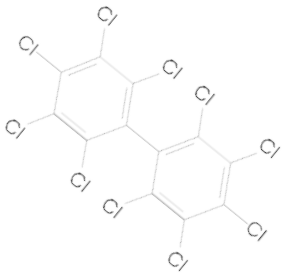
Sampling for Contaminant Analysis

Special Considerations

Module 8

What is a "contaminant?"



An impurity;
any substance, as certain chemicals or waste products, that renders the air, soil, water, or other natural resource harmful or unsuitable for a specific purpose

- **Organic (petroleum products, phamaceuticals, herbicides, etc), inorganic (some fertilizers), or metal (tertbutyl tin, copper sulfate, mercury) compound**

- **Most likely anthropogenic in origin**
- **Potential for toxic effects on coral**
- **Sampling requires specialized procedures and containers for proper analysis**

Sources of Contaminants

Module 8

- Septic systems
- Urban Runoff
- Spills
- Construction
- Agriculture
- Animal lots
- Pipelines
- Landfills

Specialized Tools and Equipment

Module 8

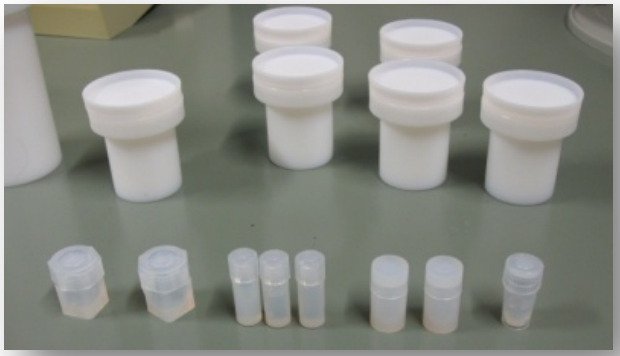
Acetone-washed leather punch and dental probe (wrapped in acetone-washed aluminum foil)

Detergent

Nitrile gloves

Specialized Tools and Equipment

Module 8

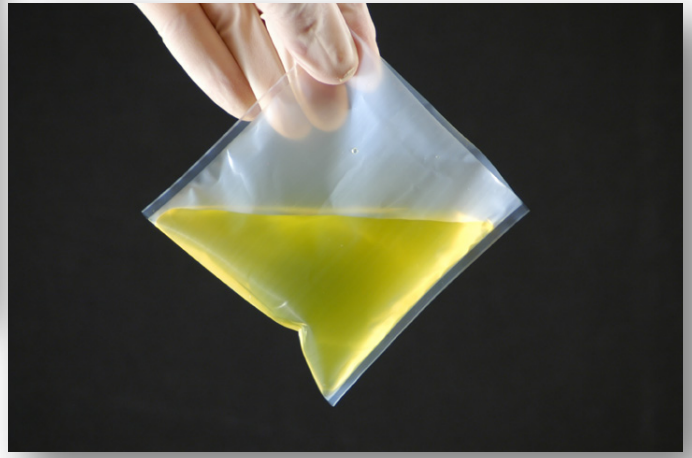


PTFE vials

Teflon® bottles

Glass syringe

Amber glass jars



PTFE bags

Preparation

1-2 days in advance:

Work Surface Preparation

1. **Don gloves, and decant acetone into a Teflon®-lined squirt bottle.**
2. **Work surface area should be covered in acetone-washed foil or teflon.**

Preparation

Module 8

1-2 days in advance:

Tool Preparation

1. Wash tools in detergent (10% Liquinox®, or similar) and rinse well with de-ionized water.
2. Collect a sample of the last rinse water for reference (amber glass jar with Teflon®-lined lid). Label and store at 4°C.
3. Rinse tools with acetone and place on acetone-rinsed aluminum foil to dry.
4. Once dry, wrap dental probe and leather punch in acetone-rinsed aluminum foil squares.

