
Kennedy Space Center
Question from Center

1
00:00:10,549 --> 00:00:08,230
good afternoon my name is duane brown

2
00:00:13,430 --> 00:00:10,559
with the office of communications and

3
00:00:15,829 --> 00:00:13,440
welcome to nasa headquarters today you

4
00:00:18,470 --> 00:00:15,839
will hear the latest update

5
00:00:20,310 --> 00:00:18,480
on the largest and most capable

6
00:00:21,830 --> 00:00:20,320
robotic machine going to the surface of

7
00:00:23,750 --> 00:00:21,840
another planet

8
00:00:25,670 --> 00:00:23,760
nasa's mars science laboratory otherwise

9
00:00:27,189 --> 00:00:25,680
known as msl

10
00:00:28,870 --> 00:00:27,199
scheduled to launch from the florida

11
00:00:31,109 --> 00:00:28,880
space coast this month and you hear the

12
00:00:32,790 --> 00:00:31,119
latest details on that

13
00:00:35,750 --> 00:00:32,800

information about this incredible

14
00:00:37,190 --> 00:00:35,760
mission is on www.nasa.gov

15
00:00:39,270 --> 00:00:37,200
msl

16
00:00:41,590 --> 00:00:39,280
and the press kit that has all of the

17
00:00:43,190 --> 00:00:41,600
detailed information

18
00:00:44,549 --> 00:00:43,200
on the mission and all the other

19
00:00:48,350 --> 00:00:44,559
logistics

20
00:00:50,310 --> 00:00:48,360
is at http colon slash

21
00:00:53,270 --> 00:00:50,320
go.nasa.gov

22
00:00:55,110 --> 00:00:53,280
msl press kit all one word

23
00:00:57,189 --> 00:00:55,120
we'll have short presentations from our

24
00:00:59,430 --> 00:00:57,199
speakers then we'll open it up for

25
00:01:01,830 --> 00:00:59,440
questions starting here in washington

26
00:01:03,830 --> 00:01:01,840
our nasa centers and the phone lines

27
00:01:06,469 --> 00:01:03,840
before we get started let me introduce

28
00:01:08,070 --> 00:01:06,479
you to today's speakers first up

29
00:01:09,350 --> 00:01:08,080
doug mcquistion

30
00:01:11,030 --> 00:01:09,360
director

31
00:01:14,070 --> 00:01:11,040
moss exploration program nasa

32
00:01:24,630 --> 00:01:17,749
ashwin

33
00:01:26,310 --> 00:01:24,640
deputy project scientist at nasa's jet

34
00:01:28,310 --> 00:01:26,320
propulsion laboratory pasadena

35
00:01:30,230 --> 00:01:28,320
california

36
00:01:33,190 --> 00:01:30,240
and pete tysinger

37
00:01:35,030 --> 00:01:33,200
msl project manager also at the jet

38
00:01:38,149 --> 00:01:35,040

propulsion lab and with that i'll toss

39
00:01:40,069 --> 00:01:38,159
it to doug to kick us off thanks duane

40
00:01:42,710 --> 00:01:40,079
boy it's great to be here uh it's a

41
00:01:44,389 --> 00:01:42,720
momentous occasion but of course uh

42
00:01:46,230 --> 00:01:44,399
what's really important is you know the

43
00:01:49,749 --> 00:01:46,240
last time i sat at a press conference on

44
00:01:51,830 --> 00:01:49,759
msl it was to announce a slip

45
00:01:54,149 --> 00:01:51,840
this is where we really want to be and

46
00:01:57,429 --> 00:01:54,159
and it's fantastic to be here i am very

47
00:02:00,550 --> 00:01:57,439
proud to say that msl has been assembled

48
00:02:04,310 --> 00:02:00,560
tested encapsulated and stacked on top

49
00:02:06,469 --> 00:02:04,320
of the atlas and is ready to go 15 days

50
00:02:09,109 --> 00:02:06,479
to launch pretty incredible

51
00:02:10,469 --> 00:02:09,119
it's not your father's rover this is a 2

52
00:02:13,110 --> 00:02:10,479
000 pound

53
00:02:15,270 --> 00:02:13,120
uh machine that's over six feet tall

54
00:02:17,110 --> 00:02:15,280
it's uh truly as dwayne said the largest

55
00:02:19,030 --> 00:02:17,120
and most complex piece of equipment ever

56
00:02:21,589 --> 00:02:19,040
placed on the surface of another planet

57
00:02:23,750 --> 00:02:21,599
truly a wonder in engineering

58
00:02:26,229 --> 00:02:23,760
from long island to california

59
00:02:28,150 --> 00:02:26,239
from new york to uh to florida we've

60
00:02:30,229 --> 00:02:28,160
employed thousands of people in very

61
00:02:31,670 --> 00:02:30,239
high tech careers for the last six or

62
00:02:33,750 --> 00:02:31,680
seven years on this mission and that's

63
00:02:35,430 --> 00:02:33,760

going to continue as we cruise to the

64
00:02:38,150 --> 00:02:35,440
planet and actually get to the surface

65
00:02:40,710 --> 00:02:38,160
and operate and do wonderful science

66
00:02:43,190 --> 00:02:40,720
it's the best of us imagination

67
00:02:44,710 --> 00:02:43,200
the best of us innovation

68
00:02:46,229 --> 00:02:44,720
and we couldn't just do this alone we

69
00:02:48,390 --> 00:02:46,239
have a lot of partners with us we have

70
00:02:51,350 --> 00:02:48,400
france with us we have canada we have

71
00:02:53,430 --> 00:02:51,360
germany we have russia and we have spain

72
00:02:55,030 --> 00:02:53,440
in the u.s of course to launch this we

73
00:02:56,390 --> 00:02:55,040
have united launch alliance and the

74
00:02:58,309 --> 00:02:56,400
kennedy space center in the united

75
00:02:59,430 --> 00:02:58,319
states air force of cape canaveral and

76
00:03:01,910 --> 00:02:59,440
of course we have the department of

77
00:03:03,430 --> 00:03:01,920
energy aboard so it's it's truly a

78
00:03:05,430 --> 00:03:03,440
spectacular mission with a lot of

79
00:03:08,550 --> 00:03:05,440
involvement worldwide

80
00:03:11,990 --> 00:03:08,560
can we have the first graphic please

81
00:03:14,790 --> 00:03:12,000
what you're looking at is a strategic

82
00:03:17,110 --> 00:03:14,800
integrated program of mars exploration

83
00:03:19,830 --> 00:03:17,120
we began this program back in two

84
00:03:21,830 --> 00:03:19,840
roughly in 2000 you'll see the operator

85
00:03:23,589 --> 00:03:21,840
operational missions there still include

86
00:03:26,309 --> 00:03:23,599
odyssey and mro

87
00:03:28,550 --> 00:03:26,319
of course the the rover opportunity is

88
00:03:32,869 --> 00:03:28,560

still operating we have a partnership on

89
00:03:35,589 --> 00:03:32,879
mars express phoenix we flew in 2007

90
00:03:37,670 --> 00:03:35,599
but msl sits squarely in the middle of

91
00:03:40,630 --> 00:03:37,680
this strategic to get decade-long

92
00:03:41,750 --> 00:03:40,640
