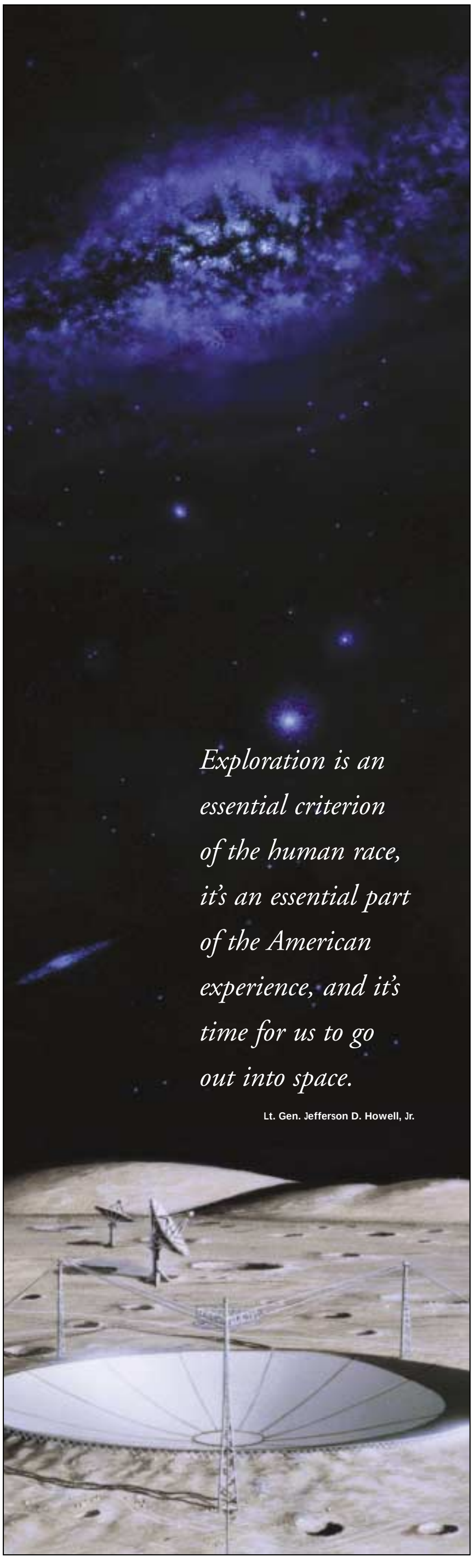

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New Space Exploration Vision

On Jan. 14, the President announced a new vision for NASA

- Implement a sustained and affordable human and robotic program to explore the solar system and beyond
- Extend human presence across the solar system, starting with a human return to the Moon by the year 2020, in preparation for human exploration of Mars and other destinations
- Develop the innovative technologies, knowledge and infrastructures both to explore and to support decisions about the destinations for human exploration
- Promote international and commercial participation in exploration to further U.S. scientific, security and economic interests.

The vision affirms the nation's commitment to space exploration and provides a clear direction for the civil space program

- Vision responds to concerns expressed by the CAIB, Congress and elsewhere on the need for a long-term vision for human space exploration
- Vision broader than some reports that it is about returning humans to Moon; indeed, robotic activities and exploration of other destinations are critical elements
- Activities will be paced by experience, technology readiness and affordability
- Implementation begins now with key missions that are already in progress such as Mars exploration, visits to other solar system targets and Origins activities

Guiding Principles for Exploration

Pursue Compelling Questions

- Exploration of the solar system will be guided by compelling questions of scientific and societal importance
- Consistent with the NASA Vision and Mission, NASA exploration programs will seek profound answers to questions of our origins, whether life exists beyond Earth and how we could live on other worlds

Across Multiple Worlds

- NASA will make progress across a broad front of destinations
- Consistent with recent discoveries, NASA will focus on likely habitable environments at the planet Mars, at the moons of Jupiter and in other solar systems
- Where advantageous, NASA will also make use of destinations like the Moon and near-Earth asteroids to test and demonstrate new exploration capabilities

