Bay Area Scientists in Schools Presentation Plan

Lesson name: Oil Spills
Presenters: Adrien Burch, Candice Cherk, Juliana Cho, Erin Nuccio and Emily Whiston
Grade Level: 3
Standards Connections:
Investigation/experimentation – predict outcome + compare results
Content – relates to interactions of living things with their environments

Abstract: Who has heard about the recent oil spill in San Francisco bay? What are scientists doing to clean up the bay in the short and long term? Students will keep a scientific journal as they learn about: (i) how oil spills are contained and cleaned on open water, (ii) how wildlife is rehabilitated, and (iii) the chemical structure of oil and how it's degraded in an ecosystem.

Vocabulary:
Petroleum – Oil from the ground that we use for gas/energy and don't eat
Containment – keep something all in one place, prevent spreading
Rehabilitation – help something that's damaged return to its normal state
Biodegradation – biological breakdown of an object into smaller pieces

Materials:
What we'll bring –
Intro/conclusion: pictures, posters, overheads, handouts
station 1: vegetable oil, glass bowls, plastic cups, cotton balls, saran wrap, plastic spoons; eye droppers;
station 2: feathers, fur, pipe cleaners, veg. oil, poster;
station 3: small marshmallows, toothpicks, poster
What they'll need – 1 piece of blank paper, pencils

Classroom set-up: overhead projector, water, space to set up 3 stations

Classroom Visit

1. **Introduction**
   a. Personal intro: 7 min – names + interests. Berkeley: explain grad school. What is a scientist? Create lab notebooks. (fold a paper twice and title it)
   b. Topic intro: 8 min – What is oil, where does it come from? Introduce the idea of petroleum, not cooking oil. What happens during an oil spill? Recent oil spill, previous big oil spills. Prepare kids for stations: write the big words on each page. (containment, rehabilitation, biodegradation)
2. **Learning Experiences** (students will rotate in groups through 3 stations)
   8 minutes each, 2 minutes moving time

a. Spill containment/immediate clean-up: 8 min – pictures of spill containment; quick demonstration of boom containment in a bowl of water. Students will predict what materials (spoons, saran wrap, cotton balls, bulb droppers) will clean up the most oil while leaving the most water, then have four volunteers test the four materials for a two-minute exercise: water with veg. oil on top in clear plastic cups.
b. Wildlife rehabilitation: 8 min – pictures of birds, fish, sea mammals covered in oil and post-cleaning; why is oil bad for animals (buoyancy, toxicity, heat retention), demonstrate difference between dry+oil feathers+fur; how scientists/vets clean wildlife. Dunking pom poms and feathers in water and oil.
c. Biodegradation: 8 min – explanation of petroleum again, and how humans can't eat it. If we were really tiny, oil would look different: Pictures of the various chemical structures of oil, construct oil molecules from marshmallows+toothpicks and draw them in your notebook; brief discussion of what are microbes. Eat the marshmallows, where did the carbon structures go? Bacteria can break down petroleum.

3. Wrap-up discussion

10min (or less depending on time crunches) – Repeating questions: what is petroleum? Why are oil spills bad? What do you do if oil is spilled in the open ocean? What tools did students find most helpful in cleaning up the oil? What happens to animals that are affected by oil? How do we clean them? How is oil removed from an environment in the long-term? Why can bacteria eat petroleum and we can't?

4. Closing

5 min – How can oil spills be prevented?
Handout. Follow-up websites to look at, preparing a display for the halls to tell the rest of the school about oil spills,
Any further questions? good-bye + clean-up

Follow-up Activities

Suggest students write a letter explaining "How we learned about oil spills...."

Oil Oil Everywhere from *NCTM Illuminations* – This math meets ecology lesson provides hands-on experiences with mixing oil and water, provides surface area information about the 2010 oil spill in the Gulf of Mexico, and gives learners opportunities to estimate small oil spills of their own making. This lesson guide includes questions for learners, assessment options, extensions, and reflection questions. http://illuminations.nctm.org/LessonDetail.aspx?id=L862

Oil Spill Absorbing Polymer Kit (Steve Spangler Science) - Add a small amount of beautiful red oil to a jar of water and figure out a way to remove the layer of oil, now floating on the surface. This amazing science kit includes a patented oil polymer and enough Marvel Mystery Oil (similar in chemical composition to crude oil) to repeat the science demonstration a dozen times. Also included is a science activity guide with information on oil polymer chemistry, lots of ideas for demonstrations and a follow-up inquiry-based science activities. Great for science fair experiments! Recommended for children ages 8 and up. http://www.stevespanglerscience.com/product/1265