activity and what it does is it bridges

93
00:03:44,630 --> 00:03:41,760
the gap

94
00:03:46,949 --> 00:03:44,640
from the past decade scientifically to

95
00:03:48,949 --> 00:03:46,959
the next decade and technologically

96
00:03:51,030 --> 00:03:48,959
scientifically from understanding the

97
00:03:53,270 --> 00:03:51,040
planet as being warmer and wetter than

98
00:03:55,110 --> 00:03:53,280
we had previously believed to the next

99
00:03:57,350 --> 00:03:55,120
decade to try to understand if it was

100
00:03:59,589 --> 00:03:57,360
ever habitable and potentially even

101
00:04:02,149 --> 00:03:59,599
seeking signs of life not life itself

102
00:04:04,470 --> 00:04:02,159
it's not a life detection mission

103
00:04:07,110 --> 00:04:04,480
technologically we move from airbag

104
00:04:09,270 --> 00:04:07,120
landings and and small systems of a few

105
00:04:11,190 --> 00:04:09,280
kilograms of payload to much larger

106
00:04:14,070 --> 00:04:11,200
systems and putting that 2000 pound

107
00:04:17,110 --> 00:04:14,080
rover on the surface

108
00:04:19,670 --> 00:04:17,120
so msl is pioneering the challenges of

109
00:04:22,469 --> 00:04:19,680
high technology we have ever increasing

110
00:04:24,550 --> 00:04:22,479
payloads we've got more accurate landing

111
00:04:26,230 --> 00:04:24,560
capabilities we've got longer life

112
00:04:28,230 --> 00:04:26,240
systems on the surface with nuclear

113
00:04:30,150 --> 00:04:28,240

power and we have state of the art

114
00:04:32,230 --> 00:04:30,160
instruments aboard

115
00:04:33,909 --> 00:04:32,240
these are also techniques that are

116
00:04:35,749 --> 00:04:33,919
necessary as we move towards the

117
00:04:37,430 --> 00:04:35,759
ultimate goal of putting humans on the

118
00:04:39,110 --> 00:04:37,440
surface of mars

119
00:04:41,030 --> 00:04:39,120
an extremely exciting time for the mars

120
00:04:43,350 --> 00:04:41,040
program and for nasa this is the

121
00:04:44,950 --> 00:04:43,360
capstone of the year of the solar system

122
00:04:46,710 --> 00:04:44,960
uh the science that we'll be doing that

123
00:04:49,110 --> 00:04:46,720
you'll hear about from oshawa and we

124
00:04:51,510 --> 00:04:49,120
couldn't even dreamed of doing 10 years

125
00:04:53,590 --> 00:04:51,520
ago at this scale and technology as well

126
00:04:55,350 --> 00:04:53,600
we've moved from pathfinder to spirit

127
00:04:57,430 --> 00:04:55,360
opportunity to msl and you'll hear more

128
00:04:59,510 --> 00:04:57,440
about the technologies from pete here

129
00:05:01,029 --> 00:04:59,520
shortly uh but it's really pretty

130
00:05:02,390 --> 00:05:01,039
amazing how in a matter of 15 years

131
00:05:04,790 --> 00:05:02,400
we've gone this far

132
00:05:06,550 --> 00:05:04,800
and again we bridge the gap from follow

133
00:05:09,189 --> 00:05:06,560
the water to seeking the signs of life

134
00:05:11,189 --> 00:05:09,199
we'll expi will will excite the nation

135
00:05:12,870 --> 00:05:11,199
will inspire the nation we're going to

136
00:05:14,310 --> 00:05:12,880
show incredible new vistas great new

137
00:05:15,830 --> 00:05:14,320
discoveries

138
00:05:17,990 --> 00:05:15,840

but most important

139
00:05:19,270 --> 00:05:18,000
is the launch is just the beginning we

140
00:05:20,790 --> 00:05:19,280
still have a little bit of cruise but

141
00:05:22,390 --> 00:05:20,800
then the key is landing in august of

142
00:05:24,550 --> 00:05:22,400
next year and that's going to be

143
00:05:26,710 --> 00:05:24,560
exciting it's very challenging never

144
00:05:28,310 --> 00:05:26,720
done it this way before but you'll hear

145
00:05:30,230 --> 00:05:28,320
about that from pete but we're we're

146
00:05:31,270 --> 00:05:30,240
just thrilled that we're at this point

147
00:05:32,710 --> 00:05:31,280
so what i'm going to do is turn it over

148
00:05:34,310 --> 00:05:32,720
to oshawa and let him talk to you about

149
00:05:36,469 --> 00:05:34,320
the science

150
00:05:37,430 --> 00:05:36,479
all right so as a scientist on this

151
00:05:39,110 --> 00:05:37,440
project

152
00:05:41,270 --> 00:05:39,120
i can tell you that this is a mars

153
00:05:42,950 --> 00:05:41,280
scientist's dream machine we're so

154
00:05:44,230 --> 00:05:42,960
excited to have this rover going to mars

155
00:05:45,749 --> 00:05:44,240
this year

156
00:05:47,670 --> 00:05:45,759
it's going to be the virtual presence

157
00:05:49,990 --> 00:05:47,680
for over 200 scientists around the world

158
00:05:51,270 --> 00:05:50,000
to explore mars and gale crater that

159
00:05:53,430 --> 00:05:51,280
we'll talk about

160
00:05:55,350 --> 00:05:53,440
this rover is not only the most

161
00:05:56,629 --> 00:05:55,360
technically capable rover ever sent to

162
00:05:58,070 --> 00:05:56,639
another planet

163
00:06:00,629 --> 00:05:58,080

but it's actually the most capable

164
00:06:02,230 --> 00:06:00,639
scientific explorer we've ever sent out

165
00:06:03,670 --> 00:06:02,240
and so with that you know we're just

166
00:06:05,270 --> 00:06:03,680
super excited

167
00:06:07,909 --> 00:06:05,280
it's about twice the size of previous

168
00:06:09,670 --> 00:06:07,919
rovers has 10 very capable scientific

169
00:06:10,870 --> 00:06:09,680
instruments and on the first graphic

170
00:06:11,670 --> 00:06:10,880
here you can see

171
00:06:14,070 --> 00:06:11,680
that

172
00:06:16,150 --> 00:06:14,080
the rover like previous rovers is has

173
00:06:18,070 --> 00:06:16,160
six wheels it is much bigger though it's

174
00:06:20,070 --> 00:06:18,080
about six feet tall

175
00:06:22,390 --> 00:06:20,080
and what really dominates the design of

176
00:06:24,550 --> 00:06:22,400
this rover is the fact that it has this

177
00:06:26,629 --> 00:06:24,560
ability to sample rocks and soils on

178
00:06:29,110 --> 00:06:26,639
mars for the first time and so it has a

179
00:06:29,909 --> 00:06:29,120
big six-foot robotic arm and the rover

180
00:06:31,990 --> 00:06:29,919
is

181
00:06:33,830 --> 00:06:32,000
partly that big because it holds two

182
00:06:35,670 --> 00:06:33,840