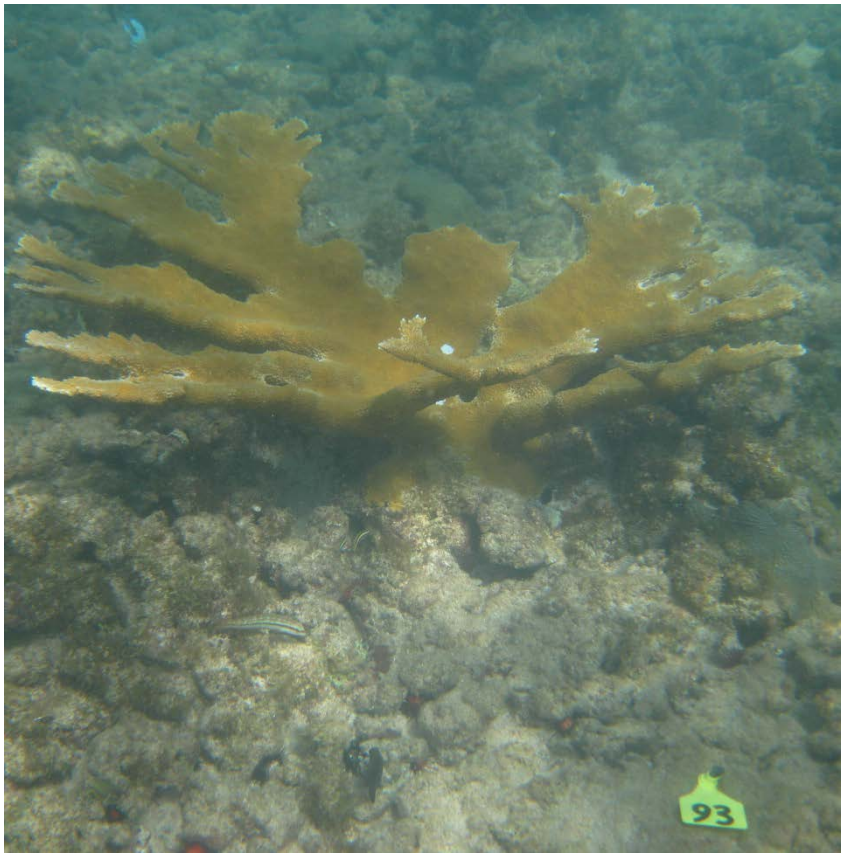
Preparation

Module 8

1-2 days in advance, or day of collection:

<u>Survey sampling site using "clean diver" protocol</u>

1. **Wash diver and dive gear with Liquinox ® (10% solution) and rinse well with water.**
2. **Determine species and number of coral colonies to be sampled.**
3. **Mark or tag colonies and record location of each (GPS).**
4. **Communicate number/designation of samples to be taken to person preparing sampling kits and sampling data sheets.**



Preparation

Module 8

1 day in advance or day of collection:

<u>Clean dive gear</u>

1. Don gloves.
2. In a large tub of water, add a small amount of Liquinox ®.
3. Clean ALL dive gear , including mesh dive bags, tanks, etc. (and swimwear, if necessary) and rinse well three times with the purest available water.

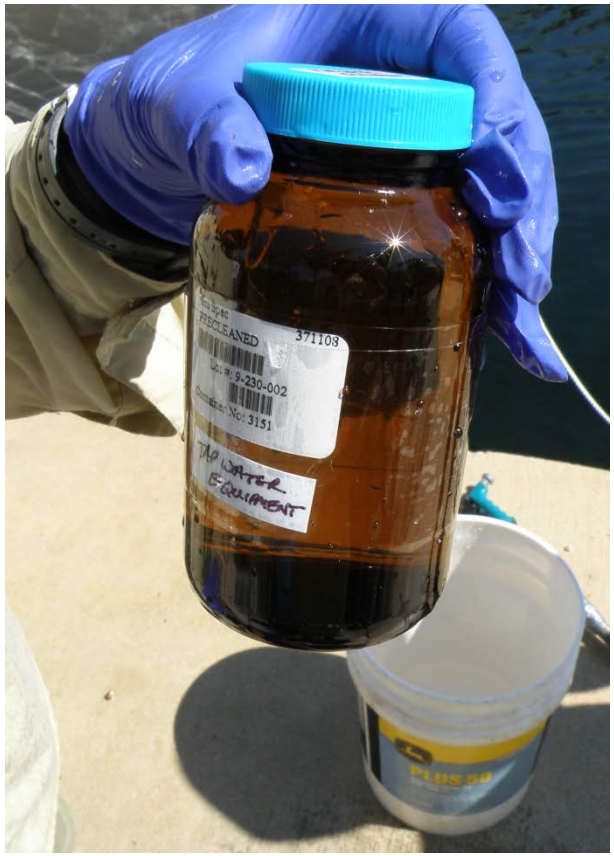
Preparation

Module 8

1 day in advance or day of collection:

Clean dive gear (continued)

4. Collect a sample of the pooled final rinse waters in an amber jar (Teflon®-lined lid) for reference. Label and store at 4°C.
5. Place equipment/swimwear on a Teflon® sheet to dry.
6. Cover with a Teflon® sheet if drying overnight.



