



1  
00:00:02,156 --> 00:00:02,236  
>> Brandi: Hi.

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00:00:02,976 --> 00:00:05,946  
Welcome to Building 9 here  
at the Johnson Space Center,

3  
00:00:05,996 --> 00:00:07,816  
the Space Vehicle  
Mockup Facility,

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00:00:07,816 --> 00:00:10,576  
and we've actually got behind  
us a space vehicle mock up,

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00:00:10,576 --> 00:00:12,186  
our space exploration vehicle.

6  
00:00:12,496 --> 00:00:15,776  
One of our Rovers which is this  
week being used for the dry runs

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00:00:15,776 --> 00:00:18,666  
of the Research and Technology  
Studies Test, or RATS,

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00:00:19,186 --> 00:00:21,266  
and here to talk with us  
today we have James Johnson,

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00:00:21,266 --> 00:00:22,596  
who is the test director  
for RATS.

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00:00:22,966 --> 00:00:24,356  
Thanks so much for coming  
and talking with us.

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00:00:24,356 --> 00:00:24,856

>> James Johnson:  
Thank you, Brandi.

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00:00:24,856 --> 00:00:25,456  
I appreciate that.

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00:00:25,686 --> 00:00:26,826  
>> Brandi: So what's  
going on this week?

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00:00:27,406 --> 00:00:28,756  
>> James Johnson: Well, as  
you mentioned, it's a dry run,

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00:00:28,906 --> 00:00:30,986  
and so what we mean by dry  
run is really practice.

16  
00:00:31,456 --> 00:00:33,536  
Practice makes perfect for us.

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00:00:33,536 --> 00:00:34,986  
We're getting ready for  
our test, which is going

18  
00:00:34,986 --> 00:00:36,276  
to be towards the end of August

19  
00:00:36,276 --> 00:00:38,976  
or officially testing  
actually starts August 20th,

20  
00:00:38,976 --> 00:00:40,376  
and we're going to run  
for ten days straight.

21  
00:00:40,456 --> 00:00:43,486  
So what we're trying to do  
right now is exercise some

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00:00:43,486 --> 00:00:46,396  
of the communications systems,  
data systems, the big simulation

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00:00:46,396 --> 00:00:48,206  
and the vehicle that's  
behind me.

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00:00:48,596 --> 00:00:50,836  
Try and get all of that up and  
running, training the crew,

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00:00:51,006 --> 00:00:54,356  
and be all ready to go  
come the end of August.

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00:00:54,616 --> 00:00:55,446  
So that's what we're doing.

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00:00:55,656 --> 00:00:57,156  
>> Brandi: And let's  
back up a little bit.

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00:00:57,186 --> 00:00:58,396  
What is RATS exactly?

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00:00:59,126 --> 00:01:01,476  
>> James Johnson: So RATS is  
Research and Technology Studies,

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00:01:01,476 --> 00:01:03,276  
as you mentioned, and what

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00:01:03,306 --> 00:01:06,956  
that does is we analyze  
both architectures,

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00:01:07,156 --> 00:01:08,786  
mission architectures,

how you're going

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00:01:08,846 --> 00:01:11,236  
to conduct a space mission  
going to an asteroid,

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00:01:11,336 --> 00:01:13,226  
going on to Mars,  
going back to the moon,

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00:01:13,226 --> 00:01:15,476  
wherever we may go outside  
the [inaudible] orbit,

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00:01:15,476 --> 00:01:18,936  
and then the technology piece,  
and that's actually trying

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00:01:19,006 --> 00:01:21,776  
to mature and advance new  
and developing technologies.

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00:01:21,956 --> 00:01:24,306  
So we're actually  
hoping to do both coming

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00:01:24,306 --> 00:01:26,066  
up here later on this month.

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00:01:26,306 --> 00:01:28,376  
>> Brandi: And this is part  
of our analogs program, right.

