Lockheed Martin Team Receives $6 Million Design Study Contract For NASA's Jupiter Icy Moons Orbiter Program

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NASA's Jet Propulsion Laboratory has awarded a Lockheed Martinteam one of three $6 million concept design study contracts for the Jupiter Icy Moons Orbiter (JIMO). JIMO would be the first outer planets mission to fly under NASA's Project Prometheus Program.

Project Prometheus was established in 2003 as part of NASA's Nuclear Systems Initiative to develop technology and conduct advanced studies for space nuclear power and electric propulsion, for the peaceful exploration of the solar system. NASA's Office of Space Science's Nuclear Systems Initiative is planning to develop radioisotope space electric power sources for use where solar energy is too weak, as well as the new fission reactor power sources for much higher power requirements. Project Prometheus would demonstrate that a reactor could be operated safely and reliably in space for use by propulsion and other spacecraft systems to explore the solar system and return science that is otherwise unachievable.

"We're extremely pleased to be participating in the JIMO program," said Jim Crocker, Lockheed Martin Space Systems vice president of civil space. "We believe that our long heritage implementing NASA deep space missions, and our leadership in the technologies that make them possible, will serve us well in moving this very exciting mission from the drawing board into space."

The Lockheed Martin team brings decades of experience from across the country to the JIMO program, including its leading role in NASA's deep space science missions, leading the SP-100 space reactor development program, and being the only supplier of space radioisotope power conversion systems to NASA for more than 25 years.

The design studies will evaluate many different technologies for the reactor, power conversion, electric propulsion, and other aspects of the JIMO spacecraft and follow-on missions. Once the technologies are selected, the studies will prepare conceptual design and development planning for the JIMO mission. NASA is planning to select an industry prime contractor in the August 2004 timeframe to develop, launch and operate the spacecraft.

The abundant power available from the reactor would drive an electric propulsion system on JIMO, which is required to achieve the mission science objectives of orbiting the three icy moons of Jupiter -- Callisto, Ganymede, and Europa. NASA's previous mission designs to Jupiter's moons required gravity assists from planets, severe constraints of spacecraft and instrument power, and limited exploration of the moons during flybys. JIMO would maintain maximum flexibility in its launch opportunities, would observe each of the moons for long periods then move to the next, and would make unprecedented electrical power available to its instrument suite.

To explore the universe and search for life is central to the mission of NASA. Jupiter's large icy moons appear to have three ingredients considered essential for life: water, energy, and the necessary chemical elements. As such, the JIMO mission has three top-level science goals:

1. Evaluate the potential for sustaining life on these moons. This would include determining whether the moons do indeed have subsurface oceans; mapping where organic compounds and other chemicals of biological interest lie on the surface; and determining the thicknesses of ice layers, with emphasis on locating potential future landing sites.

2. Investigate the origin and evolution of these moons. This would include determining their interior structures, surface features and surface compositions in order to interpret their evolutionary histories (geology, geochemistry, geophysics) and how this illuminates the understanding of the origin and evolution of the Earth.

3. Determine the radiation environments around these moons and the rates at which the moons are weathered by material hitting their surfaces. Callisto, Ganymede and Europa all orbit within the powerful magnetic environment that surrounds Jupiter. They display varying effects from the natural radiation, charged particles and dust within this environment. Understanding this environment has implications for understanding whether

life could have arisen on these distant moons.

NASA will choose the final suite of scientific instruments that would carry out the JIMO mission objectives through a competitive process open to proposals from scientists worldwide. Two highly probable ones are a radar instrument for mapping the thickness of surface ice and a laser instrument for mapping surface elevations. Others would likely include a camera, an infrared imager, a magnetometer, and instruments to study charged particles, atoms and dust that the spacecraft encounters near each moon. A generous electrical power supply available from the onboard nuclear system could run higher- powered instruments than have flown on other spacecraft and would boost the data-transmission rate back to Earth.

To allow sufficient development and ground-testing time, the JIMO mission is not proposed for launch before the year 2011. A heavy lift expendable launch vehicle would lift the spacecraft into high Earth orbit. The ion- propulsion thrusters would spiral the spacecraft away from Earth and then on its trip to Jupiter. After entering orbit around Jupiter, the spacecraft would then orbit Callisto, then Ganymede, and finally Europa. The intensity of the radiation belts at Europa limits how long a spacecraft's electronics are able to operate in orbit around Europa, even with advances in radiation-resistant electronics that would be used on this mission. The instruments onboard the spacecraft would take uniform measurements, using the same complement of instruments, of all three moons. Special attention would be paid to identifying high-potential future landing sites.

Lockheed Martin Space Systems Company is one of the major operating units of Lockheed Martin Corporation. Space Systems designs, develops, tests, manufactures, and operates a variety of advanced technology systems for military, civil and commercial customers. Chief products include a full-range of space launch systems, including heavy-lift capability, ground systems, remote sensing and communications satellites for commercial and government customers, advanced space observatories and interplanetary spacecraft, fleet ballistic missiles and missile defense systems.

Headquartered in Bethesda, Md., Lockheed Martin is a global enterprise principally engaged in the research, design, development, manufacture, and integration of advanced-technology systems, products, and services. The Corporation's core businesses are systems integration, space, aeronautics, and technology services. Employing about 125,000 people worldwide, Lockheed Martin had 2002 sales surpassing $26.6 billion.

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