Employ Human and Robotic Capabilities

- NASA will send human and robotic explorers as partners, leveraging the capabilities of each where most useful
- Robotic explorers will visit new worlds first to obtain scientific data, demonstrate breakthrough technologies, identify space resources and send tantalizing imagery back to Earth
- Human explorers will follow to conduct in-depth research, direct and upgrade advanced robotic explorers, prepare space resources and demonstrate new exploration capabilities

For Sustainable Exploration

- NASA will pursue breakthrough technologies, investigate planetary resources and align ongoing programs to develop sustainable, affordable and flexible solar system exploration strategies
- The vision is not about one-time events and, thus, costs will be reduced to maintain the affordability of the vision

Starting Now

- NASA will pursue this vision as our highest priority
- Consistent with the FY 2005 budget, NASA will immediately begin to realign programs and organizations, demonstrate new technical capabilities and undertake new robotic precursor missions to the Moon and Mars before the end of the decade

Key Elements of New Space Policy

Space Shuttle

- Return the Space Shuttle to flight and plan to retire it by the end of this decade, following completion of its role in the construction of the International Space Station

International Space Station

- Complete assembly
- Refocus research to exploration factors affecting astronaut health
- Acquire crew and cargo systems, as necessary, during and after availability of Shuttle

Crew Exploration Vehicle (CEV)

- Develop a CEV to travel beyond low Earth orbit, the first new U.S. human space flight vehicle since the 1980s
- Undertake first test flight by the end of this decade to provide an operational capability to support human exploration missions no later than 2014

Lunar Exploration

- Begin robotic missions to the Moon by 2008, followed by a period of evaluating lunar resources and technologies for exploration
- Begin human expeditions to the Moon in the 2015–2020 timeframe

Mars Exploration

- Conduct robotic exploration of Mars to search for evidence of life, to understand the history of the solar system and to prepare for future human exploration
- Timing of human missions to Mars will be based on available budgetary resources, experience and knowledge gained from lunar exploration, discoveries by robotic spacecraft at Mars and other solar system locations, and development of required technologies and know-how

Other Solar System Exploration

- Conduct robotic exploration across the solar system for scientific purposes and to support human exploration
- In particular, explore Jupiter's moons, asteroids and other bodies to search for evidence of life, to understand the history of the solar system and to search for resources

Exploration Beyond

- Conduct advanced telescope searches for Earth-like planets and habitable environments around other stars

Enabling Capabilities

- Develop and demonstrate power generation, propulsion, life support and other key capabilities required to support more distant, more capable and/or longer-duration human and robotic exploration of Mars and other destinations

PROFILE: Stephen C. Nunez

By Joanne Hale

White Sands Test Facility (WSTF), located in southwestern New Mexico, has been a part of the NASA Johnson Space Center (JSC) since its construction in 1963. Its primary mission is to provide the expertise and infrastructure to test and evaluate spacecraft materials, components and rocket propulsion systems to enable the safe human exploration and utilization of space.

Beginning with Project Apollo in the early 1960s, WSTF has supported every United States human exploration space flight program. It continues to play a key role in the nation's space effort by evaluating materials and components for use in propulsion, power generation, and life-support systems; crew cabin equipment; payloads; and experiments carried aboard the Shuttle Orbiter and the International Space Station.

Stephen C. Nunez, the new Manager of WSTF since July 2003, is a seasoned NASA veteran who brings with him his One NASA background and can-do attitude.

Nunez began his career at NASA in 1989 as a systems engineer after receiving his bachelor of science degree in civil engineering from Mississippi State University in 1984. He has held various positions throughout several NASA centers including Deputy Manager of the International Space Station Management Integration Office at JSC and Detail to Associate Administrator of the Office of Space Flight at NASA Headquarters. He also served as a Congressional Fellow to the United States Senate Majority Leader focusing on aerospace and veterans' issues.

Nunez shared his recent experiences and plans for the future with *Roundup*.

How does the President's recent announcement affect WSTF?

