



1
00:00:01,396 --> 00:00:02,466
>> Brandi Dean: We're
back here again

2
00:00:02,466 --> 00:00:05,366
in the Deep Space Habitat
mockup at Johnson Space Center,

3
00:00:05,436 --> 00:00:08,376
talking with Sarah Shull
from the Logistics Reduction

4
00:00:08,376 --> 00:00:09,496
and Repurposing Group.

5
00:00:09,596 --> 00:00:10,826
That's kind of a mouthful,

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00:00:10,826 --> 00:00:12,706
but it basically means
taking what you have

7
00:00:12,706 --> 00:00:14,546
and making something more
useful out of it; right?

8
00:00:14,906 --> 00:00:14,976
>> Sarah Shull: Yeah.

9
00:00:15,266 --> 00:00:17,206
>> Brandi Dean: So we talked
last time about the cargo bags,

10
00:00:17,206 --> 00:00:19,286
and this time she has a
different project to show us.

11
00:00:19,286 --> 00:00:20,666
Tell us what that's

called again.

12

00:00:21,216 --> 00:00:22,906

>> Sarah Shull: So
this is another aspect

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00:00:22,906 --> 00:00:24,146

of the Logistics project,

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00:00:24,146 --> 00:00:25,936

and it's called the
heat-melt compactor.

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00:00:26,406 --> 00:00:30,236

So it's a project actually led
by NASA Ames in conjunction

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00:00:30,236 --> 00:00:31,746

with our team here at
Johnson Space Center,

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00:00:31,746 --> 00:00:34,666

and they're looking at -- so
you generate all this trash

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00:00:34,666 --> 00:00:37,206

in space, then, you know,
what can you do with it

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00:00:37,526 --> 00:00:40,166

to save volume, compact
it down kind

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00:00:40,166 --> 00:00:43,486

of like a terrestrial
trash compactor?

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00:00:44,256 --> 00:00:45,456

The crew can load
their trash in,

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00:00:45,456 --> 00:00:47,026
and then it compresses it down.

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00:00:47,066 --> 00:00:49,106
It also heats it up, and
it will make these bricks.

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00:00:49,106 --> 00:00:51,166
So these are tiles
that were made

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00:00:51,166 --> 00:00:53,656
in the Gen 1 unit
out at NASA Ames.

26

00:00:54,236 --> 00:00:56,316
This one has kind of
office trash in it.

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00:00:56,656 --> 00:00:59,326
>> Brandi Dean: Procedures,
I guess, tape and gauze.

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00:00:59,616 --> 00:01:00,496
>> Sarah Shull: Yeah, gauze.

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00:01:01,046 --> 00:01:02,636
There is some plastic
material in it.

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00:01:02,636 --> 00:01:04,716
That's kind of what holds the
tile together and keeps it

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00:01:04,716 --> 00:01:07,656
from springing back like a
terrestrial compactor might do.

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00:01:08,106 --> 00:01:10,916

It also -- so it heats
the trash up hot enough

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00:01:10,956 --> 00:01:12,266

that it does sterilize it.

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00:01:12,656 --> 00:01:14,306

So if you have food
residue in here,

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00:01:14,306 --> 00:01:16,896

it will stop the microbial
growth, stop the odors.

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00:01:17,476 --> 00:01:19,896

So this actually --
this tile is just

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00:01:19,896 --> 00:01:21,186

like I said, kind
of office trash.

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00:01:21,476 --> 00:01:23,026

This one is actually
shuttle trash.

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00:01:23,026 --> 00:01:26,266

So we took some trash that we
were able to get from STS 133.

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00:01:27,656 --> 00:01:29,886

Sent it out to Ames, and they
compacted it down for us.

41

00:01:30,176 --> 00:01:31,536

>> Brandi Dean: Actual
space trash.

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00:01:31,656 --> 00:01:33,366

>> Sarah Shull: Actual
space trash labeled

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00:01:33,366 --> 00:01:34,866
as "critical space item".

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00:01:36,046 --> 00:01:38,546
It does do a 95 percent
reduction in volume.

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00:01:38,866 --> 00:01:40,696
So if nothing else, you
buy back that volume.

46

00:01:40,776 --> 00:01:43,066
>> Brandi Dean: So how big,
you know, how big, I guess,

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00:01:43,066 --> 00:01:44,796
would the trash bag
be to make that?