very capable scientific laboratories

183
00:06:37,270 --> 00:06:35,680
inside the rover

184
00:06:39,749 --> 00:06:37,280
so the one of the things that the rover

185
00:06:42,309 --> 00:06:39,759
does is to survey the landscape around

186
00:06:45,270 --> 00:06:42,319
gale crater so it does that with some hd

187
00:06:47,430 --> 00:06:45,280
cameras uh it also has

188
00:06:48,550 --> 00:06:47,440

that eye on the on the top of the rover

189
00:06:50,230 --> 00:06:48,560
which uh

190
00:06:52,150 --> 00:06:50,240
shoots out a laser and can survey the

191
00:06:53,430 --> 00:06:52,160
chemical composition within 20 feet of

192
00:06:55,189 --> 00:06:53,440
the rover

193
00:06:57,189 --> 00:06:55,199
then another thing we do is monitor the

194
00:06:59,029 --> 00:06:57,199
environment so we have a very capable

195
00:07:01,430 --> 00:06:59,039
weather station for winds and pressure

196
00:07:03,110 --> 00:07:01,440
humidity that sort of thing we can sound

197
00:07:04,870 --> 00:07:03,120
below the rover to figure out if there's

198
00:07:06,390 --> 00:07:04,880
any minerals that contain water below

199
00:07:08,469 --> 00:07:06,400
the rover

200
00:07:10,950 --> 00:07:08,479
we also detect natural high energy

201
00:07:12,469 --> 00:07:10,960
radiation this kind of radiation is

202
00:07:14,870 --> 00:07:12,479
critical to measure for the day that we

203
00:07:16,870 --> 00:07:14,880
do send humans to mars and in fact this

204
00:07:18,870 --> 00:07:16,880
sensor is being flown by the human

205
00:07:21,029 --> 00:07:18,880
exploration part of nasa

206
00:07:22,390 --> 00:07:21,039
uh on the next graphic you'll see what

207
00:07:24,950 --> 00:07:22,400
really is the meat and potatoes of this

208
00:07:27,110 --> 00:07:24,960
mission uh when we deploy that arm and

209
00:07:28,950 --> 00:07:27,120
we put out a whole bunch of sensors on

210
00:07:30,390 --> 00:07:28,960
rocks or soils that are of interest to

211
00:07:32,070 --> 00:07:30,400
the science team

212
00:07:34,950 --> 00:07:32,080
we have some tools here where we look

213
00:07:36,629 --> 00:07:34,960

close up with a magnifying glass camera

214
00:07:38,150 --> 00:07:36,639
we also have another sensor on the arm

215
00:07:40,150 --> 00:07:38,160
which takes an even more detailed

216
00:07:42,070 --> 00:07:40,160
chemical look at the composition of the

217
00:07:43,430 --> 00:07:42,080
rocks and soils

218
00:07:45,110 --> 00:07:43,440
but the you know the crowning

219
00:07:47,670 --> 00:07:45,120
achievement uh scientifically of this

220
00:07:50,469 --> 00:07:47,680
rover and technically is to

221
00:07:51,909 --> 00:07:50,479
uh drill into rocks and capture material

222
00:07:54,070 --> 00:07:51,919
from the insides of rocks which you've

223
00:07:55,510 --> 00:07:54,080
never done before on mars and that's

224
00:07:57,670 --> 00:07:55,520
really where the science will come from

225
00:07:59,909 --> 00:07:57,680
and we drill in with a big jackhammer

226
00:08:01,749 --> 00:07:59,919
drill we deliver that sample to the

227
00:08:03,990 --> 00:08:01,759
rover itself and analyze it with two

228
00:08:05,510 --> 00:08:04,000
very sophisticated instruments one of

229
00:08:07,670 --> 00:08:05,520
which measures the minerals that are in

230
00:08:09,749 --> 00:08:07,680
those rocks and soils another which

231
00:08:11,510 --> 00:08:09,759
looks element by element which chemical

232
00:08:14,469 --> 00:08:11,520
elements are there and looks for any

233
00:08:16,950 --> 00:08:14,479
organic material that might be present

234
00:08:19,350 --> 00:08:16,960
so but before we can do any of this uh

235
00:08:20,469 --> 00:08:19,360
incredible science uh and and really it

236
00:08:22,710 --> 00:08:20,479
wouldn't be worth doing if we didn't

237
00:08:25,270 --> 00:08:22,720
have a spectacular landing site as well

238
00:08:27,749 --> 00:08:25,280

and so the next graphic uh shows a

239
00:08:29,909 --> 00:08:27,759
really nice image of the sun rising over

240
00:08:32,230 --> 00:08:29,919
mars and you can see the cratered

241
00:08:33,509 --> 00:08:32,240
southern highlands and the near

242
00:08:35,190 --> 00:08:33,519
part of the picture

243
00:08:36,870 --> 00:08:35,200
the smooth plains in the far part and

244
00:08:38,230 --> 00:08:36,880
right on that boundary in the middle of

245
00:08:40,469 --> 00:08:38,240
the image here there's a crater with a

246
00:08:41,990 --> 00:08:40,479
mountain inside of it and that mountain

247
00:08:43,029 --> 00:08:42,000
inside the crater is what caught the eye

248
00:08:45,030 --> 00:08:43,039
of the scientists that have been

249
00:08:46,790 --> 00:08:45,040
studying mars for the last decade and

250
00:08:47,670 --> 00:08:46,800
resulted in being chosen for this

251
00:08:49,590 --> 00:08:47,680
mission

252
00:08:51,670 --> 00:08:49,600
if you go to the next graphic

253
00:08:53,350 --> 00:08:51,680
you'll see that gale crater is about 100

254
00:08:55,190 --> 00:08:53,360
miles across

255
00:08:56,150 --> 00:08:55,200
that yellow ellipse is where we will

256
00:08:58,389 --> 00:08:56,160
land

257
00:09:00,230 --> 00:08:58,399
curiosity and then we'll drive towards

258
00:09:01,750 --> 00:09:00,240
the mound the mound itself is over three

259
00:09:03,590 --> 00:09:01,760
miles high

260
00:09:05,350 --> 00:09:03,600
and on the next graphic i'll tell you a

261
00:09:07,350 --> 00:09:05,360
little bit about why this mound is so

262
00:09:09,430 --> 00:09:07,360
spectacular scientifically

263
00:09:11,269 --> 00:09:09,440

it's actually composed of layered rock

264
00:09:13,430 --> 00:09:11,279
and we see that from the orbiters that

265
00:09:15,350 --> 00:09:13,440
are around mars now mapping the planet

266
00:09:17,670 --> 00:09:15,360
we've discovered that the layers are

267
00:09:19,750 --> 00:09:17,680
flat which means probably sediment at

268
00:09:21,590 --> 00:09:19,760
one point filled the entire crater and

269
00:09:23,190 --> 00:09:21,600
now it's been stripped away

270
00:09:24,630 --> 00:09:23,200
but even more

271
00:09:26,310 --> 00:09:24,640
