LANL power source off to Pluto

Success … these batteries keep on going and going … for centuries.

Monitor
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NASA's New Horizon spacecraft blasted off for Pluto Thursday, beginning a nine-year voyage to the edge of the solar system and beyond.

On board the sleek Atlas V rocket, a box-shaped capsule with an antenna on top carried a suite of scientific instruments powered by 24 pounds of plutonium heat sources fabricated at Los Alamos National Laboratory.

"We're the back engine room, the behind-the-scenes people," said Marty Bowidowicz, the group leader on behalf of the lab's plutonium-38 science and engineering group, who make the heat sources known as "fueled-clads."

The 72 people in the group were part of an assembly line that involved three national laboratories, working for the Department of Energy on behalf of the space agency.

The LANL group purified a powdered form of plutonium-38 oxide, removing small impurities through various chemical processes, Bowidowicz said.

Five teams performed the fabrication, following the purification by grinding, firing and pressing the plutonium granules into ceramic pellets.

In order to bring the pellets out of the glove box where the work is performed, they were next welded into iridium capsules, or clads, made at Oak Ridge National Laboratory in Tennessee.

The iridium alloy characteristically offers protection against high heat and impacts.

When the fueled-clads were decontaminated, they could be handled outside the glove box, where exhaustive tests were conducted for quality assurance to meet strict flight grade standards - a very long term, very reliable flow of heat.

Finally, Idaho National Laboratory assembled the radioisotope thermoelectric generators. RTGs are space batteries that convert the heat from the naturally decaying plutonium sources into electricity to power the sensors and space systems on board the craft.

NASA said about 240 watts of power are available early in the flight. By the time the mission reaches Pluto, the output drops a bit to about 200 watts.

Until the launch, NASA did not know whether the flight would take nine-and-a half years to reach the vicinity of Pluto -0 with a gravitational boost from Jupiter - or 13-15 years on an unaided direct course to the icy planet. The launch had to occur before Feb. 3, in order to get a helpful sling from Jupiter and cut the time by as much as a third.

LANL's fueled-clad fabrication team is accustomed to long waits to see their work pay off.

In 1994-97, Bowidowicz said, they worked on the Cassini spacecraft that began sending spectacular images from Saturn in 2004. Cassini sported a heavier payload, and required three RTGs.

"Now, when we see those pictures coming back, we can feel proud that our group actually made those fueled-clads," Bowidowicz said.

Some opposition persists about the dangers of using the non-weapons grade plutonium.

Twenty-four missions over the last 40 years have launched safely carrying RTGs that have never malfunctioned. NASA calculated the odds at 350-to-1 against an accident occurring in the launch area.

The agency added 16 mobile field teams for radiation sampling, along with a host of air samplers and monitors for the New Horizons liftoff.

The voyage to Pluto and its large moon Charon - and two smaller moons that were just found last year - will extend more than four billion miles. After that encounter, and an intense period of geological mapping, New Horizons may continue for another five to seven years, exploring other objects in Pluto's neighborhood, known as the Kuiper Belt.

The Kuiper Belt, a vast ring around the sun that may contain more than 10,000 icy rocks larger than 60 miles across, is thought to represent enough matter to have made another planet the size of Uranus or Neptune.

"There aren't many alternatives to RTGs," for going that far away over such a long period of time, Bowidowicz said. "Once you go beyond the orbit of mars, it's difficult to get enough power by solar - especially to Pluto."