercises in the event the regular sampler/recorder are unavailable; iv) One trip leader. This person must be familiar with sampling protocols and the location of sampling sites. If sufficient numbers can be arranged for the selected date, proceed to step 4, if not return to step 2.
5. Send written notices of the confirmed sampling date to all involved laboratories, boat suppliers and other interested parties. This letter should clearly identify the date and time of the trip and the place where the boats and samplers are to meet. The letter should also indicate the number of sample bottles needed from participating laboratories which should be agreed on beforehand with the laboratories involved, also a means of making these bottles available, if these bottles are required from external laboratories.
6. Ensure the availability of reliable transportation to transport samples back to the laboratories. A courier service by TARA is available at an inexpensive rate. The use of this service is encouraged. If this mode is selected confirm departure and arrival times, and advise participating laboratories of transportation details include sample arrival times.
7. By modifying existing document templates, prepare the following forms, one for each boat:
  - a) **A map** of the sampling area identifying the sampling sites by number.
  - b) **Sampling details and instructions** describing sampling procedures, sampling concerns, the types of bottles to be used with which type of sample, instructions on how to fill out forms provided, names of participating laboratories and their roles, quality control procedures, and chain of custody protocols.
  - c) **Sampling Report Forms:** A list of the sampling sites (descriptions and numbers) that the boat will be sampling and precise details about the numbers of coliform, nutrient, and

other bottles to be used at each site and to be recorded. The number of bottles to be used at each site will be determined by where the field duplicates and quality control samples are to be taken. Normally 15-20% of the sites should be sampled in duplicate and an approximate equal number of samples should be collected to send to the quality control laboratory (include at least one field duplicate in the 15-20% mentioned). Always include both marine and fresh water sites in the duplicate and quality control samples. Over time, try to do duplicate and conduct quality control sampling at all sites. Samplers are to record the numbers written on the bottles that they fill at each site in the designated column on this form.

- d) **Environmental Observation Checklist:** These are generic forms that ask for information about the conditions at each site. At each site the recorder is to enter the site number, respond to each listed question and write down any other information they feel may be relevant.
  - e) **Sample Chain of Custody Forms:** These forms have columns for bottle numbers and the signatures of the sampler, the transporter, and the receiving analyst. Each laboratory must complete one form.
8. Contact the involved laboratories about a week before the sampling exercise to remind them of the date and to make final arrangements to collect the required number of sampling bottles.
  9. Contact the boat suppliers and the samplers about a week before the sampling exercise to remind them of the sampling date, time, and meeting point(s). The fishing village in the center of town by the East Harbor has been designated as the initial meeting point.
  10. On the day before the exercise, collect the bottles from the laboratories and remind them about sample transportation details back to the laboratory. Purchase ice, and remind the student/community samplers and boat suppliers of the time and meeting point(s) of the sampling exercise.
  11. On the evening before the sampling exercise ensure that the bottles are clearly and unambiguously numbered. Divide them into sets, one set per boat, according to the number of bottles that each boat will need, as defined in the *Sampling Report Forms*. Always include a few extra bottles (about 20%) of each type, in case the samplers wish to collect extra samples, bottles get broken, tops get lost, or bottles become contaminated. Place the bottles for each boat into appropriately labeled coolers. Place the forms for each boat on a clipboard and into a plastic bag. The bag should be big enough to allow the recorder to write on the forms while they are still in the bag to protect the forms from seawater and/or rain. Put the forms into an appropriately labeled sealing plastic box - one for each boat. Also put several plastic bags, two pens, and one waterproof marker into each box to be used as needed.

#### **On the Day of the Sampling Exercise:**

1. On the day of the sampling exercise, place the ice in the coolers and transport the coolers and the plastic boxes containing the sampling forms to the meeting point(s).
2. At the meeting point, brief the samplers on details of the sampling activities and give them their cooler(s) and plastic box. Clearly identify who will be doing what and define trip leaders. Remind participants that the expensive analytical work will be of no value if the samples are not collected with due diligence. Brief the boatmen on their responsibilities (boat safety, how to approach the sampling site, as well as dangers they may experience).
3. Send the boats off after ensuring that each boat is competently supervised.

4. When the boats return to the beach the team leaders are to sort the bottles according to which laboratory the bottles will be sent (*See Sampling Report Forms*), check to ensure that bottle tops are securely tightened, place bottles into appropriate coolers, carefully packed on ice to ensure that they do not fall over and/or break, and prepare a *Chain of Custody Form* for each laboratory. It is vital that this be done with absolute diligence.
5. Deliver the sample bottles and *Sample Chain of Custody Forms* to TARA for transport to the respective labs. Coolers should be secured ropes as appropriate.
6. Store the Sampling Report Forms and the **Environmental Observation Checklist** sheets for future reference.

