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## NASA Plans Permanent Moon Base

By [WARREN E. LEARY](#)

WASHINGTON, Dec. 4 — [NASA](#) announced plans on Monday for a permanent base on the Moon, to be started soon after astronauts return there around 2020.

The agency's deputy administrator, Shana Dale, said the United States would develop rockets and spacecraft to get people to the Moon and establish a rudimentary base. There, other countries and commercial enterprises could expand the outpost to develop scientific and other interests, Ms. Dale said.

Ms. Dale and other officials of the National Aeronautics and Space Administration said the agency envisioned a base at one of the lunar poles, to take advantage of the near-constant sunlight for solar power generation. It would have an "open architecture" design to which others could add the capabilities they want.

Scott Horowitz, NASA's associate administrator for exploration, said crews of four astronauts would make weeklong missions to the Moon starting around 2020.

As more equipment was set up, human stays would eventually grow to 180 days, and become permanent by 2024. By 2027, officials said, a pressurized roving vehicle on the surface would take people on expeditions far from the base.

NASA gave no cost estimate for the program and no design details for the base. Ms. Dale said all plans assumed that the agency would continue operating from a fixed budget of about \$17 billion a year.

The space shuttle fleet is to be retired by 2010, and the United States plans to scale back its involvement in the International Space Station. The station is still under construction, with a mission by the shuttle Discovery to lift off on Thursday. Ms. Dale said money would be shifted to the lunar exploration program from the shuttle and the station.

While the Bush administration and NASA have spoken in general terms about plans for a return to the Moon, followed by human spaceflight to Mars, the lunar outpost plan is the first time officials have proposed a permanent presence.

"We're going for a base on the Moon," Mr. Horowitz said. "It's a very, very big decision."

Many gaps in the plan remain to be filled in. NASA called Monday's announcement a baseline concept.

In a televised news conference from the Johnson Space Center in Houston on the eve of an international conference there on space exploration, Ms. Dale said the plan was developed after consultation with space agencies representing 14 countries and more than 1,000 experts in space science and commerce.

“The door is open for international and commercial interests,” she said.

The lunar base plan is part of a larger effort to develop an international exploration strategy, one that explains why and how humans are returning to the Moon and what they plan to do when they get there, NASA officials said.

The planning includes an international conference early next year on setting scientific goals for returning to the Moon, including those that private interests might want to pursue.

Doug Cooke, the agency official who led the lunar study group, said the plan called for putting a lander craft down near a polar crater and later adding solar-power generating units and living quarters to establish a base.

A site near the lunar South Pole, like the Shackleton Crater, would provide enough sunlight for power generation. It is also near possible deposits of valuable minerals.

From this site, Mr. Cooke said, other nations could add scientific laboratories or observatories, and commercial concerns might want to process rocket fuel and other products from water and other materials that might be found in the ground nearby.

Mr. Horowitz said having a base did not mean that humans would go there after every lunar landing. The option remains open for some missions to go to equatorial regions, as the Apollo project landers did in the 1970s, or even to the other side of the Moon.

Getting to the Moon and establishing a base will require a versatile, general-purpose lander that could land anywhere and be the core of an outpost, he said.

“The nickname I use for the lander is, it’s a pickup truck,” Mr. Horowitz said. “You can put whatever you want in the back. You can take it to wherever you want. So you can deliver cargo, crew, do it robotically, do it with humans on board. These are the types of things we’re looking for in this system.”

Ms. Dale said she and other NASA officials would spend part of next year visiting potential partners in the lunar project, like the space agencies of Europe, Russia and Japan, to see what they might want to contribute. Different aspects of a lunar base might come from many agreements between the United States and other nations, she said, rather than following the model of the space station of having many partners signing one agreement.

While there have been preliminary talks about cooperation in space with China, a growing space power which along with the United States and Russia has the ability to launch humans, it is too early to tell whether the two nations will agree to work together on human space flight projects such as the lunar base, she said.

Howard McCurdy, a NASA expert who is a professor at the school of public affairs at American University in Washington, expressed some skepticism about whether the space agency could make the ambitious plan fit in its budget, even with the winding down of the shuttle program and “throwing the keys to the International Space Station” to the other nations that helped to build it.

By relying on some of the ideas and technologies developed during the Apollo program and beyond, Mr. McCurdy said, NASA planners expect to be able to get back to the Moon for 40 percent to 60 percent of the original cost. There would be savings, too, in not having to reinvent technologies for protecting spacecraft from the heat of re-entry into the atmosphere, and not having to develop new launching facilities from scratch.

But he said he was concerned that the technology for lunar exploration “won’t get us beyond the Moon” and on to Mars.

“The fear is that the Moon, which is now viewed as a means to get beyond the Moon, will become its own destination, for hundreds of years,” he said. “The easy way to go to the Moon is the hard way to go to Mars.”

While NASA has yet to design the permanent camp, last July officials at the Johnson Space Center took reporters on a tour of possible lunar habitats to come.

The mock-ups were built of plywood and plastic, and had the crowded feel of a [FEMA](#) trailer. They addressed problems that NASA engineers expected astronauts living on the Moon to encounter.

Dust, for example, is not just untidy. On the Moon, the particles tend to be jagged and sticky, and so the engineers have designed an airlock to allow dust removal after any trip outside.

*John Schwartz contributed reporting from New York.*

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