Vital Ice Class Discussion Questions

Note: The questions provided below are guide questions that students can discuss as a class in order to determine what they learned/took away from the kit.

Part 1: The Protracted Winter
1. What do you think the story represents?
   The story shows what the Tlingit people think about the environment. The Tlingit people gather observations and experiences that helped shape their beliefs and perception of the environment. They think that even the slightest action on their part had a big influence on the environment.

2. How do you think this relates to this kit and how we view the world today?
   The accumulation of observations and experiences helps generate hypothesis, questions, and sometimes answers. Due to the Tlingit people living in an extreme environment, this brings to light the idea of small actions presenting big consequences, which is what this kit focuses on.

3. Name some examples of small things that you do every day that may cause bigger problems later on.
   Littering, driving car, leaving lights on, using plastic, etc.

Part 2: Permafrost
1. In what way does the polymer ice behave like real ice?
   The polymer ice expands when it gets wet and shrinks when it dries out on the hot plate. Real water expands when it freezes and shrinks when it melts.

2. What was observed when adding water to the polymer ice?
   The polymer ice absorbed the water and grew in size.

3. Compare the permafrost side of the tin to the soil side of the tin as time goes on. What differences were observed? Any similarities?
   Answers will vary according to actual observations.

Part 3: Glacial Ice
1. How many years of ice were represented in your ice core? Why did some only have a few years and others had many years?
   The weight of the ice compresses the years towards the bottom of the core.

2. How can glaciers and ice cores be used to tack past climatic events?
   Ice cores are used to reconstruct temperature, atmospheric circulation strength, precipitation, ocean volume, atmospheric dust, volcanic eruptions, solar variability, marine biological productivity, sea ice and desert extent, and forest fires.

Part 4: Melt Layers
1. How many melt events were there between 1880 and 1950? How many between 1950 and 2012? What does it mean if there is a significant number of melt events on the ice core?
   ~23 and ~125; Melt layers are related to summer atmospheric temperatures. If the surface of the ice warms enough at 13,000 feet to melt a small layer of the snow, when the temps drop again, the water refreezes, creating thin layers of ice within the annual layer of snow (different crystal structures).

Part 5: Chemical Record
1. What is the point of a spectrometer?
   A spectrometer is used to analyze ice cores.

2. What does the concentration of sulfate in glaciers signify?
   The concentration of sulfate is a major component of volcanic eruptions.

3. How did the volcanic sulfate get into the middle of the ice core?
   It fell from the ash cloud in the sky onto the surface of the ice in the year of the eruption. Subsequent years of snow covered the ash and buried it over time.

4. Why do ice scientists record sulfate concentration?
   Scientists use known volcanic eruptions and their sulfate peaks to help confirm they counted the annual ice layers accurately.

Part 6: Piecing it Together
1. When comparing your results to the graph, what similarities and differences were observed? What does this mean?
   Answers will vary according to actual observations.

Part 7: Thawing Effects
1. What did you observe happened to your permafrost model over time as it heated up?
   The side containing the permafrost heated up and 'melted' the ice. This caused the road and building to sink.

2. What happened as you added water to the edge of the black road on the permafrost side? Why did this happen?
   The addition of water to the permafrost side caused the ice to increase in size and therefore expand the road

Teacher Feedback Survey:
http://dat.cns-eoc.colostate.edu/STEMkits/stem_kit_survey.php
Thank You!