A large portion of our work is Shuttle and Station related, so from that perspective it will impact us. However, WSTF has a proven track record of supporting the safe exploration and use of space dating back to the Apollo program. We stand ready to do our part to support the President's vision.

What has been your experience at WSTF so far?

My experience has been very positive here. I have found that the WSTF team has strong passion, commitment and a great sense of pride in supporting our nation's space program. This team exhibits a "can-do" attitude with everything they do, which is a real asset to NASA. It is an honor for me to lead such a talented and dedicated group of people. I am also honored that General Howell, Randy Stone and others have the confidence in me to do the job.

You have worked at various NASA facilities – Stennis, JSC and NASA HQ. How do feel that this diversity has helped you in your position as manager of WSTF?

Each assignment that I have had has helped me to grow and gain a better understanding of what the roles are at Stennis, JSC and Headquarters. Even my time on Capitol Hill has added to my experience. I learned something from every one of those assignments. It has given me a good understanding of the big picture. By working at different centers, I have learned to value the importance of One NASA.

As a result of working at different centers I have been able to apply One NASA to what we are doing here at WSTF. For example, shortly after I arrived here we had a couple of large procurements to make by the end of fiscal year 2003. We did not have enough people to complete the procurements at the time, and JSC had a heavy workload as well. I contacted the folks at Stennis I had worked with before to see if they could help, and they said they would be glad to. With Stennis' help we were able to complete the procurements by the end of the fiscal year. Our employees learned that Stennis has a can-do attitude too and, if we need help, we can draw on resources elsewhere in the Agency as a team to accomplish our mission.

How do you see your relationship with JSC, and how do you compare the two facilities?

We work very closely with JSC. I want to make sure that we continue the close working relationship that is required to meet the missions that we have before us.

Although we are considered a test facility and part of the Johnson Space Center, we are like a "mini-Center." We have an infrastructure similar to JSC such as security, emergency services, facility maintenance and operations, component services, cleaning and calibration services, warehousing, logistics, procurement, financial management, contract administration, information technology, etc., required to support the testing of various spacecraft components, materials and propulsion systems as well as maintaining White Sands Space Harbor.

What are some of your goals for WSTF?

To improve safety performance. Safety is very important to me. I have found that the culture here is one that values safety, which is a result of the past managers like Joe Fries and others. That culture recognizes that safety is extremely important. When you are located in a hazardous test facility, you have to make sure that you are doing things safely.

We are not going to rest on our laurels relative to our current safety position – we want to do better and our employees are committed to doing that as well.

To provide excellent support for return to flight. Our support in the return to flight will involve ensuring all the thrusters required for the Shuttle are ready in a timely fashion. We are also working on hypervelocity and low-velocity impact testing. The data that we gather from this testing is going to be helpful in making good decisions to support the return to flight.

Provide excellent support to the Space Shuttle, International Space Station and other programs while preparing to support the development of the crew exploration vehicle and returning to the Moon. Even though the Space Shuttle is to be retired by the end of the decade, there is still work ahead of us to support completing the International Space Station, which will require the Space Shuttle.

How do you see your role in regard to the employees of White Sands?

