THE HERA NEAR-EARTH ASTEROID SAMPLE RETURN MISSION: SCIENCE REQUIREMENTS OF THE SAMPLE COLLECTOR. D. W. G. Sears[1], C. C. Allen[2], D. Britt[3], D. E. Brownlee[4], C. M. Pieters[5], D. Scheeres[6], E. R. D. Scott[7]. [1]Arkansas-Oklahoma Center for Space and Planetary Sciences, Univ. Arkansas, [2]Johnson Space Center, Houston, [3]Geological Sciences, Univ. Tennessee, [4]Astronomy, Univ. Washington, [5]Geological Sciences, Brown Univ., [6]Aerospace Engineering, Univ. Michigan, [7]Hawaii Institute of Geophysics and Planetology, Univ. Hawaii.

Introduction: Hera is a proposed mission to collect and return three samples from each of three asteroids using a NEAR-like spacecraft with solar electric propulsion. The mission [1] and several aspects of the mission, such as target asteroids [2], sampling locations [3], and tests of a collector designed by Honeybee Robotics [4], have been the subject of earlier conference presentations. The science case for sample return from primitive bodies was recently made by one of the community panels of the 2003-2013 NRC Decadal Study [5]. The Hera science team is now seeking input from the science community into the scientific requirements for the samples. Here we present some of our own views in the hope that they will stimulate discussion.

Requirements of the Collector: The collector must (1) obtain samples that address the scientific objectives for the mission, (2) satisfy the engineering constraints of reliability and cost.

Thoughts to Date: The science drivers for the mission, as described in ref [5], are to obtain samples of primitive material incapable of surviving passage through the Earth's atmosphere and obtain samples from know geological context. The former objective means that the samples returned must be representative samples and large enough for (1) the full range of required studies, and (2) the study of macroscopic properties like bulk composition, including measurements of metal-silicate ratio and chondrule and metal size distributions. *In situ* interior samples require drill coring, which is notoriously difficult, but interior samples might be present on the surface as clasts of impact ejecta. On the other hand, studies of solar wind and radiation environment require samples from the very surface or a few centimeters below the surface. Primitive material is virtually always volatile-rich, so regolith samples should be collected in a manner that does not heat them and should store them in a manner that preserves the volatiles. We are currently planning for minimum sample sizes of 300 g, clods or clasts of at least 3 cm, and no alteration of these properties during the collection and storage procedures. Asteroids of multiple spectroscopic classes, including one class that is believed to be related to a well-know meteorite class and one that is believed to represent material unknown on Earth, should be sampled. This objective requires visual and spectroscopic observation of the surface prior to selection of the sampling site. Our study of Eros indicates that collection from at least three sites will be required [3].

References: [1] Sears D.W.G. and 6 others (2001) *AGU Meeting, San Francisco*. [2] Sears D.W.G., Gefert L. and Scheeres G. (2001) *Meteor. Planet. Sci. suppl. 36*, A186–A187. [3] Britt D.T., Sears D.W.G. and A.F.Cheng (2001) *Meteorit. Planet. Sci. suppl., 36*, A30-A31. [4] Sears D.W.G. and 7 others (2002) *LPS XXXI*, CD-ROM #1583. [5] Sears D.W.G. and 19 others (2002). *Planetary Decadal Study Community White Paper, Solar System Exploration Survey, 2003-2013.* Sykes M.V. ed. (in press).