Preparation

Module 8

At least 1 day in advance:

Prepare working surface for boat or shore

Large 24” x 24” sheets of Teflon ® or aluminum foil should be rinsed in acetone on one side then folded with clean side in. Teflon ® should be placed on boat for use by sample handler and divers.

Preparation

Module 8

At least 1 day in advance:

Prepare sediment and/or water sampling kits and data sheets

1. **Place one pair of large to extra-large gloves, 1 amber glass jar for water, and three sample vessels (amber glass jars or Teflon ® bags with clips) into a ziploc bag.**
2. **Using a cryotag, label the ziploc bag with the site and material designated to be sampled.**
3. **Compile data spreadsheet of all samples to be taken and print onto waterproof paper.**
4. **There should be a minimum of 3 sediment samples and at least 1 water sample per site.**

Sediment and Water Sampling Kit

Module 8

Preparation

Module 8

At least 1 day in advance:

Prepare coral sampling kits and data sheets

1. Don gloves.
2. Prelabel Teflon® sample vials (they may be easily etched with a number on the bottom using a dental probe).
3. Place two pairs of large to extra-large gloves, one cleaned tool kit and up to 3 prelabeled sample vials in a gallon-sized ziploc bag and seal.
4. Divers will carry a hammer and a small bag of artist's clay for backfilling coral biopsy holes.
5. Add a cryotag to the outside of the ziploc bag and label with the sample ID.

Coral Tissue Sampling Tools

Gloves and bag of artist's clay

Unwrapped tool kit and sample vials

Hammer

Preparation

At least 1 day in advance:

Prepare coral sampling kits and data sheets (continued)

6. Record sample vial number and cryotag label on spreadsheet.
7. Print data spreadsheet onto waterproof paper.
8. If the possibility exists that samples may be used in litigation, chain of custody forms and evidence bags will need to be prepared as well.

   Note: Seals on some evidence bags may open when wet. Evidence bags with sample material should be stored in a dry area, or bagged in plastic.

9. At least 8 coral colonies per species should be sampled at each site.

Example: Sample Spreadsheet

Module 8

VBPR (Vega Baja, Puerto Rico)

Sample Date	Site	Tag number	Sample/Species	Vial number	GPS	Notes
8/3/2010	4	A	Sediment	61		
8/3/2010	4	B	Sediment	62		
8/3/2010	4	C	Sediment	63		
8/3/2010	4	71	A. palmata	71		
8/3/2010	4	74	A. palmata	72		
8/3/2010	4	73	A. palmata	73		
8/3/2010	4	75	A. palmata	75		
8/3/2010	4	76	A. palmata	76		
8/3/2010	4	77	A. palmata	77		
8/3/2010	4	78	A. palmata	78		
8/3/2010	4	79	A. palmata	79		
8/3/2010	6	80	A. palmata	80		
8/3/2010	6	81	A. palmata	81		
8/3/2010	6	82	A. palmata	82		
8/3/2010	6	83	A. palmata	83		
8/3/2010	6	84	A. palmata	84		
8/3/2010	6	85	A. palmata	85		
8/3/2010	6	86	A. palmata	86		
8/3/2010	6	87	A. palmata	87		
8/3/2010	6	88	A. palmata	88		

Example: Chain of Custody Form

Module 8

CHAIN OF CUSTODY RECORD

Case Number:

DATE AND TIME OF SEIZURE:	DUTY STATION:	EVIDENCE/PROPERTY SEIZED BY:

SOURCE OF EVIDENCE/PROPERTY (person and/or location) TAKEN FROM: RECEIVED FROM: FOUND AT:	DEFENDANT/COMPANY NAME AND REMARKS:

ITEM NO:	DESCRIPTION OF EVIDENCE/PROPERTY (include Seizure Tag numbers and any serial numbers):