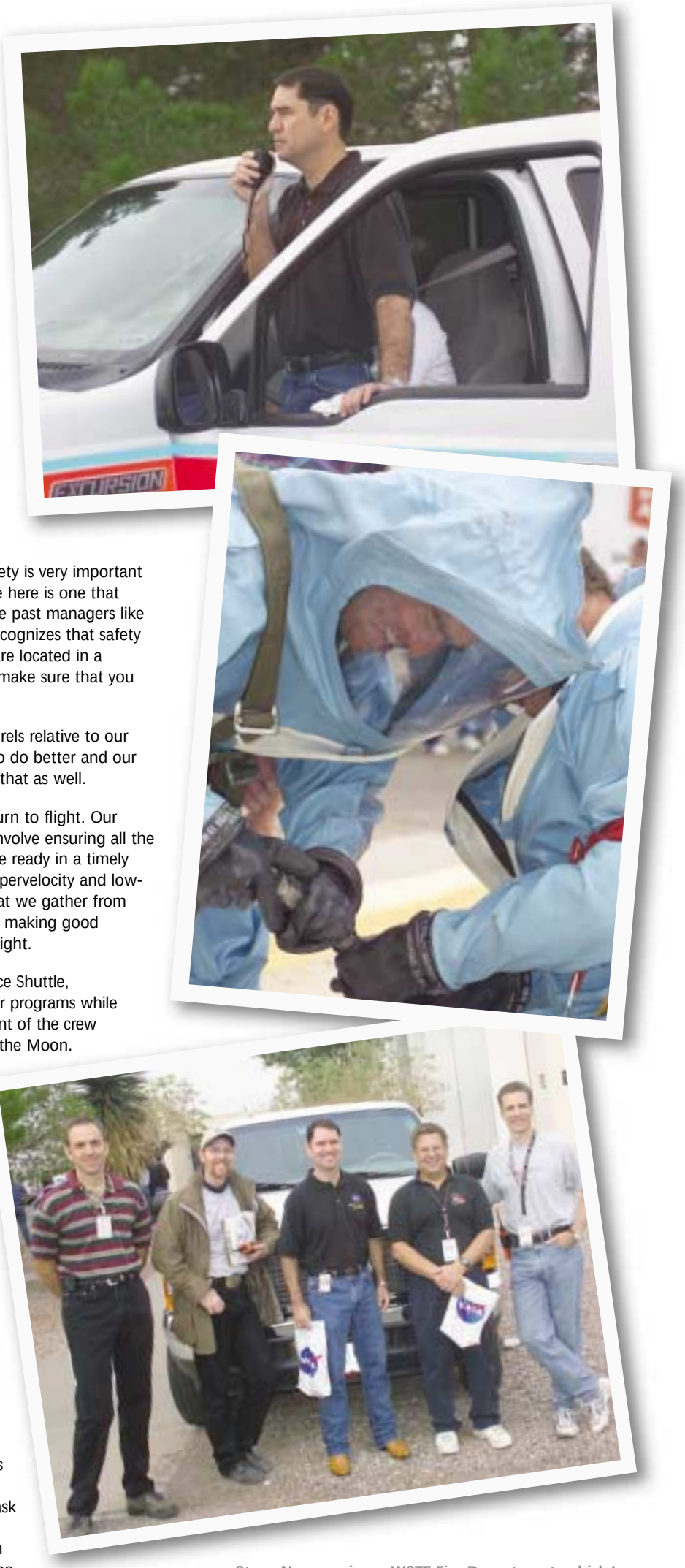
I like to be directly involved with employees. I really enjoy getting to know folks. The people here have done a great job in making me feel a part of this team and part of the community.

We recently held a Safety and Total Health Day where one of the events was set up to show the managers how difficult it was to try to do a task while wearing personal protection equipment. The Honeywell program manager and I had a race to see who could complete the task first. This was a great way for management to get involved with our employees and get a feel for what they deal with relative to getting their jobs done.

What would you like people to know about WSTF?

I want people to know that we at WSTF are proud to be part of the Johnson Space Center and are proud to support our nation's space program. We are looking forward to the new vision that President Bush has set out for us and in helping the Agency fulfill that vision.

I would also like to extend an invitation to all to come visit us. I believe you will recognize our tremendous capability to test and evaluate spacecraft materials, components and propulsion systems. More importantly, I believe you will find the people here very friendly and eager to help wherever they can as we work together to advance human exploration of space.



Steve Nunez using a WSTF Fire Department vehicle's PA system to address the WSTF population at the 2003 Safety and Total Health Day.

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Steve Nunez attempting to perform a manual task while wearing an ILC Dover protective suit during a PPE demonstration at WSTF's 2003 Safety and Total Health Day.

