EXPLORING METEORITE MYSTERIES: A TEACHERS' GUIDE WITH ACTIVITIES .

M. Lindstrom (SN2/NASA JSC, Houston TX 77058), J. Allen (DUAL), A. Treiman (Lockheed), J. Burch (Pearland ISD), K. Crowell, K. Stocco, B. Swaby (Pasadena ISD), R. Luksch, K.Tobola (Alvin ISD).

In 1991 two boys in Noblesville, Indiana watched a rock fall out of the sky. Their curiosity led them to ask questions about what it was and what it meant. They learned that it was a meteorite. Scientists told them that meteorites reveal clues to many of the mysteries of the solar system, such as: how the solar system formed; what the asteroids, Moon and Mars are like; how life began; or how the dinosaurs died. EXPLORING METEORITE MYSTERIES is a teachers' guide with activities that allows other students to share the boys' experience and to investigate many of the mysteries of the solar system.

EXPLORING METEORITE MYSTERIES was developed at JSC by a team of planetary scientists and teachers from grades 4-12 with funding and guidance from the NASA Office of Education. It is currently being tested and evaluated in classrooms in Houston for revision and publication in 1994. It will be available through education offices at all NASA centers or through the JSC Office of the Curator. The teachers' guide will be available separately, with audio-visual materials (currently a slide set; a video or CD are planned), or packaged with a lucite disk containing chips of six different types of meteorites. EXPLORING METEORITE MYSTERIES teaches basic science concepts and techniques together with math, reading, writing and social implications. It is consistent with national goals for the reform of science education. The lessons include a variety of different teaching styles that are either hands-on or heads-on and emphasize observation, experimentation and critical thinking. The activities are designed for upper elementary through high school; most of the lessons can be easily modified for different grade levels. The interdisciplinary approach is ideal for the Middle School team format. Meteorites are a natural subject for interdisciplinary teaching because their study involves all fields of science (math, physics, chemistry, earth science, astronomy, biology) and offers fascinating historical accounts and possibilities for creative expression.

The EXPLORING METEORITE MYSTERIES teachers' guide contains three main parts: 1) Background information for the teacher or advanced student; 2) Classroom activities and 3) Narrative for the accompanying slides. The outline for the lessons is given below. The lessons begin with the story of the two boys witnessing the Noblesville fall. Students are asked to put themselves in the boys' place and brainstorm on how the boys felt, what they did, and what they wanted to know. This student involvement sets the stage for the following lessons that attempt to answer the questions: Where did they come from? What are they? How did they form? How do they affect people? and How can I use them? The concluding lessons are an activity on careers and teamwork and a meteoroid tabloid.

EXPLORING METEORITE MYSTERIES provides teachers with information, activities and visual aids to use meteorites to teach the interdisciplinary science of the solar system. It also provides planetary scientists with activities to take to local schools and ideas for sharing their knowledge with their communities.

EXPLORING METEORITE MYSTERIES Outline: Lindstrom M. et al.

PART 1 BACKGROUND INFORMATION

PART 2 CLASSROOM ACTIVITIES

Lesson #	Topic	Activity type/Objective	Subject
1	Noblesville Fall	brainstorm	English
2	Follow the falling meteorite	triangulate, plot data	math
3	Searching for meteorites	experiment, control variables	earth science
4	Orbits in the solar system	plot trajectories, predict	math, physics
5	Looking at asteroids	observe, experiment	astronomy, physics
6	Making impact craters	experiment, observe, predict	earth, physics
7	Crater hunters	map, observe, predict	earth science
8	Edible rocks	observe, describe, teamwork	science, English
9	Classifying meteorites	observe, compare	chemistry
10	Building blocks of planets	demonstrate, experiment	astronomy, chem
11	Changes inside planets	demonstrate, experiment	earth, chemistry
12	Building blocks of life	critical thinking, experiment	biology, chemistry
13	Noblesville meteorite	observe, describe, classify	chemistry, earth
14	Meteorite explorers' game	critical thinking	astronomy, earth
15	Historical meteorite falls	read, critical thinking	English, history
16	Near miss - impacts	role play, plan	social studies
17	Direct hit - K/T crater	analyze, experiment, write	bio, chem, Eng.
18	Asteroid resources	simulate, experiment, plan	astronomy, social
19	Antarctic meteorite teams	teamwork, explore careers	science, social
20	Meteoroid tabloid, epilogue	evaluate, write creatively	English, science

PART 3 NARRATIVE FOR SLIDE SET