

WELCOME TO THE ENVIRONMENTAL GEOLOGY DAY PROGRAM

We are pleased that you will be joining us for the Environmental Geology Lab/Cruise program! We are proud and excited to provide your students with this exciting program series. We have developed this program to assist sixth grade teachers with meeting the California Content Standards for Science. Students come to the Ocean Institute to learn how physical processes and human actions can alter the surrounding environment. In the Lab, students learn about stream structure and dynamics, erosion processes, local geological history, and longshore transport. Aboard the *RV Sea Explorer*, they take part in data collection at three designated sample sites. The students examine nitrogen levels, plankton productivity/diversity, and the nearshore benthic habitat, as they move along the transect line from the mouth of San Juan Creek towards a local wastewater outfall. The data collected at each site is compared to current and archived information. Join us for an exploration into watershed science in our labs and out at sea!

Please take a few moments to familiarize yourself with the materials we have included, and share them with other teachers and chaperones that will be joining you. These materials contain important information to prepare you, your chaperones, and your students for your visit. You will also find important forms that must be returned to the Ocean Institute.

If you have any questions about your visit to the Ocean Institute, please do not hesitate to contact our Director of Environmental Programs, Jonathan Witt at 949-496-2274, extension 330. Again, welcome to the Environmental Geology series of programs! We're looking forward to your visit.

Sincerely,

Rick Baker
Vice President of Education



TABLE OF CONTENTS**WELCOME TO THE ENVIRONMENTAL GEOLOGY LAB/CRUISE PROGRAM**

A. ADMINISTRATIVE CHECKLIST FOR DAY PROGRAM	3
B. DESCRIPTIONS OF DAY PROGRAM	4
C. LINKS TO CALIFORNIA SCIENCE STANDARDS	5
D. ADMINISTRATIVE PREPARATION FOR DAY PROGRAM	6
Administrative Contact / Introduction	6
Teacher Information: Before the Program / Teacher Information: During the Program	6
To Start the Program / Chaperone Introduction and Information / Payment / Final Count	7
Student Aid / Transportation	7
Forms / Student Preparation / Student Behavioral Expectations / Student Safety Rules	8
Student Clothing and Supply List	8
Avoiding Seasickness / <i>Laurena G. Chambers Gallery</i> Book and Gift Store	9
Directions to the Ocean Institute	9

APPENDIX – FORMS

1. Acknowledgement of Risk and Waiver
2. *R/V Sea Explorer* Manifest
3. Pre Trip Activity Packet
4. Pre Trip Activity Packet Answer Sheet



A. ADMINISTRATIVE CHECKLIST FOR DAY PROGRAMS

This preparation package contains information for the Environmental Geology Lab/Cruise program. Please review the package carefully to ensure that you will be prepared for your program.

Immediately upon receiving this package...

- Carefully review the Teacher Preparation Package
- Arrange your transportation

Two months prior to your trip...

- Confirm student and adult numbers with the Ocean Institute
- Arrange for parent chaperones—please limit the number to two adults for every 12 students

One month prior to your trip...

- Begin student preparation
- Copy and distribute Acknowledgement of Risk and Waiver to each student

Two weeks prior to your trip...

- Mail program payment to the Ocean Institute—full payment must be received a minimum of 10 days before your program
- Collect Acknowledgement of Risk and Waiver from each student
- Contact parents to remind them to sign and return the Acknowledgement of Risk and Waiver
- Call the Ocean Institute with any changes in the number of participants. We cannot guarantee that changes in numbers of students or adults can be accommodated if requested within 2 weeks of your program date

One week prior to your trip...

- Review behavioral expectations with students
- Contact the Ocean Institute with any last minute questions or changes

24 hours to go!!!...

- If inclement weather is expected, contact the Ocean Institute for status of the program
- Prepare nametags for students and adults
- Complete ship manifest listing ALL students and adults participating in the program

When you arrive for the program...

- Unload the bus in front of the Ocean Institute
- Check in at the Student Services building with a final head count
- If necessary, students may use the restroom facilities—please limit use to 7 girls and 7 boys at a time
- Have your Manifest filled out with the full name of each passenger (including chaperones) for the ***R/V Sea Explorer*** Floating Lab Specialist who will greet you before the program
- Seasickness remedies should be taken at least 30 minutes before departure



B. DESCRIPTION OF LAB/CRUISE PROGRAM

Environmental Geology Laboratory

Geological History of Dana Point

Students are introduced to plate tectonics, weathering, and erosion as they learn the geologic history of Dana Point. They will discuss current processes of weathering and erosion at work in the area, how people impact and/or affect those processes, and what they think we should be responsible for in terms of contributing to, or managing these processes. They identify the physical characteristics of two rock samples from formations that comprise the headlands and surrounding cliffs.