interestingly

272
00:09:28,790 --> 00:09:26,320
the layers are made up of different

273
00:09:31,110 --> 00:09:28,800
material the bottom layers are mixture

274
00:09:33,269 --> 00:09:31,120
of clays and sulfates then you go into

275
00:09:34,710 --> 00:09:33,279
layers that are just sulfate salts and

276
00:09:36,870 --> 00:09:34,720
then you get into some upper layers

277
00:09:38,630 --> 00:09:36,880
which are just frankly uninteresting

278
00:09:41,350 --> 00:09:38,640
martian dust

279
00:09:43,430 --> 00:09:41,360
and it's that change over time which the

280
00:09:45,829 --> 00:09:43,440
whole planet has experienced but what's

281
00:09:47,990 --> 00:09:45,839
incredible about gale is it's all in one

282
00:09:50,389 --> 00:09:48,000
place here probably the entire early

283
00:09:52,389 --> 00:09:50,399
history of mars is here for us to to

284
00:09:54,070 --> 00:09:52,399
drive out of that ellipse over several

285
00:09:56,070 --> 00:09:54,080
months and then start climbing this

286
00:09:58,630 --> 00:09:56,080
mountain with curiosity so we couldn't

287
00:09:59,990 --> 00:09:58,640
be more excited about that uh and before

288
00:10:02,150 --> 00:10:00,000

we do any of this we got to get there

289
00:10:03,590 --> 00:10:02,160
and so that's what uh pete tyson will

290
00:10:04,949 --> 00:10:03,600
talk with you about

291
00:10:06,630 --> 00:10:04,959
thank you ashlyn

292
00:10:08,949 --> 00:10:06,640
um as uh

293
00:10:10,870 --> 00:10:08,959
as doug mentioned we are in florida uh

294
00:10:12,550 --> 00:10:10,880
we are prepared

295
00:10:14,230 --> 00:10:12,560
on the vehicle and prepared to go i want

296
00:10:16,949 --> 00:10:14,240
to show some pictures of the of the

297
00:10:18,949 --> 00:10:16,959
build-up of the vehicle

298
00:10:20,550 --> 00:10:18,959
uh when you land on mars when you go to

299
00:10:23,110 --> 00:10:20,560
land on mars what you're really talking

300
00:10:24,710 --> 00:10:23,120
about is three vehicles not just one um

301
00:10:25,670 --> 00:10:24,720
there is the vehicle that gets you to

302
00:10:27,670 --> 00:10:25,680
mars

303
00:10:29,110 --> 00:10:27,680
um uh there is the vehicle that actually

304
00:10:30,310 --> 00:10:29,120
penetrates the atmosphere and goes

305
00:10:32,150 --> 00:10:30,320
through the entry descent and landing

306
00:10:33,670 --> 00:10:32,160
portion of the of the mission and then

307
00:10:35,110 --> 00:10:33,680
there is the rover that eventually gets

308
00:10:36,389 --> 00:10:35,120
deposited on the surface and i'll show

309
00:10:38,150 --> 00:10:36,399
you some pictures

310
00:10:41,030 --> 00:10:38,160
of how we build up that vehicle in in

311
00:10:44,069 --> 00:10:41,040
that way uh on this uh in the first

312
00:10:46,389 --> 00:10:44,079
graphic is the uh is the rover itself uh

313
00:10:48,389 --> 00:10:46,399

it you can see uh it's as ashwin

314
00:10:50,790 --> 00:10:48,399
mentioned it's a six wheel what we call

315
00:10:52,630 --> 00:10:50,800
rocker bulky system you can see arm on

316
00:10:55,190 --> 00:10:52,640
the left with a turret assembly which

317
00:10:56,870 --> 00:10:55,200
has a several of the science instruments

318
00:10:59,190 --> 00:10:56,880
and you can just barely make out in this

319
00:11:01,269 --> 00:10:59,200
photograph the mast above

320
00:11:04,230 --> 00:11:01,279
as doug mentioned it's about 900

321
00:11:06,230 --> 00:11:04,240
kilograms or roughly 2 000 pounds i

322
00:11:08,550 --> 00:11:06,240
could have the next graphic please

323
00:11:10,470 --> 00:11:08,560
um as i'm as doug mentioned this

324
00:11:12,790 --> 00:11:10,480
requires a new and novel system in order

325
00:11:16,310 --> 00:11:12,800
to get to mars we're not landing uh like

326
00:11:18,069 --> 00:11:16,320
murr uh did on uh on the uh airbags we

327
00:11:19,590 --> 00:11:18,079
are landing propulsive like phoenix but

328
00:11:21,829 --> 00:11:19,600
we're landing a rover and it's not a

329
00:11:23,990 --> 00:11:21,839
stationary lander and so what you see

330
00:11:26,710 --> 00:11:24,000
on the graphic is the descent stage that

331
00:11:28,710 --> 00:11:26,720
we use to propulsively lower the rover

332
00:11:31,430 --> 00:11:28,720
and the uh and itself to the surface of

333
00:11:33,350 --> 00:11:31,440
mars uh you can see the eight large main

334
00:11:35,990 --> 00:11:33,360
landing engines and then off to the

335
00:11:38,310 --> 00:11:36,000
right uh that large uh kind of surfboard

336
00:11:39,990 --> 00:11:38,320
shaped picture uh feature is the landing

337
00:11:41,670 --> 00:11:40,000
radar which you use to measure the

338
00:11:43,590 --> 00:11:41,680

velocity that we land at and the

339
00:11:45,829 --> 00:11:43,600
altitude both very critical

340
00:11:48,550 --> 00:11:45,839
for this particular landing system i

341
00:11:50,389 --> 00:11:48,560
could have the next graphic please

342
00:11:51,910 --> 00:11:50,399
this shows the rover underneath that

343
00:11:53,190 --> 00:11:51,920
descent stage

344
00:11:54,389 --> 00:11:53,200
you can see the

345
00:11:55,590 --> 00:11:54,399
reddish

346
00:11:57,269 --> 00:11:55,600
elements are

347
00:11:59,030 --> 00:11:57,279
protective covers around the main

348
00:12:00,710 --> 00:11:59,040
landing engines they're used when we put

349
00:12:01,670 --> 00:12:00,720
assembling things so that they don't get

350
00:12:03,269 --> 00:12:01,680
damaged

351
00:12:05,269 --> 00:12:03,279
and you can see that the composite of

352
00:12:08,310 --> 00:12:05,279
that the descent stage plus the rover is

353
00:12:10,310 --> 00:12:08,320
being put up inside the the back shell

354
00:12:11,670 --> 00:12:10,320
that's the top half of the entry of the

355
00:12:13,750 --> 00:12:11,680
entry vehicle

356
00:12:15,910 --> 00:12:13,760
if i could have the next graphic please

357
00:12:17,750 --> 00:12:15,920
uh and now you see that that that

358
00:12:20,230 --> 00:12:17,760
assemblage is now up inside the white

359
00:12:21,190 --> 00:12:20,240
back shell and below it is the heat

360
00:12:22,790 --> 00:12:21,200