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(L to R) Mike Kirsch, NASA WSTF Deputy Manager; Cameron Dunlap; Steve Nunez, NASA WSTF Manager; Mark Leifeste, Honeywell Program Manager; Bob Kowalski at WSTF's 2003 Safety and Total Health Day.

wstf1003e4538 Photos by David Huskey

Mars Rovers continue search for signs of water

By Bill Jeffs

NASA's Spirit and Opportunity rovers completed pinpoint landings on Mars Jan. 3 and Jan. 24, respectively, and began their missions to gather knowledge about the planet and whether conditions there were ever favorable for life to have evolved.

Spirit landed in Gusev Crater, a broad depression believed to once have contained a lake. Opportunity was sent 6,600 miles away to Meridiani Planum, which scientists believe abounds in a mineral called gray hematite. The iron-rich mineral can form in lake or lucustrine environments and can also form by the thermal oxidation of volcanic materials without the presence of water.

Two members of Johnson Space Center's Astromaterials Research and Exploration Science team, Doug Ming, NASA Soil Mineralogist, and Dick Morris, NASA Physical Chemist, are playing key roles in the missions. They have been at NASA's Jet Propulsion Laboratory in Pasadena, Calif., since December, operating the rovers and sharing in science interpretation.

Morris and Ming are both members of the science team, which decides every sol (a Mars day) what science each rover will conduct that day. Morris is also the Payload Downlink Lead for the Moessbauer and Pancam instruments. He is responsible for validating science data returned from the rovers and for initial science product generation and preliminary interpretation for the science team.

Ming has served throughout the mission as the lead for either the Geochemistry and Mineralogy or the Soil and Rock Physical Properties Science Team Groups. He is responsible for defining the science that will be conducted during the sol for these science disciplines and then translating these science goals into specific observations and activities that the rovers will be commanded to perform.

Following its landing, Spirit developed serious problems, cutting off what had been a steady flow of pictures and scientific data. It stopped transmitting intelligible information back to Earth on Jan. 21. Software problems with Spirit's onboard computer memory were found to be the cause. Engineers deleted files from Spirit's flash memory and then reformatted it completely.

Soon the rover was up and running. In early February, Spirit shattered a one-day distance record on Mars, rolling nearly 70 feet across the planet's rocky surface. The drive covered more than three times the greatest distance that NASA's tiny rover Sojourner ever traveled in a day during its 1997 mission.

Spirit drove "blind" about half the distance, following a planned route to a stopping point. For the second half of the short trip, the rover drove to a second stopping point, autonomously executed a turn and then rolled onward before stopping.

Following this successful trek, drivers of the Rover, stationed at JPL, planned to send Spirit on longer excursions. NASA has sent Spirit toward a crater nicknamed Bonneville that sits more than 800 feet from where the spacecraft landed. NASA hopes the six-wheeled rover (and its twin, Opportunity) will eventually cover as much as 140 feet or more a day.

"We are heading off towards Bonneville Crater in hopes of finding rocks or other materials that have been ejected during the impact event that may show signs of past water in Gusev Crater," Ming said. "Who knows what we might find once we get to the crater rim – just look at the incredible outcrop Opportunity is exploring in a small crater on the plains of Meridiani."

Opportunity sent its first pictures of Mars to Earth on Jan. 25, delighting and puzzling scientists just hours after the spacecraft bounced to a landing on the opposite side of the red planet from its twin rover. The pictures showed a surface smooth and dark red in some places and strewn with fragmented slabs of light bedrock in others. Orbital images show that, with incredible luck, Opportunity landed in a shallow crater, facing an outcrop of bedrock.

Opportunity has been on the move at its landing site. It used its microscopic cameras and onboard spectrometers to zoom in on an outcropping of bedrock whose composition has tantalized scientists since the rover landed. Data returned by Opportunity suggest that the reddish-colored rocks that comprise the outcropping consist of a fine, sand-like matrix embedded with spherical grains of a different material. Scientists at JPL believe the outcropping, nicknamed "Opportunity Ledge," was formed by compacted layers of volcanic ash or wind-blown dust.