Performance Objectives:

- Students will be able to describe the basic theory of plate tectonics.
- Students will understand how the cliffs of Dana Point were formed by plate movement (particularly subduction), weathering, and erosion.
- Students examine the physical attributes of two rock samples from the Dana Point Headlands and surrounding cliffs.
- Students will identify examples of weathering and erosion on the cliffs and speculate on the contributing factors.

River Systems

Students observe a river system in action with a stream table. They note specific features and functions of the river system. Then they have the opportunity to alter the system and watch the consequences of that alteration.

Performance Objectives:

- Students will be able to name and identify the following river features: headwaters, mouth, channel, floodplain, meander, and alluvium.
- Students will explain how a river acts as an agent of erosion.
- Students will describe how humans alter river systems to obtain specific goals and how those alterations have an impact on the entire system.

Longshore Transport

Students explore the origin of sand and wave action using the sand table to understand topics such as longshore transport and sand starvation.

Performance Objectives:

- Students will be able to recognize sand characteristics as clues to sand origin.
- Students will understand that waves transport energy, water, sediment, nutrients, and pollutants.
- Students will understand the process of longshore transport or drift.

Environmental Geology Cruise

Marine Nitrogen Cycle

Students from the Nitrogen research team will retrieve a sample of water with a Niskin Bottle. The team will be comparing 3 samples of water, each collected at a different sample site. Students will record the level of ammonia, nitrates, and nitrites, in each sample collected. They will explain the role of nutrients in within the marine ecosystem and analyze what factors might lead to changes in the levels.

Performance Objectives:

- Students will be able to identify the possible origins of excess nutrients.
- Students will conduct the experiments and record their results.
- Students will explain the role of nutrients within the marine ecosystem.

Plankton Productivity

A vertical plankton tow will be taken at sites 1, 2, and 3. Students will deploy the plankton net off the starboard bow of the R/V Sea Explorer. Once all three samples are on board, they will test for the presence

of chlorophyll in each sample to determine the level of phytoplankton productivity. In addition, students will identify species of phytoplankton and zooplankton. Students will be able to confirm the presence or absence of chlorophyll in a collected sample.

Performance Objectives:

- ❑ Students will be able to differentiate between zoo and phytoplankton, as well as identify specific species of phytoplankton.
- ❑ Students will be able to explain the role of plankton as a producer in the marine food web and the effects of phytoplankton productivity within the marine environment.
- ❑ Students will conduct the experiments and record the results.

Benthic Habitat

Students in the Sediment research team will sit on the stern deck as the Benthic Sampler is deployed and the sample retrieved. After we have collected all three samples, students will examine the composition of each sample. They will calculate biomass, identify benthic organisms and biological indicators, and examine grain size and mixture. Student will identify the biological indicator each sample and explain its function.

Performance Objectives:

- ❑ Students will identify common benthic organisms and indicator species in the sample.
- ❑ Students will determine the approximate percentage of the sediment sample trapped in each of the three sieves.

C. Links to California Content Standards

Grade Six

Plate Tectonics and Earth's Structure

- 1a. Students know evidence of plate tectonics is derived from the fit of continents; the location of earthquakes, volcanoes, and midocean ridges; and the distribution of fossils, rock types, and ancient climatic zones.
- 1d. Students know that earthquakes are sudden motions along breaks in the crust called faults and that volcanoes and fissures are locations where magma reaches the surface.
- 1e. Students know major geologic events, such as earthquakes, volcanic eruptions, and mountain building result from plate motion.
- 1f. Students know how to explain major features of California geology (including mountains, faults, volcanoes) in terms of plate tectonics.

Shaping Earth's Surface

- 2a. Students know that water running downhill is the dominant process in the shaping of the landscape, including California's landscape.
- 2b. Students know rivers and streams are dynamic systems that erode, transport sediment, change course and flood their banks in natural and recurring patterns.
- 2c. Students know beaches are dynamic systems in which the sand is supplied by rivers and moved along the coast by the action of waves.

Heat (Thermal Energy) (Physical Sciences)

- 3a. Students know energy can be carried from one place to another by heat flow or by waves, including water, light and sound waves, or by moving objects.

Ecology (Life Sciences)

- 5a. Students know energy entering ecosystems as sunlight is transferred by producers into chemical energy through photosynthesis, and then from organism to organism through food webs.
- 5b. Students know matter is transferred over time from one organism to the others in the food web and between organisms and the physical environment.
- 5c. Students know populations of organisms can be categorized by the functions they serve in an ecosystem.

