A MULTIPLE NEAR-EARTH ASTEROID SAMPLE RETURN MISSION CALLED HERA. D. W. G. Sears[1], D. D. Brownlee[2], C. Pieters[3], M. Lindstrom[4], D. Britt[5], B. C. Clark[6], L. Gefert[7], S. Gorevan[8], and J. C. Preble[9], [1]AR-OK Center for Space and Planetary Science, University of Arkansas, Fayetteville AR 72701, USA, [2]University of Washington, Seattle WA 98195, USA, [3]Brown University, Providence, RI 02912, USA, [5]University of Tennessee, Knoxville TN 37996, USA, [4]NASA Johnson Space Center, Houston TX 77058, USA, [6]NASA Glenn Research Center, Cleveland OH 44135, USA, [6]Lockheed Martin Astronautics, Denver CO 80202, USA, [8]Honeybee Robotics, Inc., New York NY 10012, USA, [9]SpaceWorks, Inc., Carefree AZ 85377, USA.

Introduction: The scientific case for multiple sample return from Near-Earth asteroids has been made in several recent conference abstracts and in many prominent advisory committee reports and it features large in the NASA's Space Science Strategic Plan and Roadmap. With the discovery of large numbers of Near-Earth Asteroids in recent months, the successful mission of Deep Space 1 and its validation of solar electric propulsion and automatic navigation, and the successful mission of Shoemaker NEAR which involved complex maneuvering close to an asteroid, a mission to take multiple samples from three NEA and return them to Earth is not only scientifically essential, but it is technically feasible. We have designed a mission to take three samples from three NEA and return them to Earth. The mission is named Hera, after the mother of the three Graces.

The Mission. The target asteroids for Hera will be chosen on the basis of spectral classification. The sampling sites will be chosen on the basis of spectra and imagery taken from orbit. Sufficient sample quantities will be returned so that all qualified investigators can obtain samples.

The Trajectory. Hera would be launched on 15 Jan 2006 by a Boeing Delta 7925-10 and would reach asteroid AO10 on 3 Aug 2006. After a 99 day stay, it would fire its hydrazine thrusters and take a transfer orbit to asteroid 2000 AG6 where it would arrive on 10 Nov 2006 and stay for 98 days. It would then move on to asteroid 1989 UQ which it would reach on 7 Mar 2009 for a stay of 205 days. It would reach Earth on 13 Nov 2010 and land and be recovered using Stardust technology and procedures. While this trajectory represents our baseline mission, Hera is capable of conducting similar missions to other asteroid trios.

The Spacecraft. Hera is equipped with gallium arsenide solar panels capable of producing 6 kWe, and three ion thrusters similar to those on Deep Space 1 (NSTAR), although only two are used at any one time. Hydrazine thrusters are available for operations in the vicinity of the asteroids. Hera's dryweight is 650 kg, and the fuel weight is 350 kg Xe and 60 kg hydrazine. The sampling device is an auger bit on a universal coupling housed inside a conical collector and is described by Gorevan *et al.* at this meeting. Independent compartments house the samples for return. The device is deployed without landing the spacecraft.

The Science Driving Hera. The amount and quality of science data produced by Hera will be higher than any mission since Apollo. The depth and breath of analysis on Earth far exceeds that possible by *in situ* methods and samples can be archived for future research.

The seven of the eleven goals in the NASA Strategic Plan can be uniquely addressed by Hera and the samples it returns. They are (i) look evidence of processes occurring during planet formation, (ii) investigate the relationship between stars and planet formation, (iii) study organic compounds that could shed light on the origin of molecules necessary for life on Earth, (iv) look for chemical processes that preceded life on Earth so as to better understand possibilities of life on other planets (v) look for solar wind and solar energetic particles on asteroids of known orbit, (vi) help design methods to deflect potentially hazardous objects and predict the effects should they reach Earth's atmosphere, (vii) be a Pathfinder for human missions to NEA for exploration, colonization or development of their natural resources.

Engineering and management aspects of the Hera mission will be addressed over the next few years. At this point we invite input from the scientific community on the design of the mission so as to ensure maximum scientific return.