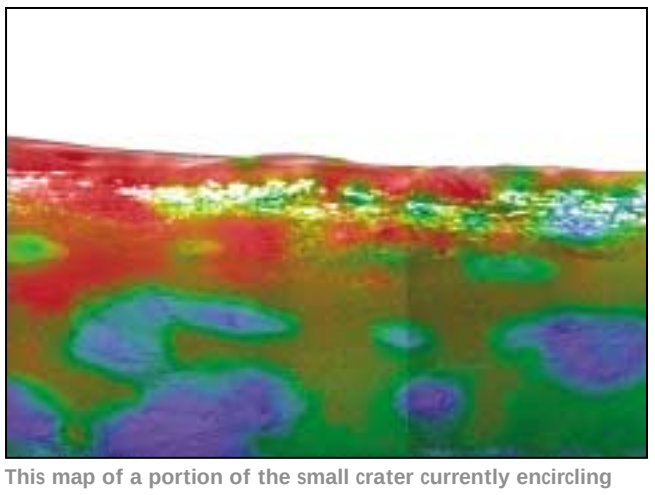
"We are keenly interested in using the science instruments on Opportunity, particularly the Moessbauer spectrometer, to learn about the mineralogical composition of this bedrock (or bedcrud)," Morris said. "It may be the key to unraveling the nature of water-driven weathering processes on Mars."

Opportunity continues to "scoot and shoot" along the face of the outcrop, embedded in the side of the crater where it landed. It will drive along the rock formation and take detailed pictures of the finely layered rocks.

Together, the 384-pound rovers make up an $820 million mission to seek out geologic evidence that Mars was a wetter world possibly capable of sustaining life. NASA launched Spirit on June 10 and Opportunity on July 7.

This image shows the Mars Exploration Rover Spirit's "hand," or the tip of the instrument deployment device, poised in front of the rock nicknamed Adirondack. In preparation for grinding into Adirondack, Spirit cleaned off a portion of the rock's surface with a stainless steel brush located on its rock abrasion tool. The image was taken by the rover's panoramic camera.

This magnified look at the Martian soil near the Mars Exploration Rover Opportunity's landing site, Meridiani Planum, shows coarse grains sprinkled over a fine layer of sand. The image was captured by the rover's microscopic imager on the 10th day, or sol, of its mission and roughly approximates the color a human eye would see. Scientists are intrigued by the spherical rocks, which can be formed by a variety of geologic processes, including cooling of molten lava droplets and accretion of concentric layers of material around a particle or "seed."