shield

361
00:12:24,550 --> 00:12:22,800
looks very much like an apollo entry

362
00:12:26,550 --> 00:12:24,560
capsule except in fact it is larger than

363
00:12:29,670 --> 00:12:26,560

an apollo empty capsule it is about four

364
00:12:31,590 --> 00:12:29,680
and a half meters across at the bottom

365
00:12:33,670 --> 00:12:31,600
i could have the next graphic

366
00:12:34,790 --> 00:12:33,680
this is the entire vehicle that goes to

367
00:12:36,150 --> 00:12:34,800
mars

368
00:12:41,670 --> 00:12:36,160
the

369
00:12:43,670 --> 00:12:41,680
white uh circumferential uh banding is

370
00:12:45,110 --> 00:12:43,680
the is the crew stage

371
00:12:47,430 --> 00:12:45,120
that is all the equipment that we need

372
00:12:49,990 --> 00:12:47,440
to get to mars but we don't need at mars

373
00:12:52,150 --> 00:12:50,000
it includes telecommunications equipment

374
00:12:54,870 --> 00:12:52,160
the solar rays for the interplanetary uh

375
00:12:56,389 --> 00:12:54,880
transverse and uh and the propulsion

376
00:12:57,829 --> 00:12:56,399
system to do the uh trajectory

377
00:13:00,069 --> 00:12:57,839
connection maneuvers in order to get us

378
00:13:01,269 --> 00:13:00,079
navigated to the right place for entry

379
00:13:03,509 --> 00:13:01,279
when we launch

380
00:13:05,350 --> 00:13:03,519
this is actually uh upside down we

381
00:13:06,949 --> 00:13:05,360
actually launch with the heat shield up

382
00:13:08,230 --> 00:13:06,959
and the cruise stage down on top of the

383
00:13:09,829 --> 00:13:08,240
atlas

384
00:13:11,509 --> 00:13:09,839
next please

385
00:13:12,389 --> 00:13:11,519
and here you can see kind of the last

386
00:13:14,310 --> 00:13:12,399
picture

387
00:13:16,310 --> 00:13:14,320
of the vehicle as we could see it as a

388
00:13:18,230 --> 00:13:16,320

total vehicle before it was encapsulated

389
00:13:20,230 --> 00:13:18,240
in the fairing that shows the atlas

390
00:13:21,990 --> 00:13:20,240
fairing which is then put around the

391
00:13:24,629 --> 00:13:22,000
vehicle and then the very impressive

392
00:13:26,790 --> 00:13:24,639
vehicle is transported to the uh very

393
00:13:29,509 --> 00:13:26,800
close integration facility at the launch

394
00:13:31,190 --> 00:13:29,519
pad if i can see the next graphic please

395
00:13:32,150 --> 00:13:31,200
this shows the vehicle inside the

396
00:13:34,470 --> 00:13:32,160
fairing

397
00:13:36,069 --> 00:13:34,480
being lifted to the top of the of the

398
00:13:37,590 --> 00:13:36,079
atlas i think that occurred on the on

399
00:13:39,509 --> 00:13:37,600
the 2nd of november

400
00:13:40,550 --> 00:13:39,519
uh and if i can see the next graphic

401
00:13:42,150 --> 00:13:40,560
please

402
00:13:44,629 --> 00:13:42,160
that shows the assembled vehicle as it

403
00:13:46,550 --> 00:13:44,639
currently is we're going through final

404
00:13:48,629 --> 00:13:46,560
launch vehicle operations and we're

405
00:13:50,069 --> 00:13:48,639
going through final electrical testing

406
00:13:51,509 --> 00:13:50,079
on side the rover

407
00:13:53,430 --> 00:13:51,519
and we'll be all prepared to launch on

408
00:13:54,790 --> 00:13:53,440
the 25th of november the friday after

409
00:13:56,710 --> 00:13:54,800
thanksgiving

410
00:13:58,790 --> 00:13:56,720
of course once we launched the vehicle

411
00:14:00,790 --> 00:13:58,800
to mars that is that is only the first

412
00:14:02,790 --> 00:14:00,800
part of this of the of the journey in

413
00:14:04,629 --> 00:14:02,800

order to get ashwin science instruments

414
00:14:07,269 --> 00:14:04,639
to a place where you can do science

415
00:14:09,910 --> 00:14:07,279
and i'll show you a uh uh an animation

416
00:14:12,870 --> 00:14:09,920
now of the uh kind of the total mission

417
00:14:15,590 --> 00:14:12,880
in two minutes uh so bear with us

418
00:14:17,910 --> 00:14:15,600
we can start that please we inject on us

419
00:14:19,509 --> 00:14:17,920
on the centaur upper stage and we are

420
00:14:20,949 --> 00:14:19,519
kicked off on the cruise trajectory it

421
00:14:23,590 --> 00:14:20,959
takes eight and a half months for us to

422
00:14:26,310 --> 00:14:23,600
get to mars we are a slow spinner

423
00:14:28,310 --> 00:14:26,320
uh and uh and that traverse

424
00:14:30,310 --> 00:14:28,320
we arrive at mars doing about 12 000

425
00:14:32,310 --> 00:14:30,320
miles an hour we kick off the cruise

426
00:14:34,230 --> 00:14:32,320
stage and we enter the atmosphere

427
00:14:35,430 --> 00:14:34,240
you can see the uh the thrusting of

428
00:14:37,430 --> 00:14:35,440
thrusters that we use to do the

429
00:14:39,189 --> 00:14:37,440
precision landing that both doug uh

430
00:14:40,230 --> 00:14:39,199
indicated in auschwitz shield delaney

431
00:14:42,310 --> 00:14:40,240
ellipse

432
00:14:44,230 --> 00:14:42,320
at 2 000 miles an hour

433
00:14:46,310 --> 00:14:44,240
excuse me mach 2 about a thousand miles

434
00:14:48,069 --> 00:14:46,320
an hour we kick out the parachute

435
00:14:49,990 --> 00:14:48,079
drop off the heat shield at about 10

436
00:14:52,069 --> 00:14:50,000
kilometers high and then about two

437
00:14:54,310 --> 00:14:52,079
kilometers high we drop off the descent

438
00:14:55,670 --> 00:14:54,320

stage and propulsively lower ourselves

439
00:14:56,949 --> 00:14:55,680
toward the planet

440
00:14:58,949 --> 00:14:56,959
when we're a couple hundred meters off

441
00:15:01,350 --> 00:14:58,959
the ground we actually lower the rover

442
00:15:02,550 --> 00:15:01,360
on what's called the sky crane

443
00:15:04,870 --> 00:15:02,560
and uh

444
00:15:07,030 --> 00:15:04,880
and cut the bridle and then the descent

445
00:15:10,150 --> 00:15:07,040
stage flies away and we have the rover

446
00:15:11,350 --> 00:15:10,160
sitting on six wheels on the surface

447
00:15:13,350 --> 00:15:11,360
we will then

448
00:15:15,110 --> 00:15:13,360
either do institute science if we happen

449
00:15:16,710 --> 00:15:15,120
to land somewhere exciting or we will

450
00:15:17,910 --> 00:15:16,720
traverse to a science interesting

451
