

NASA's New Horizons mission also a new horizon for INL

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The New Horizons mission lifts off from NASA's Cape Canaveral facility Thursday, Jan. 19. (NASA photo)

The successful launch of NASA's New Horizons mission to Pluto also represents a new horizon for Idaho National Laboratory.

Mankind's first scientific space mission focused on Pluto will use instruments powered by the first plutonium space battery built at INL's new Space and Security Power Systems Facility.

"We congratulate NASA on its successful New Horizons launch," said Laboratory Director John Grossenbacher. "We are especially proud that the space battery for the New Horizons mission was manufactured at our new Space and Security Power Systems Facility."

It was the first such radioisotope thermoelectric generator, or RTG, built at the new facility. And it is going to travel a long, long way. Pluto, ninth planet from the sun in our solar system, orbits at a mean distance of 2.9 billion miles from the sun - about 40 times the distance at which Earth orbits the sun.

But that's just part of the story. To meet NASA's critical launch window requirements, INL - the nation's leading nuclear energy laboratory and home to the new [Center for Space Nuclear Research](#) - had to perform its own stunning feat.

INL installed 28 tractor-trailer loads of manufacturing equipment at its new Space and Security Power Systems Facility - then built and tested the plutonium-powered RTG in just nine months.

"This launch is a huge accomplishment for the Department of Energy, state of Idaho and our INL family," said Stephen Johnson, manager of the RTG program. "Workers will be able to look back 10 years from now when images are being received from the first mission to the last planet and say to their grandchildren, 'I built that right here in Idaho.'"

Almost 80 employees worked on the space battery project over the past two years. The technicians, engineers, quality assurance and health physics professionals, technical writers, trainers, mechanics, electricians, facility and project managers all helped INL complete the project by the October deadline required by NASA.

Just what did they build?

The RTG is a unique power production device that uses a nonweapons grade of plutonium to generate heat. The heat then generates electricity through solid-state thermocouples. The electricity powers the seven on-board scientific instrument systems that will enable New Horizons to beam exciting new information on Pluto and moon, Charon, back to Earth.



NASA workers apply the mission decal to the New Horizons space vehicle. (NASA photo)

The battery's heat comes from 8 kilograms (about 17 pounds) of plutonium-238 (a material unsuited for nuclear weapons). "By the time it gets to Pluto, it is going to produce about 200 watts of power at a potential of 30 volts," said Johnson.

"That may not seem like a lot of power - it's equivalent to a couple of light bulbs," Johnson said. "But INL's radioisotope thermoelectric generator actually powers seven different experiments." NASA hopes New Horizons' instruments will yield important new scientific data about Pluto. That's likely to happen because Pluto has never been the object of a space mission before.

The RTG technology showcases the power of collaboration among DOE national laboratories. Oak Ridge National Laboratory developed and fabricated the material used to encapsulate the plutonium; Los Alamos National Laboratory purified the plutonium, palletized it into a ceramic form and encapsulated it; and INL assembled and tested the RTG and safely delivered the flight-ready RTG to the Kennedy Space Center.

New Horizons will cross the entire span of the solar system - in record time - and conduct flyby studies of Pluto and its moon in 2015. Because of a unique alignment of planets in the solar system, the New Horizons mission will use Jupiter's gravity to slingshot the spacecraft toward Pluto, saving some five years in the process.

Pluto is so far from the Sun (about 2.8 billion miles) that the solar power used by many space missions won't work for this one - the sunlight in deep space is too weak for the use of solar panels to generate electricity for the mission.

NASA scientists hope to learn a lot about this mysterious, distant relative of Earth. Among the things we don't yet know is how many moons the planet has.

The discovery of Charon, the only confirmed moon of Pluto, was announced by the U.S. Naval Observatory in 1978. But in November 2005, NASA scientists announced the discovery of two more potential moons of Pluto, based on observations made with the Hubble Space Telescope. NASA will try to confirm the existence of those moons in February.

The little that is known about Pluto suggests a forbidding place - gravity on Pluto is only six hundredths that of Earth; the surface temperature is minus 220 degrees Celsius.

Pluto is one-fifth the diameter of Earth, but only 40 percent as dense as Earth. It has an ammonia atmosphere. Unlike some planets, Pluto does not have rings. And it orbits the sun once in 248 years.

The new 10,000-square-foot Space and Security Power Systems Facility was started and completed in 2004 to house the INL work. The building is located at INL's Materials and Fuels Complex. INL workers started training on the project in October 2004, with the actual battery assembly work taking place from April to October 2005.

After the terrorist attacks of 9/11, the U.S. Department of Energy acted to site its space battery production work at a place with a highly technical work force and strict security safeguards already in place. INL fit the bill.

Additional Information

- [Center for Space Nuclear Research](#)

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This coin commemorates NASA's and INL's roles in the New Horizons mission to Pluto.