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00:01:28,406 --> 00:01:29,846  
It's a stimulation -

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00:01:29,846 --> 00:01:30,416  
>> James Johnson:  
That's correct -

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00:01:30,416 --> 00:01:31,236

>> Brandi: Here on  
the ground, right.

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00:01:31,396 --> 00:01:32,076

>> James Johnson: Exactly, yeah.

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00:01:32,076 --> 00:01:36,506

Analogs is all about exercising  
real time mission operations

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00:01:36,996 --> 00:01:38,546

with new and developing  
technologies

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00:01:38,616 --> 00:01:41,146

so that way we can get a good  
understanding of how some

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00:01:41,146 --> 00:01:42,536

of these technologies  
are going to perform

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00:01:42,536 --> 00:01:44,366

when we actually go ahead and  
take beyond [inaudible] orbit.

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00:01:44,596 --> 00:01:46,006

We do that early in development

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00:01:46,366 --> 00:01:47,996

so that way there's  
fewer surprises

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00:01:47,996 --> 00:01:48,806

when we actually get there -

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00:01:48,806 --> 00:01:48,926

>> Brandi: OK.

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00:01:48,976 --> 00:01:53,146

For folks who watch NASA TV Live  
may have seen fairly recently

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00:01:53,146 --> 00:01:55,316

the Nemo mission  
down below the sea.

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00:01:55,986 --> 00:01:58,706

Another one of our analogs, and  
we also had one just last month

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00:01:58,966 --> 00:02:00,616

in Hawaii doing some  
[inaudible] work.

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00:02:00,756 --> 00:02:03,346

So that, a lot of  
different things going on,

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00:02:03,476 --> 00:02:07,506

but what are we trying to  
accomplish specifically

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00:02:07,556 --> 00:02:09,986

with this year's RAT test?

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00:02:10,596 --> 00:02:13,246

>> James Johnson: So this  
RAT, there's two aspects

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00:02:13,246 --> 00:02:14,726

that we're really  
taking a look at.

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00:02:14,796 --> 00:02:17,166

The first is, again,  
that architecture piece,

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00:02:17,646 --> 00:02:20,306

and what we're looking at there  
is where do we put crew members

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00:02:20,706 --> 00:02:22,416

between some of the  
major elements

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00:02:22,686 --> 00:02:24,376

for deep space exploration, OK.

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00:02:24,716 --> 00:02:27,386

We have the [inaudible] mission  
space exploration vehicle here.

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00:02:27,466 --> 00:02:30,106

We also have what would be  
called the deep space habitat,

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00:02:30,546 --> 00:02:32,976

and we are mocking that up  
with a work station also here

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00:02:32,976 --> 00:02:34,446

in building 9 and another room.

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00:02:35,026 --> 00:02:37,406

And we're trying to  
understand, you know,

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00:02:37,406 --> 00:02:39,486

how many crew do you want  
in each of those elements

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00:02:39,486 --> 00:02:42,186

as you're actively  
exploring a surface.

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00:02:43,136 --> 00:02:45,056

In this case, it's actually  
an asteroid surface.

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00:02:45,126 --> 00:02:46,196

We're looking at the  
surface of [inaudible].

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00:02:46,196 --> 00:02:46,346

>> Brandi: OK.

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00:02:46,346 --> 00:02:47,966

And, you know, I guess,

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00:02:48,436 --> 00:02:52,906

and we've had many  
RATS test in the past.

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00:02:53,976 --> 00:02:56,126

Usually, though, we have desert  
[inaudible], desert RATS -

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00:02:56,126 --> 00:02:56,636

>> James Johnson: Right, right.

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00:02:56,756 --> 00:02:58,276

>> Brandi: But this year,  
though, we're here in Houston

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00:02:58,276 --> 00:02:59,076

at Johnson Space Center.

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00:02:59,386 --> 00:02:59,776

Why is that?

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00:03:00,546 --> 00:03:00,636

>> James Johnson: Well,

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00:03:00,636 --> 00:03:01,976

there are a few different

reasons for it.