- 5e. Students know the number and types of organisms an ecosystem can support depends on the resources available and on abiotic factors, such as quantities of light and water, a range of temperatures and soil composition.

Investigation & Experimentation

- 7.b. Select and use appropriate tools and technology (including calculators, computers, balances, spring scales, microscopes, and binoculars) to perform tests, collect data, and display data.
- 7d. Communicate the steps and results from an investigation in written reports and oral presentations.
- 7e. Recognize whether evidence is consistent with a proposed explanation.
- 7g. Interpret events by sequence and time from natural phenomena (e.g., the relative ages of rocks and intrusions).
- 7h. Identify changes in natural phenomena over time without manipulating the phenomena (e.g., a tree limb, a grove of trees, a stream, a hill slope).

D. ADMINISTRATIVE PREPARATION FOR DAY PROGRAMS

ADMINISTRATIVE CONTACT

For scheduling information, please contact:

Alexis Honens, Reservation Coordinator
Telephone Number: (949) 496-2274, extension 610
E-mail: ahonens@ocean-institute.org

For program information, please contact:

Jonathan, Director of Environmental Programs
Telephone Number: (949) 496-2274, extension 330
E-mail: jwitt@ocean-institute.org

INTRODUCTION

Thank you for choosing the Ocean Institute as your field trip destination. We appreciate the time and effort it takes to prepare your students for their program, and we will do everything we can to make their experience as rewarding as possible.

Please make sure that all of the participating teachers have a copy of these teacher materials. The information contained here can help you find answers to your questions, develop your preparation timeline, and prepare both your students and chaperones. This packet also contains directions to the Ocean Institute as well as contact telephone numbers—please call us at any time with any questions you may have about your field trip.

TEACHER INFORMATION: BEFORE YOUR PROGRAM

You can do several things before you arrive to help make your program run as smoothly as possible:

- Review the program goals, station activities, and expected student behaviors with the students before you arrive. Complete the pre-trip activity with your students, and make sure they have a clear understanding of the educational concepts they will explore during the program.
- Spend some time choosing and preparing your parent chaperones. Review the program goals, station activities, and expected student behaviors with them before you arrive. Make sure that they have a clear understanding of their role as a chaperone.
- Have a signed Acknowledgement of Risk and Waiver for each student and chaperone before boarding the bus.

- Have a completed Manifest for the *R/V Sea Explorer*.
- Notify the Ocean Institute staff of students with any special health or behavioral considerations.
- Send program payment to the Ocean Institute at least 10 days before the scheduled date of your field trip.

TEACHER INFORMATION: DURING YOUR PROGRAM

Ocean Institute instructors are all well trained to instruct students of different ages and abilities. You and the chaperones can help the instructors monitor student behavior and safety. There are several things you can do to facilitate the smooth running of your educational program:

- Work cooperatively with Ocean Institute instructors and parent chaperones to manage students during the program.
- Work cooperatively with Ocean Institute instructors and parent chaperones to solve student and chaperone management problems.
- Report any problems to the Ocean Institute staff as soon as possible.

TO START THE PROGRAM

Ocean Institute instructors will greet your students and lead them to the appropriate starting point for your program. They will receive an introduction and then be divided into groups for the duration of the program.

CHAPERONE INTRODUCTION AND INFORMATION

Adult chaperones play a significant role in safety and the educational quality of the program. We request that you bring no more than two adults per 12 students. We ask your chaperones to help us in the following ways:

- Work cooperatively with Ocean Institute instructors and classroom teacher to enforce all safety rules
- Work cooperatively with Ocean Institute instructors and classroom teacher to keep students on task at the stations
- Guide students to different stations throughout the program
- Act as a positive role-model for the students by exhibiting enthusiasm for learning without answering questions directed at students

PAYMENT

Payment must be received 10 days before your program date. Please mail a **single check** for the total amount of the program minus the deposit you have already paid. Please make the check payable to **Ocean Institute**.

FINAL COUNT

Call the Ocean Institute two days before your program if the number of students or adults changes. When you arrive at the Ocean Institute for your program, you must have an accurate count of total students and adults participating in the program. If the number of participants listed on your Program Agreement is not accurate, call the Ocean Institute immediately. **We cannot guarantee that changes in numbers of students or adults can be accommodated if requested within 2 weeks of your program date.**

STUDENT AID

The Ocean Institute maintains a student aid fund for students who are unable to obtain sufficient funding to attend the program. Please call (949) 496-2274, extension 0 for more information and to receive the necessary forms for student aid.

TRANSPORTATION

Student transportation should be arranged well in advance. It is important that you arrive on time. Please schedule yourself to arrive at least 15 minutes before your scheduled program start time. If you arrive late, your program time will be shortened.