48

00:01:45,086 --> 00:01:47,356
>> Sarah Shull: So this, again,
would be a 95 percent reduction.

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00:01:47,386 --> 00:01:49,496
So if you kind of
multiply this by 20.

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00:01:49,906 --> 00:01:49,996
>> Brandi Dean: Okay.

51

00:01:50,056 --> 00:01:51,166
>> Sarah Shull: That's
how big it's going to be.

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00:01:51,216 --> 00:01:53,706
So if you could picture this
stacked up, maybe, you know,

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00:01:53,706 --> 00:01:56,456
like a printer paper
size box full of trash.

54

00:01:56,456 --> 00:01:56,796
>> Brandi Dean: Okay.

55

00:01:57,616 --> 00:01:57,946
Okay.

56

00:01:58,126 --> 00:01:58,896
>> Sarah Shull: So
then we're also --

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00:01:58,896 --> 00:02:01,166
as part of Logistics to Living,
which we talked about earlier --

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00:02:01,166 --> 00:02:03,566
looking at what can you
do with these tiles?

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00:02:03,636 --> 00:02:05,556
So in addition to just
reclaiming the volume,

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00:02:05,646 --> 00:02:07,856
could you repurpose these
tiles in some manner?

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00:02:08,216 --> 00:02:12,036
Because there's a 20-30
percent plastic content

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00:02:12,036 --> 00:02:14,566
in the trash generated
in space average,

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00:02:14,976 --> 00:02:19,666

there is some radiation
protection capability

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00:02:19,666 --> 00:02:20,766

of these tiles.

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00:02:21,456 --> 00:02:21,786

>> Brandi Dean: Okay.

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00:02:22,276 --> 00:02:22,956

>> Sarah Shull: So
you may be able

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00:02:22,956 --> 00:02:24,856

to get some additional
radiation shielding for free.

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00:02:24,856 --> 00:02:26,616

>> Brandi Dean: So there's a
few different reasons then.

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00:02:26,616 --> 00:02:28,236

So you said it, first of
all, gets rid of the germs.

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00:02:28,286 --> 00:02:28,836

The heat kills the germs.

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00:02:29,046 --> 00:02:31,146

Second, this is much
easier to store

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00:02:31,146 --> 00:02:33,526

than a big box of
trash would be...

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00:02:33,656 --> 00:02:34,046

>> Sarah Shull: Absolutely.

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00:02:34,046 --> 00:02:35,706

>> Brandi Dean: ...and then hopefully you can not only,

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00:02:36,126 --> 00:02:37,776

you know, get those good purposes out of it

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00:02:37,776 --> 00:02:39,096

but also reuse it for something else.

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00:02:39,246 --> 00:02:39,916

>> Sarah Shull: Right, radiation.

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00:02:39,916 --> 00:02:39,983

>> Brandi Dean: Yeah.

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00:02:40,356 --> 00:02:41,126

>> Sarah Shull: Radiation's something

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00:02:41,126 --> 00:02:43,566

that we're definitely concerned about and trying to figure out.

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00:02:43,726 --> 00:02:43,876

>> Brandi Dean: Yeah.

82

00:02:43,876 --> 00:02:45,016

>> Sarah Shull: So that's a major concern

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00:02:45,016 --> 00:02:45,756

for going into deep --

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00:02:45,866 --> 00:02:46,806

>> Brandi Dean: Solutions

for us, so.

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00:02:46,886 --> 00:02:48,886
>> Sarah Shull: Yeah, so we're
developing a second-generation

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00:02:48,886 --> 00:02:50,686
of the heat- melt compactor,
and the tiles are actually going

87

00:02:50,686 --> 00:02:53,306
to be square with --
just for the reason

88

00:02:53,306 --> 00:02:54,576
that it's easier to repurpose.

89

00:02:55,046 --> 00:02:57,616
You know, if you've got a
layer of tiles layering around,

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00:02:57,616 --> 00:02:59,096
you have to have a lot
of overlap to cover.

91

00:02:59,096 --> 00:02:59,186
>> Brandi Dean: Right.

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00:02:59,186 --> 00:03:00,286
>> Sarah Shull: Whereas,
square you can kind

93

00:03:00,286 --> 00:03:02,686
of put them end-to-end
and get a nice coverage.

94

00:03:03,096 --> 00:03:06,846
>> Brandi Dean: Okay, so the
heat compactor, how big is that?

