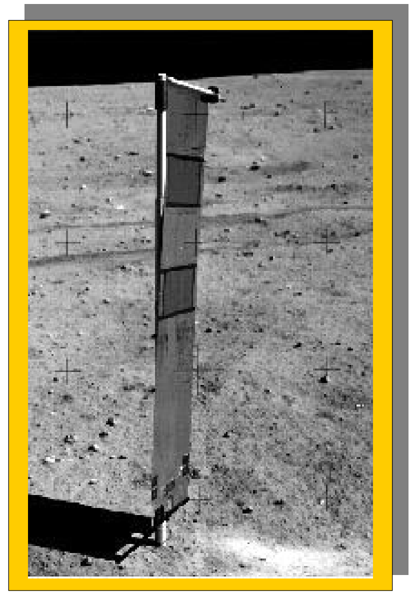
Dynamic Design:
A Collection Process

It Began with Apollo
A Brief History of Solar Wind Sample Return

TEACHER NOTES: POWERPOINT PRESENTATION

BACKGROUND INFORMATION


NASA

The PowerPoint presentations, provided as a supplement to the student texts from which they were derived, are always offered in a pdf format for those teachers who do not have the Microsoft® PowerPoint application.

Because teacher use of the presentation slide notes as talking points is vital for complete understanding of the concepts, the slide notes from the PowerPoint are provided here for those teachers using the pdf presentation. Therefore it is important to read and print out these talking points before presenting the material to your students. You may wish to use the teacher guide that accompanies this presentation for additional tips, delivery strategies, and correlation to the national standards.

SLIDE NOTES/TALKING POINTS

Slide 1: This PowerPoint presentation can be used in conjunction with the “It Began with Apollo” student text in *Dynamic Design: A Collection Process.*

The information used to make this PowerPoint was taken from Journal Entries of all Apollo missions located at http://www.hq.nasa.gov/office/pao/History/alsj/a11/a11.step.html#1100253.

This presentation was put together to allow a class to read dramatically.

Slide 2: Narrator: This story is about the difficulties that astronauts experienced in using the solar wind collection device on the moon in the early 1970s. The first Apollo mission in which solar wind particles were collected was Apollo 11, the first mission in which humans landed on the moon.

Slide 3: Narrator: The following is the conversation that occurred during the Apollo 11 deployment of the solar wind collector. The speakers are astronaut Buzz Aldrin, Mission Control Capsule Communicator Bruce McCandless, and astronaut Neil Armstrong.

Slide 4: In every Apollo mission, the solar wind experiment was intentionally conducted in a consistent fashion. The telescopic pole was extended and the five sections locked automatically. The reel was then pulled out, and the foil was unrolled and fastened to a hook near the lower end of the pole. The pole was planted upright into the ground, but it did not necessarily have to be at a perfect angle with the moon’s surface.

It was important that the correct side of the foil was facing the sun. One side of the foil, marked with the word “SUN,” was pointed at the sun.

Buzz Aldrin deployed the solar wind experiment on July 21, 1969 UT.

Slide 5: Capsule Communications (CAP COM) is the one station at mission control that communicates information from mission control to the spacecraft. The CAP COM officer is usually an astronaut.

Why do you think NASA wants an astronaut at this station?

Slide 6: This is a photo that Neil Armstrong took of Buzz Aldrin with the solar wind experiment.

Where is the sun's light coming from in this picture? How were you able to determine this? The solar wind experiment is located to the right of astronaut Buzz Aldrin. From this picture, describe the size of the solar wind collector foil.

Slide 7: Teachers Note: During the time that this is read, you may have the person reading Aldrin's part use a broom stick to model this. Use a lamp with about a 60 watt bulb, darken the room and have the person playing Aldrin's part use the shadow to make a 90 degree angle.

Slide 8: As the experiment was being deployed, what do you think Bruce McCandless did? Do you think he had a checklist or was writing down what happened?

Slide 9: This is the first time this experiment was ever conducted on the moon. So the scientists that planned this did not know how hard the surface of the moon was.

What do you think would have happened if Aldrin could not have put the pole into the surface?

Knowing about the conditions of the moon, why was it not a problem for the pole to be stable in the ground?

Slide 10: The Apollo 11 solar wind collection (SWC) was developed for 18 hours and 42 minutes. Each subsequent Apollo mission, except 13 and 17, had increasingly longer exposure times.

Slide 11: Relate an analogy to students of a retractable window shade or overhead projector screen. Ask students if they have ever had trouble operating something like this. Another analogy is how difficult it is sometimes to roll up plastic kitchen wrap after it has been used.

Slide 12: The difficulty in rolling up the foil after collection varied from one mission to another. Apollo 12 astronaut Alan Bean had a tougher time rolling up the foil from that mission's SWC than Buzz Aldrin did in Apollo 11. Astronauts Alan Bean and Pete Conrad are speaking with mission control's Ed Gibson.

Slide 13-Slide 23: None

Slide 24: This is probably where Al is compressing the roll with his hands to get it tight enough to fit into the bag.

Slide 25: None

Slide 26: The experimenters are looking for relative abundances of isotopes of helium, argon, and neon, the chemically inert noble gases in the solar wind.

What do all inert or noble gases have in common?

Slide 27-Slide 29: None

Slide 30: Bean and Conrad could not get the foil to roll up automatically. They finally used their hands to roll it, and as a result the foil was soiled by the dirt adhering to the astronaut's gloves. After it was rolled, they discovered that it was too big to fit into the container that was used to return it, and had to crush it with their hands.

Slide 31: On subsequent Apollo missions the retrieval of the SWC had varying degrees of success.

Although there were no design changes for the retrieval of the experiment, the Apollo 16 foil was made of platinum and aluminum so that it could be cleaned with hydrofluoric acid to remove dust.

Suppose you were an engineer and heard Alan Bean's recommendation during his technical debrief. Describe the steps you would take to help remedy the problem of retrieving the SWC.

Slide 32: Observe the Apollo collector at left and the Genesis collector at right. Compare and contrast these two systems.

Apollo	**Genesis**
- Deployed by humans.	- Deployed by machine.
- Collected only noble gasses.	- Collects elemental isotopes, atomic number 3-93.
- Simple design.	- More complex assembly.