00:15:18,710 --> 00:15:17,920
science site

452
00:15:20,870 --> 00:15:18,720
um

453
00:15:22,710 --> 00:15:20,880
and and we'll see here

454
00:15:24,470 --> 00:15:22,720
going up to an outcrop

455
00:15:25,350 --> 00:15:24,480
deploying the arm which contains the

456
00:15:27,590 --> 00:15:25,360
drill

457
00:15:29,509 --> 00:15:27,600
which we used to collect samples uh

458
00:15:31,509 --> 00:15:29,519
showing the deposit of that sample and

459
00:15:33,030 --> 00:15:31,519
one of the science instruments uh for

460
00:15:35,749 --> 00:15:33,040
its analysis

461
00:15:36,629 --> 00:15:35,759
um it's a very complicated rover uh we

462
00:15:39,269 --> 00:15:36,639
will

463
00:15:41,509 --> 00:15:39,279

take our time when we get to the surface

464
00:15:44,069 --> 00:15:41,519
the initial science will probably not be

465
00:15:45,829 --> 00:15:44,079
coming very fast it will take a lot of

466
00:15:47,590 --> 00:15:45,839
our how good is the rover in its

467
00:15:49,509 --> 00:15:47,600
condition what the science terrain like

468
00:15:51,430 --> 00:15:49,519
where the closest science targets how

469
00:15:53,430 --> 00:15:51,440
does the drilling really work on mars

470
00:15:55,509 --> 00:15:53,440
very difficult to test that on earth so

471
00:15:57,749 --> 00:15:55,519
it'll be a while to get the first real

472
00:15:59,350 --> 00:15:57,759
samples back but it's a two year long

473
00:16:01,030 --> 00:15:59,360
mission and we're expecting tremendous

474
00:16:03,509 --> 00:16:01,040
results

475
00:16:06,069 --> 00:16:03,519
entry descent landing is always a

476
00:16:08,310 --> 00:16:06,079
an exciting time and a challenging time

477
00:16:09,829 --> 00:16:08,320
we're confident in our ability to do it

478
00:16:11,509 --> 00:16:09,839
successfully at the planet but it is

479
00:16:13,110 --> 00:16:11,519
clearly not risk-free as you can just

480
00:16:14,949 --> 00:16:13,120
free as you can see from the complexity

481
00:16:17,350 --> 00:16:14,959
and the animation

482
00:16:18,949 --> 00:16:17,360
dwayne okay thank you gentlemen

483
00:16:20,069 --> 00:16:18,959
okay okay what we're going to do is

484
00:16:22,550 --> 00:16:20,079
actually we're going to go down to the

485
00:16:24,629 --> 00:16:22,560
kennedy space center uh where they're

486
00:16:26,150 --> 00:16:24,639
preparing for the launch and hopefully

487
00:16:28,310 --> 00:16:26,160
preparing for

488
00:16:30,230 --> 00:16:28,320

a delusion for folks for thanksgiving

489
00:16:32,470 --> 00:16:30,240
dinner there um

490
00:16:34,949 --> 00:16:32,480
so uh kennedy space center uh you're up

491
00:16:40,150 --> 00:16:34,959
first at bat and uh let's have the first

492
00:16:44,949 --> 00:16:41,670
hello this is marcia dunn of the

493
00:16:47,430 --> 00:16:44,959
associated press i'm wondering could you

494
00:16:49,749 --> 00:16:47,440
give a list of some specific signs of

495
00:16:50,790 --> 00:16:49,759
life you might be looking for with the

496
00:16:53,430 --> 00:16:50,800
rover

497
00:16:55,990 --> 00:16:53,440
and why not

498
00:16:58,710 --> 00:16:56,000
why didn't you just put some life

499
00:17:02,069 --> 00:16:58,720
detecting equipment on board to actually

500
00:17:04,789 --> 00:17:02,079
look for real signs of life

501
00:17:07,350 --> 00:17:04,799
sure i can answer that uh it's important

502
00:17:09,110 --> 00:17:07,360
to know that uh this mission is really

503
00:17:10,870 --> 00:17:09,120
uh has a purpose of setting us up for

504
00:17:13,189 --> 00:17:10,880
the day when we'll go to mars and do the

505
00:17:15,189 --> 00:17:13,199
life detection experiments it turns out

506
00:17:17,029 --> 00:17:15,199
those are pretty hard to do and you

507
00:17:18,630 --> 00:17:17,039
actually need to know a lot about mars

508
00:17:19,829 --> 00:17:18,640
to understand where to go to do those

509
00:17:21,750 --> 00:17:19,839
experiments

510
00:17:23,669 --> 00:17:21,760
so the goal of this as doug mentioned is

511
00:17:25,429 --> 00:17:23,679
to look for habitable environments on

512
00:17:27,669 --> 00:17:25,439
mars these would be environments that

513
00:17:28,870 --> 00:17:27,679

are capable of supporting life we

514
00:17:30,789 --> 00:17:28,880
actually are pretty limited in our

515
00:17:32,230 --> 00:17:30,799
knowledge of where to look for those we

516
00:17:33,909 --> 00:17:32,240
have gale crater which is a very

517
00:17:36,070 --> 00:17:33,919
promising site

518
00:17:38,230 --> 00:17:36,080
because it has some things we can detect

519
00:17:41,350 --> 00:17:38,240
from orbit that would indicate a

520
00:17:43,110 --> 00:17:41,360
habitable environment for example it has

521
00:17:44,950 --> 00:17:43,120
some geologic evidence that water was

522
00:17:47,110 --> 00:17:44,960
around

523
00:17:48,230 --> 00:17:47,120
we hope in fact to search for organics

524
00:17:50,710 --> 00:17:48,240
with this mission that's another

525
00:17:52,390 --> 00:17:50,720
requirement for life as we know it

526
00:17:53,909 --> 00:17:52,400
but this mission is really about looking

527
00:17:57,669 --> 00:17:53,919
for those habitable environments and not

528
00:18:03,590 --> 00:18:00,870
another question from kennedy um thank

529
00:18:06,630 --> 00:18:03,600
you and how might this rover pave the

530
00:18:10,789 --> 00:18:06,640
way for future human explorers how might

531
00:18:14,310 --> 00:18:12,549
that's a very good question

532
00:18:16,470 --> 00:18:14,320
many of the things that you need for

533
00:18:17,590 --> 00:18:16,480
humans to explore the planet

534
00:18:19,510 --> 00:18:17,600
um

535
00:18:21,830 --> 00:18:19,520
involve obviously as as pete was talking

536
00:18:23,750 --> 00:18:21,840
about landing that's very complicated so

537
00:18:25,270 --> 00:18:23,760
we are shrinking landing ellipses

538
00:18:28,150 --> 00:18:25,280

dramatically from

539
00:18:29,990 --> 00:18:28,160
um 100 kilometers or so down to a small

540
00:18:32,950 --> 00:18:30,000
circle of about 20. so that type of

541
00:18:35,190 --> 00:18:32,960
precision landing is a direct precursor