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00:03:06,846 --> 00:03:07,586

Is that something --

96

00:03:07,736 --> 00:03:12,446

>> Sarah Shull: The Gen 1 unit is probably about the size

97

00:03:12,446 --> 00:03:15,076

of this glove box if it were turned, you know, on its side.

98

00:03:15,186 --> 00:03:15,426

>> Brandi Dean: Okay.

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00:03:15,636 --> 00:03:17,416

>> Sarah Shull: For the Gen 2 we're making it smaller

100

00:03:17,416 --> 00:03:20,856

because we know that volume is very, you know, limited in space

101

00:03:20,856 --> 00:03:21,696

and the Deep Space Hab.

102

00:03:21,766 --> 00:03:25,966

So it's going to be two express rack locker size.

103

00:03:26,046 --> 00:03:27,316

The size of two express rack lockers,

104

00:03:27,316 --> 00:03:29,896

which is roughly probably half the size of this glove box.

105

00:03:29,896 --> 00:03:30,126

>> Brandi Dean: Okay.

106

00:03:30,716 --> 00:03:31,496

>> Sarah Shull: So
we're constraining it

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00:03:31,536 --> 00:03:32,436

to be that small.

108

00:03:32,596 --> 00:03:34,496

We want to make sure
that it's not taking

109

00:03:34,496 --> 00:03:35,886

up too much volume itself.

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00:03:36,226 --> 00:03:37,466

>> Brandi Dean: Are there other
things you could use the tiles

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00:03:37,466 --> 00:03:39,156

for besides the radiation
protection?

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00:03:39,156 --> 00:03:40,216

Or is that something
you're looking at?

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00:03:40,476 --> 00:03:41,276

>> Sarah Shull: We've
brainstormed,

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00:03:41,276 --> 00:03:43,066

and we've talked a little
bit about, you know,

115

00:03:43,066 --> 00:03:47,146

you could use them
to build dividers

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00:03:47,436 --> 00:03:48,916
or additional partitions.

117
00:03:49,196 --> 00:03:50,816
The leading candidate
is really additional

118
00:03:50,816 --> 00:03:51,806
radiation protection...

119
00:03:51,806 --> 00:03:51,906
>> Brandi Dean: Okay.

120
00:03:52,086 --> 00:03:54,036
>> Sarah Shull: ...and using
the NCTBs that we talked

121
00:03:54,176 --> 00:03:56,436
about earlier, if
folks were watching --

122
00:03:57,166 --> 00:03:57,806
>> Brandi Dean: The cargo bags.

123
00:03:57,936 --> 00:03:58,956
>> Sarah Shull: The
cargo bags, yeah.

124
00:03:59,226 --> 00:04:00,216
We've developed a schema

125
00:04:00,216 --> 00:04:03,056
that you could deploy the
tiles using those bags.

126
00:04:03,116 --> 00:04:04,736
So, you know, you could
line your crew quarters

127

00:04:05,376 --> 00:04:07,506
with a bag that's
covered in tiles.

128
00:04:07,616 --> 00:04:09,926
The tiles aren't
real pretty to look

129
00:04:09,926 --> 00:04:11,636
at so you probably
want the bag covering,

130
00:04:11,636 --> 00:04:12,936
and that would be the
side the crew would see.

131
00:04:13,056 --> 00:04:13,586
>> Brandi Dean: In green.

132
00:04:14,206 --> 00:04:13,736
Yeah.

133
00:04:14,296 --> 00:04:14,596
>> Brandi Dean: Okay.

134
00:04:14,686 --> 00:04:16,476
Well, I guess that's two of, I
think you told me four projects

135
00:04:16,476 --> 00:04:17,826
that you're working on.

136
00:04:17,826 --> 00:04:17,966
>> Sarah Shull: Yes.

137
00:04:18,496 --> 00:04:18,876
>> Brandi Dean: Do you want

138
00:04:18,876 --> 00:04:21,786

to real quick just give us a
quick overview of the other two?

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00:04:21,926 --> 00:04:23,726

>> Sarah Shull: Yeah, so the
other two tasks that fall

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00:04:23,726 --> 00:04:25,786

under Logistics Reduction
Repurposing,

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00:04:25,956 --> 00:04:27,096

one is advanced clothing.