Buses can unload in front of the Student Services building. After the students have unloaded, the drivers will be notified of where to park the buses.

FORMS

The following forms can be found in the Appendix. Please make sure to have all the completed forms with you upon arrival for your program.

Acknowledgement of Risk and Waiver

Each student must have this form signed by a parent or guardian to participate in the Environmental Geology Lab/Cruise program. Please make sure that you have one signed form for each student and adult chaperone when you check in with the Ocean Institute staff.

Manifest for the *R/V Sea Explorer*

A Manifest for the *R/V Sea Explorer* must be completed before you arrive for the program. The Coast Guard requires us to have a completed Manifest in order to account for all passengers before we leave the dock. Please have it completed before you arrive at the Ocean Institute—we will lose valuable instructional time if the Manifest must be completed when you arrive. It is important that the Manifest is accurate and includes the first and last names of ALL students, teachers, and chaperones. Your Ocean Institute Floating Laboratory Specialist will take a head count before boarding the vessel and the number of this count must match the number on the Manifest.

STUDENT PREPARATION

We have found that the more familiar the students are with program concepts and content before they arrive, the more they will benefit from and enjoy their experience. We have included a pre program activity packet and answer sheet to introduce important concepts to your students before they arrive for their program.

STUDENT BEHAVIORAL EXPECTATIONS

Please take time to discuss the academic nature of their field experience with your students before arriving at the Ocean Institute. When at the Ocean Institute, we expect that your students will follow the same behavioral rules you have in your classroom.

STUDENT SAFETY RULES FOR THE *R/V SEA EXPLORER*

The Watershed Science Cruise program takes place on the *R/V Sea Explorer*. When you arrive at the Ocean Institute, you will be met by an Ocean Institute Floating Laboratory Specialist who will review the following safety rules with you and your students.

- Walk at all times while onboard the *R/V Sea Explorer*—running and horseplay are not permitted.
- Keep both feet on the deck at all times, and remember to stay off the rails.
- Keep off the upper deck and access ladder unless permitted by Ocean Institute instructors.
- Keep hands off the equipment until instructed to do otherwise.

STUDENT CLOTHING AND SUPPLY LIST FOR THE *R/V SEA EXPLORER*

For safety reasons, students participating in the program need to have and/or wear the following clothing.

- Jacket
- Rubber-soled, closed-toe shoes
- Hat
- Sunscreen

Optional Items:

- Camera with film
- Money for the gift and book store
- Seasickness medication

AVOIDING SEASICKNESS ON THE R/V SEA EXPLORER

There are several things that you and your students can do to avoid seasickness:

- Eat a good breakfast or lunch before the cruise—make sure that you avoid sweets and greasy foods!
- Take anti-motion medication at least 30 minutes before boarding the vessel

LAURENA G. CHAMBERS GALLERY BOOK AND GIFT STORE

Chambers Gallery Book and Gift Store is a fun and unique non-profit museum store open daily from 9:00 AM to 5:00 PM and definitely worth the visit. The revenue is directed toward lowering tuition for schools that participate in Ocean Institute programs.

To help accommodate all of the schools that would like to shop each day, please have one teacher from your school check-in with a store staff member before your students begin shopping.

There will be a limit on the number of students allowed to shop at one time and we encourage you to organize them so that they all have time to enjoy the shop. Please have one or two adults in the store to help supervise your students. We ask that all food, drink, and backpacks be left outside while they are shopping. Teachers receive a 15% discount in the shop if members of the Teachers Club and 10% normally.

Please remind your students that sales tax will be added to their items.

In order to ensure a positive experience, we recommend the following:

1. Plan sufficient time before or after your program to shop.
2. All purchases should be stowed safely away and out of sight for the program.
3. Please allow only 10-12 students in *Chambers Gallery* Book and Gift Store at a time. Remaining students should remain outside in a manner that does not interfere with traffic in and out of the building.

DIRECTIONS TO THE OCEAN INSTITUTE

The address of Ocean Institute:
24200 Dana Point Harbor Drive
Dana Point, CA 92629
(949) 496-2274

Directions from Los Angeles:

- Travel south on Interstate 5
- Exit on the Pacific Coast Highway Exit
- Stay in the right lane of the exit ramp and go north on P.C.H.
- Turn left onto Dana Point Harbor Drive
- The road ends in the Ocean Institute parking lot

Directions from San Diego:

- Travel north on Interstate 5
- Exit on the Beach Cities Exit
- Stay in the left lane of the ramp and go north on P.C.H.
- Turn left onto Dana Point Harbor Drive
- The road ends in the Ocean Institute parking lot