542
00:18:36,950 --> 00:18:35,200
the ability to manipulate and handle

543
00:18:38,630 --> 00:18:36,960
samples robotically on the surface in

544
00:18:40,310 --> 00:18:38,640
other words all the sample handling that

545
00:18:43,350 --> 00:18:40,320
needs to be done to get

546
00:18:45,510 --> 00:18:43,360
samples into ashland's instruments

547
00:18:48,390 --> 00:18:45,520
is also something that uh would be

548
00:18:50,390 --> 00:18:48,400
useful in in getting humans to mars

549
00:18:51,750 --> 00:18:50,400
larger masses to the surface you have to

550
00:18:54,630 --> 00:18:51,760
resupply

551
00:18:56,549 --> 00:18:54,640
um astronauts on the surface as well as

552
00:18:58,789 --> 00:18:56,559
uh you know feed them and water and

553
00:19:00,470 --> 00:18:58,799
other kinds of supplies and so this is a

554
00:19:01,510 --> 00:19:00,480
good landing system to do that type of

555
00:19:03,029 --> 00:19:01,520
thing

556
00:19:05,350 --> 00:19:03,039
and just learning how to get through the

557
00:19:08,470 --> 00:19:05,360
atmosphere with much larger masses will

558
00:19:10,470 --> 00:19:08,480
take us to humans now oshawa mentioned a

559
00:19:12,310 --> 00:19:10,480
specific instrument is called rad which

560
00:19:14,950 --> 00:19:12,320
is a radiation detector provided by the

561
00:19:16,390 --> 00:19:14,960
human exploration organization at nasa

562
00:19:18,470 --> 00:19:16,400
that actually is the first time we've

563
00:19:21,350 --> 00:19:18,480

taken measurements on the surface in

564
00:19:23,110 --> 00:19:21,360
great detail over several uh several

565
00:19:25,110 --> 00:19:23,120
earth years and maybe several martian

566
00:19:27,110 --> 00:19:25,120
years if we're lucky

567
00:19:28,710 --> 00:19:27,120
and that is obviously going directly

568
00:19:30,630 --> 00:19:28,720
into the database to understand how much

569
00:19:32,789 --> 00:19:30,640
radiation would astronauts be exposed to

570
00:19:35,270 --> 00:19:32,799
on the surface over time and then how

571
00:19:37,669 --> 00:19:35,280
you can actually mitigate some of those

572
00:19:39,110 --> 00:19:37,679
uh effects so those are just a few of

573
00:19:40,150 --> 00:19:39,120
the issues that could help with humans

574
00:19:41,990 --> 00:19:40,160
to mars

575
00:19:44,789 --> 00:19:42,000
and before we take the next question to

576
00:19:46,310 --> 00:19:44,799
kennedy just uh a note for the media

577
00:19:48,070 --> 00:19:46,320
watching this and here

578
00:19:49,430 --> 00:19:48,080
the kennedy space center will be issuing

579
00:19:52,070 --> 00:19:49,440
immediate advisory if they haven't

580
00:19:54,549 --> 00:19:52,080
already that pretty much lays out a

581
00:19:57,110 --> 00:19:54,559
virtual buffet of diverse briefings that

582
00:19:59,510 --> 00:19:57,120
talk about mars getting to the specifics

583
00:20:01,510 --> 00:19:59,520
of the science and also a press briefing

584
00:20:03,990 --> 00:20:01,520
from the johnson space center on the

585
00:20:05,669 --> 00:20:04,000
human future human exploration and the

586
00:20:07,430 --> 00:20:05,679
synergy between robotics and human

587
00:20:08,630 --> 00:20:07,440
exploration so stay tuned for that

588
00:20:11,909 --> 00:20:08,640

briefing

589
00:20:13,750 --> 00:20:11,919
and on the website www.nasa.gov

590
00:20:15,190 --> 00:20:13,760
msl you'll also see that coming out of

591
00:20:16,310 --> 00:20:15,200
the kennedy space center and nasa

592
00:20:22,070 --> 00:20:16,320
headquarters

593
00:20:26,710 --> 00:20:24,470
uh thanks this is todd halperson of

594
00:20:29,590 --> 00:20:26,720
florida today for doug doug could you

595
00:20:32,950 --> 00:20:29,600
update us on uh negotiations with the

596
00:20:34,470 --> 00:20:32,960
europeans uh in regard to the 2016

597
00:20:35,350 --> 00:20:34,480
mission what the

598
00:20:37,909 --> 00:20:35,360
uh

599
00:20:39,270 --> 00:20:37,919
split of responsibilities would be and

600
00:20:40,789 --> 00:20:39,280
and whether you guys are going to

601
00:20:43,430 --> 00:20:40,799
actually have the

602
00:20:46,390 --> 00:20:43,440
the money to do it and be able to come

603
00:20:48,549 --> 00:20:46,400
to an agreement with the europeans

604
00:20:51,750 --> 00:20:48,559
uh todd i'd like to keep this focused on

605
00:20:54,070 --> 00:20:51,760
msl but i'll give you a couple of second

606
00:20:55,590 --> 00:20:54,080
answer here um we certainly have

607
00:20:58,710 --> 00:20:55,600
continued obviously our work with the

608
00:21:00,390 --> 00:20:58,720
europeans um obviously the u.s and esa

609
00:21:03,350 --> 00:21:00,400
realize we may have some budget concerns

610
00:21:04,870 --> 00:21:03,360
in the future and so esa has approached

611
00:21:07,350 --> 00:21:04,880
russia about potentially providing

612
00:21:09,830 --> 00:21:07,360
launch vehicle and maybe be involved

613
00:21:11,990 --> 00:21:09,840

at this point since the 2012 budget

614
00:21:13,990 --> 00:21:12,000
isn't passed the 2013 budget is still in

615
00:21:16,070 --> 00:21:14,000
development i really can't talk about

616
00:21:17,590 --> 00:21:16,080
the budgets any further than that so i'd

617
00:21:19,029 --> 00:21:17,600
kind of like to leave it at that todd

618
00:21:20,470 --> 00:21:19,039
and in a few months i think we'll have

619
00:21:21,990 --> 00:21:20,480
more that we can share

620
00:21:23,990 --> 00:21:22,000
and so dwayne i'd kind of like to keep

621
00:21:25,430 --> 00:21:24,000
it on msl if you don't mind

622
00:21:31,990 --> 00:21:25,440
roger that um

623
00:21:36,310 --> 00:21:33,029
um

624
00:21:39,110 --> 00:21:36,320
yeah i won't ask about america's future

625
00:21:42,549 --> 00:21:39,120
uh programs at mars and we'll just stick

626
00:21:44,789 --> 00:21:42,559
with msl i'm wondering uh you know the

627
00:21:46,549 --> 00:21:44,799
skycrane um

628
00:21:48,549 --> 00:21:46,559
entry landing

629
00:21:50,870 --> 00:21:48,559
entry and landing scheme is quite

630
00:21:53,510 --> 00:21:50,880
different from anything you've ever done

631