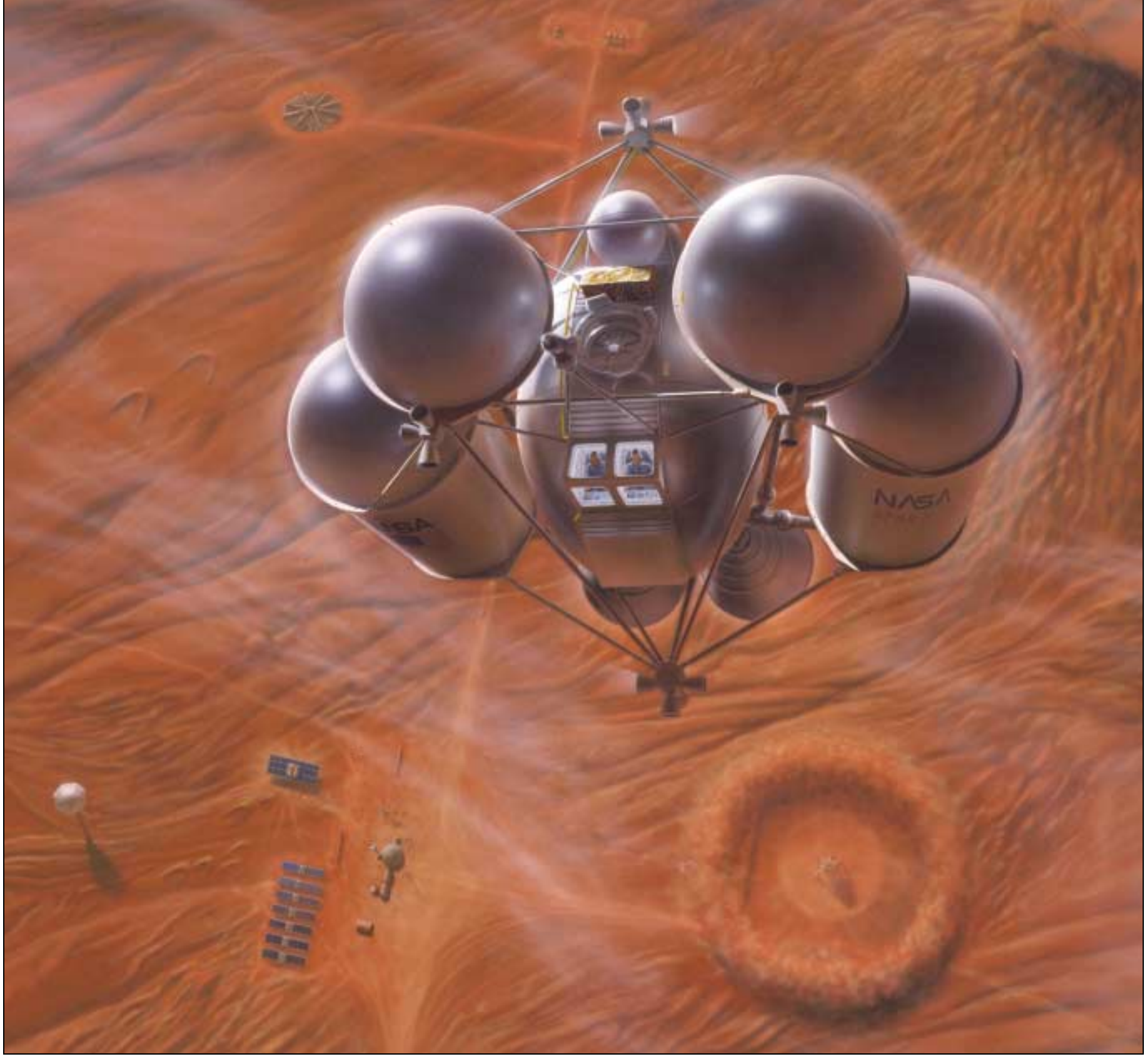
This map of a portion of the small crater currently encircling the Mars Exploration Rover Opportunity shows where crystalline hematite resides. Red and orange patches indicate high levels of the iron-bearing mineral, while blue and green denote low levels. The northeastern rock outcropping lining the rim of the crater does not appear to contain much hematite. Also lacking hematite are the rover's airbag bounce marks. This image consists of data from Opportunity's miniature thermal emission spectrometer superimposed on an image taken by the rover's panoramic camera.

Shift Change

The ascent stage of a two-stage lander soars through the tenuous Martian atmosphere on the first leg of a long trek home. This Mars outpost crew has just completed many months exploring the surface of Mars and is headed toward a rendezvous with an orbiting vehicle that will return them to Earth. This equatorial base, located near a tributary of Valles Marineris, is in the vicinity of the Viking I landing site. These future missions of discovery and exploration will employ humans where their capabilities are unique and critical: physical adaptability, intellectual flexibility, capacity for innovation and ability to inspire. Today's youth will watch humans explore Mars in their lifetimes and will see the understanding of the universe expand through discoveries we have not yet imagined.

ABOUT THE ILLUSTRATOR

Pat Rawlings creates images based on scientific and technical themes that appeal to both rocket scientists and regular folk. His extraterrestrial "snapshots" of future events give viewers a sense of "being there" as explorers hop from one world to the next using the best technology of the 21st century. Rawlings' desire to travel in space and time motivates him to make scenes that are as accurate as possible. After consulting with numerous space experts around the country, he uses hand-built and computer models, topographical maps, and space and family vacation photos to mentally create his worlds.



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