Subject: Science Grade: Eleventh - Earth Science

Standard: #2 The Nature of Science and Technology

Key Concept: Scientists can bring information, insights, and analytical skills to bear on matters of public concern.

Generalization: Orbital debris is a concern of both the space environment and our own environment.

Background:

Students are completing a study of the solar system, including space exploration. Along with the topics of asteroids and meteoroids, the teacher has introduced the concept of other orbital debris, such as paint chips from space shuttles and old inoperable satellites. She has found a wonderful set of lesson plans on the topic, Meteoroids and Orbital Debris Lesson Plans, developed as part of NASA's Space Environments and Effects (SEE) Program. These are downloadable from the website http://see.msfc.nasa.gov. Each session includes a materials list, background information, and complete instructions. In addition, articles on orbital debris can also be downloaded.

This lesson is tiered in ***process*** according to ***learning style***.

Tier I: ***Types of Impact Sites - Kinesthetic***

These students will simulate meteorite impacts on various types of terrain and observe the effects. This is Activity Two of Session One of the NASA material.

Tier II: ***Simulated Hypervelocity Impacts - Logical/Mathematical***

These students will evaluate the differences in impact sites caused by each type of projectile. This is Activity Three of Session Two of the NASA material.

Tier III: ***Space Debris Collection Agency - Verbal/Linguistic***

These students will propose a method and design a prototype for the reduction of space debris. This is Activity One of Session Four of the NASA material.

Assessment:

Teacher observation and student interviews during the investigation will serve as formative assessments. Each lesson has a set of questions that can be used to evaluate student understanding. Groups should share their results with other groups at the same tier. In addition, each tier should pool their data/results and prepare a presentation for the entire class. A rubric should be used to evaluate the presentations. Discussions of the investigations should be the culminating activity.