



1
00:00:00,000 --> 00:00:03,800

Narrator: In one of the driest places on Earth,

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00:00:03,820 --> 00:00:07,050

a NASA robot is searching for water.

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00:00:07,070 --> 00:00:09,550

The Mojave Desert, in southern California, receives

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00:00:09,570 --> 00:00:12,660

very little rain and the dry environment is very

5
00:00:12,680 --> 00:00:16,540

similar to the surfaces of the Moon and Mars.

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00:00:16,560 --> 00:00:18,610

However, there is enough underground moisture that

7
00:00:18,630 --> 00:00:20,490

the Mojave is an excellent lunar

8
00:00:20,510 --> 00:00:22,910

or Red Planet analog.

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00:00:22,930 --> 00:00:26,290

Also, since the locations and quantities of that

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00:00:26,310 --> 00:00:29,370

moisture are well-known to geologists, researchers

11
00:00:29,390 --> 00:00:31,420

are able to ground truth science instruments

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00:00:31,440 --> 00:00:35,280

by comparing their measurements to the actual amounts.

13
00:00:35,300 --> 00:00:38,780

The Mojave Volatiles Prospector, or MVP project,

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00:00:38,800 --> 00:00:41,050

is a test bed for scientists from NASA Ames

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00:00:41,070 --> 00:00:43,720

Research Center to develop the technologies

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00:00:43,740 --> 00:00:45,680

and procedures that will be needed to search

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00:00:45,700 --> 00:00:48,610

for water ice and other volatiles that might

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00:00:48,630 --> 00:00:51,020

be hidden under the surface of the Moon, Mars

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00:00:51,040 --> 00:00:54,210

or another planetary body.

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00:00:54,230 --> 00:00:57,390

The foundation of the MVP project is a 4-wheel-drive,

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00:00:57,410 --> 00:01:00,630

electric-powered robot, known as K-REX.

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00:01:00,650 --> 00:01:04,280

About the size of golf cart, K-REX is designed to

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00:01:04,300 --> 00:01:06,740

autonomously navigate rugged terrain, while

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00:01:06,760 --> 00:01:09,560

driving over obstacles as high as 12 inches

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00:01:09,580 --> 00:01:13,150

and slopes as steep as 30 degrees.

26
00:01:13,170 --> 00:01:15,720
It has multiple cameras on-board, which are used by

27
00:01:15,740 --> 00:01:17,940
the rover's control system to navigate between

28
00:01:17,960 --> 00:01:20,820
waypoints and to provide real-time situational

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00:01:20,840 --> 00:01:24,940
awareness for the science team back at NASA Ames.

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00:01:24,960 --> 00:01:28,480
To search for water, K-REX carried two instruments

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00:01:28,500 --> 00:01:31,600
specifically selected for the MVP mission.

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00:01:31,620 --> 00:01:34,340
The first was a Neutron Spectrometer System,

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00:01:34,360 --> 00:01:38,410
known as NSS, that scans for underground hydrogen.

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00:01:38,430 --> 00:01:41,740
NSS measures changes in the energy of neutrons

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00:01:41,760 --> 00:01:45,510
that interact with hydrogen in the subsurface.

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00:01:45,530 --> 00:01:49,900
If there is no hydrogen, those changes are not detected.

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00:01:49,920 --> 00:01:52,680
The second instrument was the Near-Infrared Volatile

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00:01:52,700 --> 00:01:55,750

Spectrometer System, known as NIRVSS.

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00:01:55,770 --> 00:01:58,940

NIRVSS measures light reflections from soil samples and

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00:01:58,960 --> 00:02:02,650

was used to calculate the amount of soil moisture.

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00:02:02,670 --> 00:02:04,940

Data from the two instruments helped scientists

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00:02:04,960 --> 00:02:07,410

select locations where samples were collected

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00:02:07,430 --> 00:02:09,780

for analysis.

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00:02:09,800 --> 00:02:12,210

For science planning and mission operations,

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00:02:12,230 --> 00:02:14,720

the team used a software tool developed at Ames

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00:02:14,740 --> 00:02:19,840

called the Exploration Ground Data System or xGDS.

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00:02:19,860 --> 00:02:23,340

The MVP deployment was an opportunity to learn how

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00:02:23,360 --> 00:02:26,190

the web-based software tool works and where

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00:02:26,210 --> 00:02:27,810

improvements are needed in order to conduct a

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00:02:27,830 --> 00:02:29,970

high-tempo science mission with a rover

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00:02:29,990 --> 00:02:32,910

in a remote location.

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00:02:32,930 --> 00:02:36,180

Another goal of the MVP project was to answer the question

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00:02:36,200 --> 00:02:40,290

"How can NASA use a robot to prospect for resources on the

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00:02:40,310 --> 00:02:44,330

Moon in a very short timeframe?"

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00:02:44,350 --> 00:02:46,850

The Mojave Volatiles Prospector mission brought together

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00:02:46,870 --> 00:02:49,960

a rugged robotic rover, unique prospecting instruments,

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00:02:49,980 --> 00:02:53,270

a robust mission operations software package and

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00:02:53,290 --> 00:02:57,870

a dedicated support team for a remote, live field test.

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00:02:57,890 --> 00:03:00,590

The mission successfully demonstrated the concept of

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00:03:00,610 --> 00:03:04,240

"high-tempo" robotic science and the MVP team

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00:03:04,260 --> 00:03:07,930

stands ready to help develop an actual prospecting mission

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00:03:07,950 --> 00:03:10,350

beyond Planet Earth.