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00:03:02,876 --> 00:03:05,556

What we really want to do  
is make sure we're testing

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00:03:05,706 --> 00:03:10,126

in the best environment to get  
as much data as we possibly can

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00:03:10,396 --> 00:03:12,076

for those future  
architectural scenarios,

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00:03:12,536 --> 00:03:15,176

and the desert really  
doesn't lend itself well

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00:03:15,256 --> 00:03:16,246

to an asteroid surface.

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00:03:16,296 --> 00:03:18,006

You know, it's a micro  
gravity environment.

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00:03:18,366 --> 00:03:21,976

So with the Nemo test, we ended  
up focusing a little bit more

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00:03:21,976 --> 00:03:23,236

on the micro gravity aspects,

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00:03:23,696 --> 00:03:25,426

and for the actual  
exploration aspects,

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00:03:25,426 --> 00:03:27,176

we found we can do a lot  
of that through simulation,

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00:03:27,776 --> 00:03:30,436

and that's why we're here  
utilizing the simulation

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00:03:30,436 --> 00:03:31,156

behind us.

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00:03:31,156 --> 00:03:31,256

>> Brandi: OK.

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00:03:31,906 --> 00:03:33,676

And you mentioned,  
like you said, this.

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00:03:33,756 --> 00:03:36,186

So the SEV, the space  
exploration vehicle behind us is

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00:03:36,436 --> 00:03:38,166

one of the ways, and  
we've got a few others.

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00:03:38,166 --> 00:03:39,406

You mentioned the  
deep space habitat.

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00:03:39,886 --> 00:03:42,946

It all comes together, and  
hopefully will help us figure

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00:03:42,946 --> 00:03:44,666

out how we're going  
to send teams

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00:03:44,666 --> 00:03:45,836

to an asteroid in the future?

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00:03:46,596 --> 00:03:47,146

>> James Johnson: Exactly.

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00:03:47,236 --> 00:03:50,296

Yeah. We want to understand how we're going to do it.

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00:03:50,416 --> 00:03:51,806

We want to understand the technologies

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00:03:51,806 --> 00:03:52,786

that are going to take us there.

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00:03:53,046 --> 00:03:55,696

So, you know, the other piece of that technology is studies,

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00:03:55,696 --> 00:03:57,016

and one neat thing that we're doing

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00:03:57,336 --> 00:04:00,286

at RATS this year is we're actually demonstrating some new

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00:04:00,286 --> 00:04:01,816

generation fuel cell technologies.

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00:04:02,246 --> 00:04:05,056

So we actually will have a fuel cell coming in here periodically

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00:04:05,136 --> 00:04:08,166

and providing power to the space exploration vehicle,

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00:04:08,496 --> 00:04:11,476

and then as they're providing that power, fuel cell is going

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00:04:11,606 --> 00:04:13,956

to provide power and also  
produces a lot of water

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00:04:13,956 --> 00:04:16,786

in that process, and that  
water is going to get taken

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00:04:16,836 --> 00:04:18,326

to another facility here on site

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00:04:18,326 --> 00:04:21,116

to exercise another  
technology called Marco Polo,

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00:04:21,276 --> 00:04:22,846

and that's a demonstration  
technology

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00:04:22,946 --> 00:04:24,816

for electrolysis water.

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00:04:24,816 --> 00:04:27,246

Breaking down the water, turning  
it into hydrogen, oxygen,

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00:04:27,296 --> 00:04:29,006

assuming that that water  
was actually gathered

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00:04:29,106 --> 00:04:30,616

through in situ research  
utilization -

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00:04:31,176 --> 00:04:31,286

>> Brandi: OK -

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00:04:31,346 --> 00:04:32,416

>> James Johnson: SO

that way, we're testing

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00:04:32,416 --> 00:04:34,316  
out a couple different  
technology pieces while we're

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00:04:34,316 --> 00:04:35,746  
answering some of the  
questions on how we're going

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00:04:35,746 --> 00:04:36,496  
to explore an asteroid.