142

00:04:27,136 --> 00:04:29,956

So it's actually looking at
how do we reduce the volume

143

00:04:29,956 --> 00:04:32,436

of clothing we need
to fly for the crew

144

00:04:32,816 --> 00:04:34,466

by extending the life wear

145

00:04:34,466 --> 00:04:39,136

of the clothing before it
gets too smelly or, you know,

146

00:04:39,206 --> 00:04:40,226

too much microbial growth.

147

00:04:40,296 --> 00:04:42,886

So we're looking at
fabric stress, you know,

148

00:04:43,266 --> 00:04:45,756

fabrics we use here on earth
for long-duration clothing,

149

00:04:46,226 --> 00:04:47,686
some anti-microbial coatings.

150

00:04:48,056 --> 00:04:48,696
So the idea is --

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00:04:48,696 --> 00:04:49,566
>> Brandi Dean: [Inaudible]
would kill the germs?

152

00:04:49,566 --> 00:04:49,716
>> Sarah Shull: Uh-huh.

153

00:04:49,806 --> 00:04:49,966
>> Brandi Dean: Okay.

154

00:04:50,316 --> 00:04:51,466
>> Sarah Shull: The
idea is to, you know,

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00:04:51,876 --> 00:04:54,086
roughly double the wear time
of the clothing so you'd have

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00:04:54,086 --> 00:04:55,516
to fly half the amount
of clothing.

157

00:04:55,786 --> 00:04:56,606
Cut down on that volume.

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00:04:56,606 --> 00:04:57,796
>> Brandi Dean: What is the
wear time that we have now?

159

00:04:58,326 --> 00:04:59,716
>> Sarah Shull: It
varies by item.

160

00:05:00,186 --> 00:05:04,626

I don't actually have all of them memorized, but I would say,

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00:05:04,626 --> 00:05:06,306

you know, a pair of exercise shorts you may wear them

162

00:05:06,306 --> 00:05:06,736

for a week.

163

00:05:06,786 --> 00:05:06,876

>> Brandi Dean: Okay.

164

00:05:07,786 --> 00:05:09,516

>> Sarah Shull: So we would -- if that's the actual number,

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00:05:09,516 --> 00:05:10,946

we'd be looking at two weeks, say.

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00:05:11,066 --> 00:05:11,316

>> Brandi Dean: Okay.

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00:05:11,676 --> 00:05:14,196

>> Sarah Shull: Same thing, you know, shirts and pants.

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00:05:14,246 --> 00:05:16,366

They all have different numbers.

169

00:05:17,046 --> 00:05:18,896

The fourth task is a trash to supply gas.

170

00:05:19,086 --> 00:05:22,396

So that is another method of looking at what we can do

171

00:05:22,396 --> 00:05:24,756
with the trash that's generated,
and that actually looks

172

00:05:24,756 --> 00:05:27,016
at can you take the trash
that's generated and turn it

173

00:05:27,016 --> 00:05:29,416
into a useful gas like methane?

174

00:05:29,416 --> 00:05:30,956
So if you have a lander as part

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00:05:30,956 --> 00:05:32,886
of your deep space
architecture --

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00:05:33,346 --> 00:05:35,216
some folks are probably
familiar with Morpheus --

177

00:05:35,546 --> 00:05:38,606
that uses methane, could we
generate the methane the lander

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00:05:38,606 --> 00:05:39,706
needs from the trash?

179

00:05:39,826 --> 00:05:40,026
>> Brandi Dean: Okay.

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00:05:40,206 --> 00:05:42,336
>> Sarah Shull: That actually
is from our team members

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00:05:42,336 --> 00:05:44,816
from Kennedy Space Center on

that portion of the project.

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00:05:45,106 --> 00:05:47,296

>> Brandi Dean: Well, lots of interesting projects going on.

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00:05:47,296 --> 00:05:47,366

>> Sarah Shull: Yeah.

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00:05:47,366 --> 00:05:47,806

>> Brandi Dean: Thank you, again,

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00:05:47,806 --> 00:05:48,876

so much for talking with us.

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00:05:48,876 --> 00:05:49,366

>> Sarah Shull: You're welcome.

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00:05:49,366 --> 00:05:49,696

>> Brandi Dean: This, again,

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00:05:49,696 --> 00:05:51,916

was Sarah Shull the Deputy Project Manager

189

00:05:51,916 --> 00:05:54,506

for the Logistics Reduction and Repurposing Group

190

00:05:54,506 --> 00:05:57,426

of the Advanced Exploration Systems program.