LOW-ENERGY INTERCEPT ORBITS TO NEO 2004 GU9 OFFER A COMPELLING OPPORTUNITY FOR LONG-DURATION MANNED AND SAMPLE-RETURN MISSIONS. Justin G. Rodriguez, Gary J. Rodriguez, *sys*RAND Corporation, 17011 Lincoln Avenue Unit 130 Parker CO 80134, j.rodriguez@sysrand.net, g.rodriguez@sysrand.net.

Recent interest in Near-Earth Objects (NEOs) covers a spectrum from fascination with space probes impacting asteroids to morbid worries about extinction-level events (ELEs) caused by asteroids impacting the Earth. The In-Situ Resource Utilization (ISRU) community would do well to exploit this interest by developing a series of joint NASA and commercial missions to a NEO that is relatively easy to access, provides continuous line-of-sight communications, and whose position is easily predictable.

An excellent candidate for early NEO visitation is 2004GU9, an asteroid in an orbit with a semi-major axis similar to that of Earth, serving as a target that meets the needs of the ISRU community. Its orbit is well understood and its regular close passes to Earth provide the NEO community with several opportunities to improve upon their knowledge of the asteroid. Due to its relatively high inclination orbit and earth-like range from the sun, 2004 GU9 appears to spiral (orbit) once around the Earth per year, crossing Earth's orbit twice as it travels from above our orbit to below and then back out again.

The author has developed the orbital mechanics models necessary to identify highly efficient intercepts that take advantage of Earth's proximity to 2004 GU9 and its short-term relative periodicity. The two methods of intercept detailed include a traditional Hohmann transfer orbit and a unique direct flight.

Intercepting this object with unmanned probes, sample-return, and, finally, manned missions would be an exciting enterprise with worldwide appeal. The technologies and methods employed in such missions are precursors to long-duration missions to Mars and would provide the opportunity to "shakedown" systems and operations.

Such missions would also give the ISRU community another planetary context in addition to the Moon and Mars for development of operations and methods. ISRU digestion of NEO threats may also prove to be a more practical option when compared to other impact mitigations in that the threat could be entirely eliminated by conversion into resource feedstocks.