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00:04:36,846 --> 00:04:38,466  
>> Brandi: And, hopefully,  
all of this comes together,

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00:04:38,466 --> 00:04:39,856  
and you've got kind  
of a big piece

133

00:04:39,856 --> 00:04:41,476  
of the exploration puzzle solved

134

00:04:41,476 --> 00:04:42,746  
by the time we're  
ready to go, right.

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00:04:43,106 --> 00:04:43,406  
>> James Johnson: Exactly.

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00:04:43,406 --> 00:04:46,176  
What we do is we call that the  
ops concept, and what we try

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00:04:46,176 --> 00:04:49,196  
to do is define how are you  
going to do those operations,

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00:04:49,196 --> 00:04:51,086

how are you going to conduct  
that mission so that way

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00:04:51,086 --> 00:04:53,836

as you are developing our  
hardware, everybody is

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00:04:53,836 --> 00:04:56,196

in lock step with how you're  
going to develop the hardware,

141

00:04:56,196 --> 00:04:58,436

why you're developing it,  
what the core means and goals

142

00:04:58,436 --> 00:05:00,036

and objectives are  
for that hardware.

143

00:05:00,576 --> 00:05:03,256

So that way when it's all  
built and ready to go,

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00:05:03,526 --> 00:05:07,046

everybody's in full agreement,  
and we expect how that is going

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00:05:07,046 --> 00:05:08,806

to behave when we take  
it out to [inaudible].

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00:05:08,806 --> 00:05:09,106

>> Brandi: OK.

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00:05:09,666 --> 00:05:11,616

And, you know, I think a  
lot of people are talking

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00:05:11,616 --> 00:05:13,266

about the Curiosity  
landing that's coming up -

149  
00:05:13,266 --> 00:05:14,216  
>> James Johnson:  
It's pretty exciting -

150  
00:05:14,216 --> 00:05:15,906  
>> Brandi: On Mars  
this, well, next week,

151  
00:05:16,386 --> 00:05:17,046  
beginning of next week.

152  
00:05:17,416 --> 00:05:19,266  
Do you think, you know,

153  
00:05:19,266 --> 00:05:21,436  
hopefully some day we'll be  
sending humans to follow it.

154  
00:05:21,436 --> 00:05:24,296  
Do you think these are lessons  
that we'll be able to use

155  
00:05:24,296 --> 00:05:25,106  
when it's time for that?

156  
00:05:25,796 --> 00:05:26,676  
>> James Johnson:  
Well, certainly.

157  
00:05:26,736 --> 00:05:30,286  
You know, the question of where  
do you place crew between some

158  
00:05:30,286 --> 00:05:33,756  
of the deep space elements is  
one that it not unique just

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00:05:33,756 --> 00:05:34,846

to asteroid exploration.

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00:05:34,846 --> 00:05:35,706

It applies to Mars.

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00:05:35,706 --> 00:05:36,986

It applies to lunar exploration.

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00:05:37,016 --> 00:05:38,206

Any destination we go,

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00:05:38,546 --> 00:05:40,956

how do you really handle  
those types of operations?

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00:05:40,996 --> 00:05:41,866

Where do you place the crew?

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00:05:42,166 --> 00:05:43,096

How are they best utilized?

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00:05:43,606 --> 00:05:46,176

Those questions are going to  
apply even when we go to Mars,

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00:05:46,176 --> 00:05:49,676

and so, hopefully, the lessons  
that we learn here we'll be able

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00:05:49,676 --> 00:05:52,336

to go ahead and apply when  
we actually set foot on Mars.

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00:05:52,416 --> 00:05:52,536

>> Brandi: OK.

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00:05:52,806 --> 00:05:54,586

Maybe we'll come more  
and talk about that

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00:05:54,586 --> 00:05:55,416  
when that happens [inaudible] -

172

00:05:55,416 --> 00:05:56,636  
>> James Johnson: I hope  
I can be here for that.