ITEM NO:	FROM (PRINT NAME, AGENCY)	RELEASE SIGNATURE	RELEASE DATE	DELIVERED VIA: FEDEX U.S. MAIL IN PERSON OTHER:
	TO (PRINT NAME, AGENCY)	RECEIPT SIGNATURE	RECEIPT DATE	
ITEM NO:	FROM (PRINT NAME, AGENCY)	RELEASE SIGNATURE	RELEASE DATE	DELIVERED VIA: FEDEX U.S. MAIL IN PERSON OTHER:
	TO (PRINT NAME, AGENCY)	RECEIPT SIGNATURE:	RECEIPT DATE	

Example: Evidence Bags

Module 8

Preparation

Module 8

Day of Sampling:

NOTE: NO personal care products should be worn at any time during sampling!
Persons exposed to sun should wear full-body protective clothing.

Clean Diver or Snorkeler (performed one of two ways)

A. **Wash swimwear with 10% Liquinox ® the previous day and dry on a Teflon® sheet.**

- **Shower using Liquinox ®, then don cleaned swimwear.**
- **Stand or sit on Teflon® sheets while traveling to sampling site.**

B. **Diver or snorkeler dons swimwear, then washes in Liquinox ® on the boat or dock, and rinses using purest available water.**

- **Stand or sit on Teflon® sheets on the sampling boat.**

Preparation

Module 8

Day of Sampling:

NOTE: NO personal care products should be worn at any time during sampling!
Persons exposed to sun should wear full-body protective clothing.

Clean Sample Handler

- **Prior to handling samples, wash hands in Liquinox ®, rinse in purest available water, then don gloves.**
- **Care should be taken not to touch samples to anything other than clean gloves.**
- **If gloves are accidentally dirtied or used in processing a sample, they should be immediately exchanged for a clean pair.**

Sampling Protocol

Module 8

Safety Considerations

Sample collections at a large contaminant spill may be monitored by one or more government agencies and/or the company responsible for the release of the toxicant. Additional safety trainings or modified protocols may be required prior to sampling to protect the sampling team from biological, chemical, or physical hazards. If sampling is deemed too hazardous for humans, the Incident Commander may either delay sampling until the risk is reduced, or institute the use of remote sampling devices.

Sampling Protocol

Module 8

Upon arrival at the sampling site, personnel don gloves provided in the sampling kit.

Sampling Protocol

Module 8

Water

- Water samples are collected in prelabeled, certified clean amber glass jars or in glass syringes.

- Jars may be filled with sterile water for ease of transport below the surface and will need to be emptied by filling with air from the diver's regulator.

- Once filled with sample seawater, capped jars or syringes are placed in the mesh dive bag for transport to the surface.

Sampling Protocol

Module 8

Sediment

- Sediment samples are collected in certified clean amber glass jars or in Teflon ® bags with clips.

- Sediment is scooped into the jar using the Teflon ® lid, or into the bag by using acetone-washed tools designated for this purpose.

- Filled jars or bags are sealed and placed in the mesh dive bag for transport to the surface.