#### **After the Day of the Sampling Exercise**

1. About a week after the sampling exercise, contact the laboratories for their results.
2. The laboratories will report the analytical results against bottle numbers. When the results have been obtained, assign site numbers to the bottle numbers using the information on the *Sampling Report Forms* and enter the data into an appropriate spreadsheet.
3. Sort each laboratory data by site and print reports for the respective laboratories.
4. Deliver the reports to the laboratories for their review with instructions for them to return the reports to you corrected if necessary and signed to show their confirmation of the results.
5. When confirmation has been received, make the necessary changes, if any.
6. Prepare a report for the laboratories, which show the results reported by each laboratory for each site that was sampled for that purpose. Deliver that report to the laboratories and if significant differences exist between or within laboratories (remember to send at least one duplicate sample to the quality control laboratory) convene a meeting of laboratory personnel to try to seek reasons for the differences, and correct identified problems.
7. Once satisfied with the results prepare a data report for distribution to NEPA, designated community members, and other interested parties. After every 2-3 sampling exercise, it is advisable to seek technical advice on the data and the sampling program.

# Instructions to Samplers

## Numbered 1 Litre Plastic Bottles

The numbered one litre plastic bottles are to be used for the water samples to be analyzed for nutrients. The bottles would have been provided cleaned and numbered. They would have been rinsed with distilled water and ready for use. Carry these bottles into the field in milk crates being careful to keep them clean.

Two bottles are needed for each site except for sites where duplicate samples are to be collected, at which time four bottles will be needed. When handling the sample bottles, ensure bottle contamination and ensure hands are clean. Rinse hands with water close to the sampling site if necessary, but not at the sampling site.

## Numbered Glass Bottles

The numbered glass bottles are for fecal coliform samples. Bottle caps are covered with aluminum foil. Ensure that hands do not come into contact with the tops of the bottles or the inside of the caps. Carry these bottles into the field inside the coolers within which they were shipped after having placed about 15 cm of ice in the bottom of the cool box.

## Field Containers

Carry in each boat one big cooler sufficient to hold the sample bottles, with 15 cm of ice at the bottom of the container. Carry into the field a plastic container within which should be kept with data sheets, pens, and anything else that are to be kept dry. Carry into the field plenty of plastic bags, clean rags, and a towel to keep dry.

## At the Sampling Site

At each site, collect the nutrient and coliform samples at about 20 cm depth. Fill in each page and box of the field data sheets.

Follow the sampling procedures detailed herein. Store the collected samples in the appropriate ice cooled boxes ensuring that bottle tops are securely tightened.

## Duplicate Samples

Collect duplicate samples at sites so designated.

## Return From the Field

Upon return to land, check with the coordinator to initiate quality control and chain of custody procedures before shipping to lab. Hand over custody to Coordinator who will attend to shipping details.

# Sample Collection, Storage, and Transport Protocols

## 1. Collect Samples at a Single Established Time of Day

- Collect samples between six and nine O'clock in the morning when the sea is most calm and ample time is available for transport of samples to participating laboratories.

## 2. Sample Bottle Preparation

- Sterilization
  - All bottles for chemical parameters should be presoaked in 1 molar hydrochloric acid and rinsed in distilled water at the laboratory before shipment to field.
  - Bacterial sample bottles should be autoclaved at 120 degrees Celsius and 20 lbs/in<sup>2</sup> pressure in the laboratory before shipment to field.
- Numbering
  - Bottles should be numbered in lab prior to field use
  - Bottles should be drawn at random by samplers at sampling site. The number on the bottles should bear no relation to the site.

## 3. Sample Collection

- Approaching a collection site by boat:
  - The motor of the boat should be cut so that the boatman maintains control of the boat. This action should be taken about 30 feet from each site.
  - The boat should be allowed to drift toward the site prior to collection of the sample.
- Sample bottles should be drawn at random from the set of sample bottles.
- Sample bottles should be submerged upside down to a depth of about 15 inches.
- Invert bottle to fill.
- Rinse bottle three times with the water to be sampled;
- Rinse bottle cap three times in the water to be sampled;
- Rinse water should be disposed of in boat.
- Cap bottle underwater with a rinsed cap.
- Collect duplicate samples as instructed by Coordinator or Trip Leader and as detailed on the field sheets.
- Log bottle numbers, sampling sites, the site name and identification, any in situ data, and the environmental conditions under which the samples were collected. In situ data should be collected in accordance with the manufacturer's instructions for the field equipment in use.

#### 4. Sample Transportation

- Samples should be delivered to the analytical facility within six hours of completing the sampling exercise.
- If analyses can be done within one hour of sample collection:
  - Place samples into a dark cooler without ice
  - Transport samples to the analytical facility
- If analyses cannot be done within one hour of sample collection:
  - Store samples in a dark cooler containing freezer packs or ice to maintain temperature of between 4 and 10 degrees Celsius
  - Ship samples and freezer packs or ice as soon as possible to the analytical facility.

#### Items Required for Sampling Exercise

1. Two or more coolers per boat depending on number of bottles.
2. Sampling Forms (see *Before the Day of the Sampling Exercise*, step 7).
3. Plastic boxes for Sampling forms.
4. Clipboards for Sampling forms and large plastic bags.
5. Pens and waterproof markers.
6. Ice
7. Towels or rags for drying hands, etc., prior to writing (if it rains or you get splashed).

#### Key Contacts

- National Environment and Planning Agency (NEPA): Mr. Dillard Knight or Mr. Dwight McKoy. 927-1552.
- Coastal Water Quality Improvement Project: Mr. Louis Daley - 754-3910-2.
- Discovery Bay Marine Laboratory – Chemical Analytical Facility: Dr. Anthony Greenaway or Ms. Debbie-Ann Ramsay - 973-2241 or 973-2947.

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