Sampling Protocol

Module 8

Coral Tissue

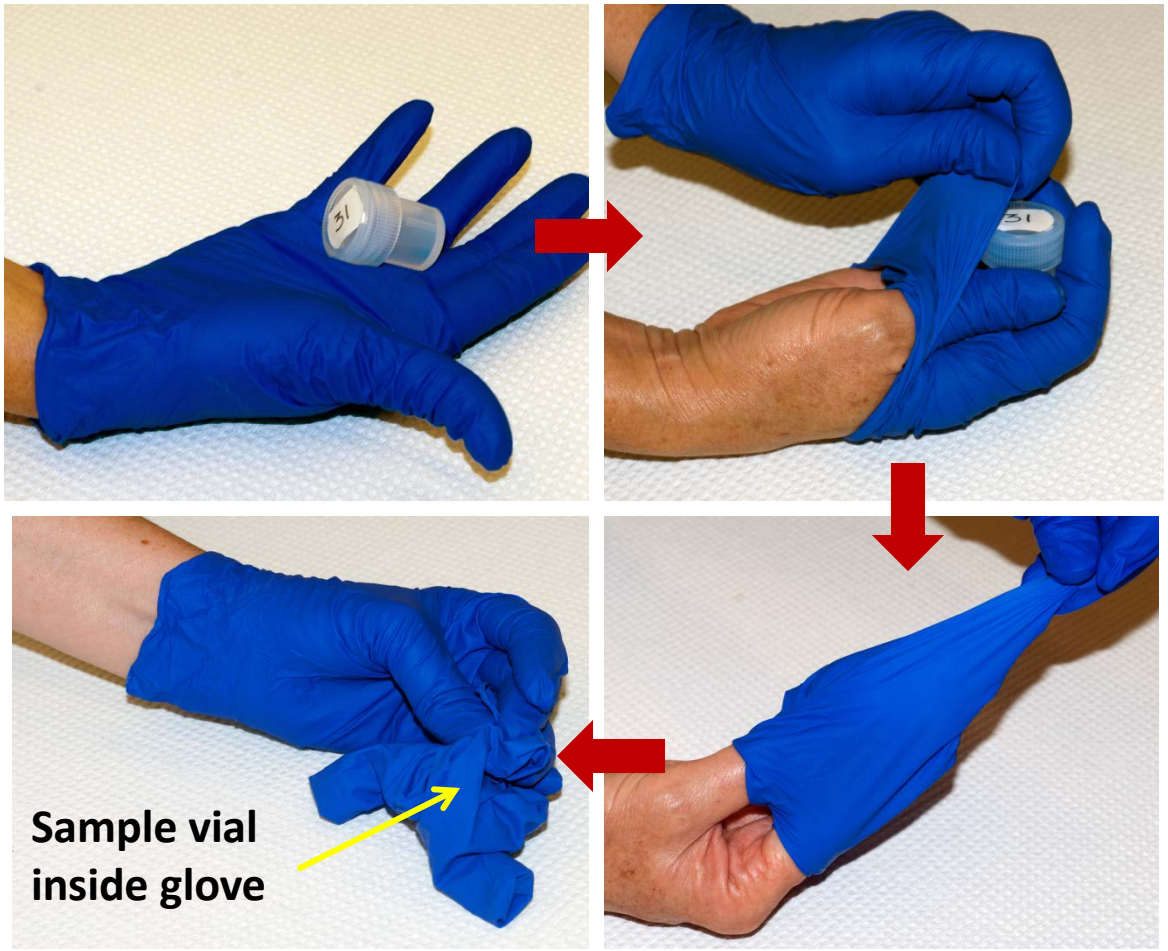
- Once sediment and water samples have been taken, the diver unwraps the pre-cleaned tools for tissue sampling.
- The dental probe should be used to push the tissue biopsy out of the punch and into the bag or vial.
- Up to three tissue samples may be taken from a single colony, and should be at least 10 cm apart.

Sampling Protocol

Module 8

- Sample biopsies are placed in small Teflon ® bags or vials and sealed.

- Sampler gloves should be removed and used to cover biopsy containers for transport to the surface, as these samples are <u>light sensitive</u>.



Sampling Protocol

Module 8

Sample Processing

Once all samples have been collected from a single colony, place them back into the labeled sampling bag. It is imperative to transport them quickly to the shore/boat for processing (via snorkeler).

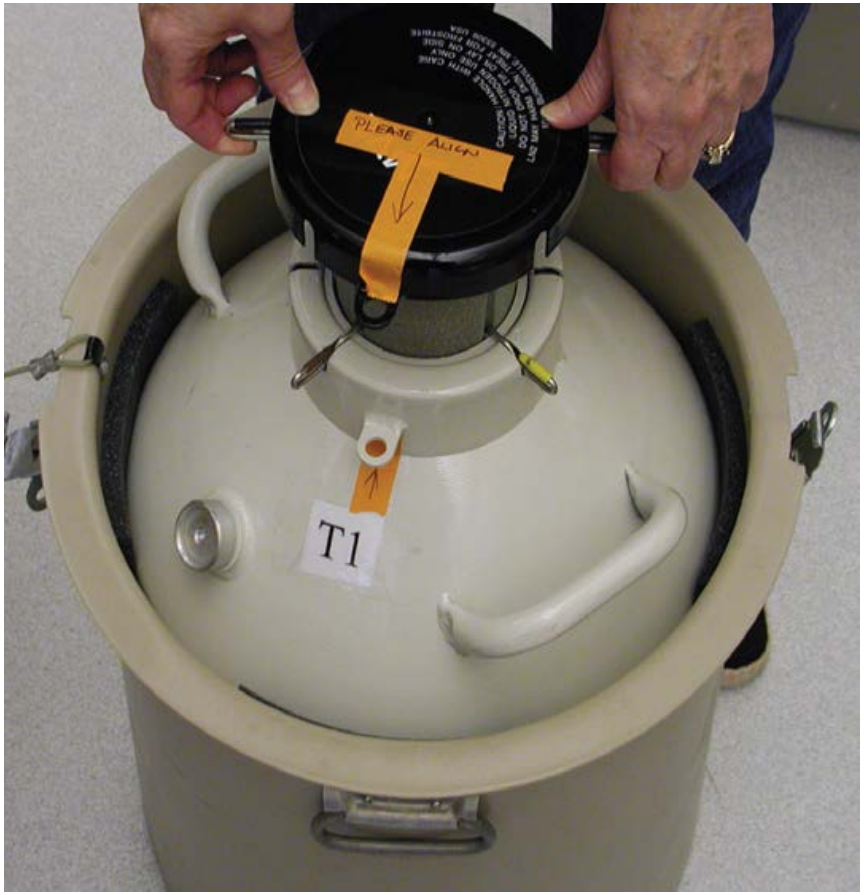
Sampling Protocol

Module 8

Sample Processing

- Water and sediment samples should be stored in a cooler on ice (4°C).

- Tissue biopsy containers are drained of seawater, then placed in a liquid nitrogen dry shipper.



Liquid N_2 Dry Shipper

Sampling Protocol

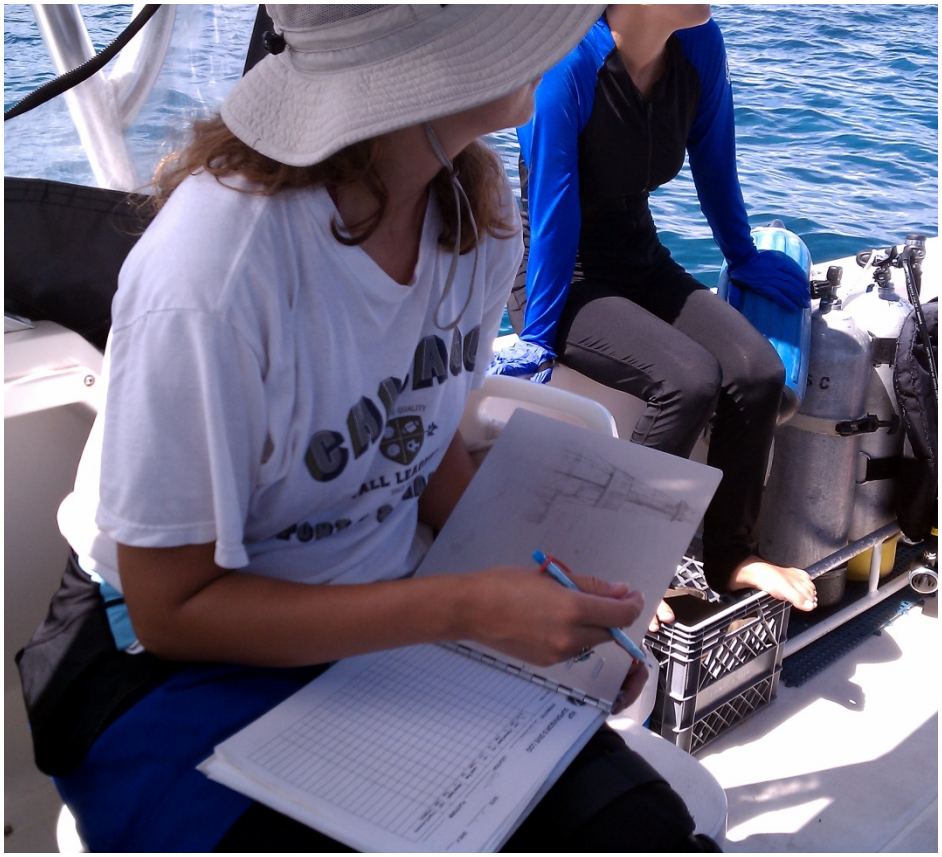
Module 8

Data Collection

- Sampling times, diver notes, photos and GPS information should be recorded for each sample.

- Strict records must be kept at all times, which should include the names of all team members.

- All samples, notebooks, documents and digital information (photos, movies, GPS, etc.) may be sequestered prior to analysis.



Sample Evaluation

Module 8