00:21:55,909 --> 00:21:53,520
before and and to a lot of us that we

632
00:21:59,750 --> 00:21:55,919
sitting on the sidelines that it seems

633
00:22:02,310 --> 00:21:59,760
to be well um

634
00:22:03,990 --> 00:22:02,320
scary um i'm wondering if you can kind

635
00:22:06,870 --> 00:22:04,000
of describe

636
00:22:08,549 --> 00:22:06,880
or compare it to some kind of mechanism

637
00:22:10,470 --> 00:22:08,559
on earth and

638
00:22:12,390 --> 00:22:10,480

exactly you know whether you're going to

639
00:22:14,789 --> 00:22:12,400
be biting your nails during that

640
00:22:16,630 --> 00:22:14,799
descendant entry

641
00:22:19,029 --> 00:22:16,640
well i think entry any entry descent

642
00:22:21,029 --> 00:22:19,039
landing on mars is is a place where you

643
00:22:23,350 --> 00:22:21,039
uh where you take paws and bite your

644
00:22:27,110 --> 00:22:23,360
nails a little bit it

645
00:22:29,029 --> 00:22:27,120
it's not a risk-free environment um when

646
00:22:31,029 --> 00:22:29,039
when the agency decided the objectives

647
00:22:32,390 --> 00:22:31,039
for this mission and and the suite of

648
00:22:33,990 --> 00:22:32,400
instruments that would be required to

649
00:22:35,669 --> 00:22:34,000
perform the science

650
00:22:37,909 --> 00:22:35,679
and and we and we saw that we had to

651
00:22:39,510 --> 00:22:37,919
develop a very large rover uh it was

652
00:22:41,190 --> 00:22:39,520
very clear that that was beyond the

653
00:22:42,549 --> 00:22:41,200
scale of airbags to be able to land

654
00:22:44,390 --> 00:22:42,559
successfully

655
00:22:46,390 --> 00:22:44,400
and so we had to land in a propulsive

656
00:22:47,110 --> 00:22:46,400
way on the planet

657
00:22:52,230 --> 00:22:47,120
and

658
00:22:53,590 --> 00:22:52,240
propulsively on the planet that's to put

659
00:22:54,870 --> 00:22:53,600
the rover on top of the propulsion

660
00:22:56,390 --> 00:22:54,880
system or put the rover under the

661
00:22:58,230 --> 00:22:56,400
propulsion system

662
00:22:59,990 --> 00:22:58,240
um if we put the rover on top of the

663
00:23:01,750 --> 00:23:00,000

propulsion system kind of a traditional

664
00:23:03,590 --> 00:23:01,760
way that you've seen it looks i mean

665
00:23:07,190 --> 00:23:03,600
without a rover but you've seen

666
00:23:09,430 --> 00:23:07,200
a viking and then and then phoenix

667
00:23:10,630 --> 00:23:09,440
you've got to get a 2 000 pound rover

668
00:23:13,029 --> 00:23:10,640
off the top

669
00:23:15,909 --> 00:23:13,039
and that was a daunting daunting thing

670
00:23:17,669 --> 00:23:15,919
to do um in examining this we said well

671
00:23:19,190 --> 00:23:17,679
we already have a system that's capable

672
00:23:21,270 --> 00:23:19,200
of contacting the surface and

673
00:23:22,630 --> 00:23:21,280
interacting with the surface a landing

674
00:23:24,230 --> 00:23:22,640
gear as it will that's the six wheel

675
00:23:25,669 --> 00:23:24,240
rocker bogey system

676
00:23:27,510 --> 00:23:25,679
so the challenge is really to just

677
00:23:29,590 --> 00:23:27,520
simply i shouldn't say simply is to put

678
00:23:31,750 --> 00:23:29,600
it there softly enough

679
00:23:33,990 --> 00:23:31,760
in a controlled enough fashion

680
00:23:35,270 --> 00:23:34,000
and um and i don't want to say that we

681
00:23:36,630 --> 00:23:35,280
looked at this flippantly because there

682
00:23:38,630 --> 00:23:36,640
were an awful lot of people that had

683
00:23:40,310 --> 00:23:38,640
exactly your same reaction of you've got

684
00:23:42,710 --> 00:23:40,320
to be kidding

685
00:23:43,830 --> 00:23:42,720
but we did an awful lot of independent

686
00:23:45,669 --> 00:23:43,840
reviews

687
00:23:47,830 --> 00:23:45,679
we went to an awful lot of non-nasa

688
00:23:49,750 --> 00:23:47,840

control specialists the people actually

689
00:23:51,669 --> 00:23:49,760
fly helicopter sky cranes we got them in

690
00:23:53,750 --> 00:23:51,679
the game to talk about whether or not

691
00:23:54,710 --> 00:23:53,760
this was not only an achievable design

692
00:23:56,070 --> 00:23:54,720
system

693
00:23:57,909 --> 00:23:56,080
but whether or not we could put together

694
00:23:59,430 --> 00:23:57,919
a test program that would verify it

695
00:24:01,110 --> 00:23:59,440
adequately enough

696
00:24:03,110 --> 00:24:01,120
and we convinced ourselves and were

697
00:24:05,350 --> 00:24:03,120
reviewed several times by the agency

698
00:24:06,950 --> 00:24:05,360
that we were able to do that and and so

699
00:24:08,390 --> 00:24:06,960
that's the system that we put together

700
00:24:09,909 --> 00:24:08,400
uh we have done

701
00:24:11,269 --> 00:24:09,919
a tremendous amount of entry decent

702
00:24:14,070 --> 00:24:11,279
landing reviews

703
00:24:15,990 --> 00:24:14,080
uh and tests um you can't do the test in

704
00:24:18,549 --> 00:24:16,000
an end-to-end sense because you can't

705
00:24:20,710 --> 00:24:18,559
land on mars on the earth but you can do

706
00:24:22,630 --> 00:24:20,720
the test in a piecewise sense

707
00:24:24,390 --> 00:24:22,640
so we have done deployments of the sky

708
00:24:25,269 --> 00:24:24,400
crane with test equipment and we have

709
00:24:26,070 --> 00:24:25,279
done

710
00:24:28,470 --> 00:24:26,080
um

711
00:24:31,029 --> 00:24:28,480
surface contact testing to to do the

712
00:24:33,350 --> 00:24:31,039
landing we have done radar testing

713
00:24:35,669 --> 00:24:33,360

on helicopters and f-18 jets out at

714
00:24:37,990 --> 00:24:35,679
dryden to do basically test all the

715
00:24:39,669 --> 00:24:38,000
components of the sky crane system so

716
00:24:41,350 --> 00:24:39,679
we're confident that we've done our due

717
00:24:43,110 --> 00:24:41,360
diligence and uh

718
00:24:43,909 --> 00:24:43,120
and you know mars may interfere with us

719
00:24:45,590 --> 00:24:43,919
but

720
00:24:47,830 --> 00:24:45,600
uh or there may be something we haven't

721
00:24:49,269 --> 00:24:47,840
caught that's always the element of risk

722
00:24:51,029 --> 00:24:49,279
but to the extent that we've been able

723
00:24:52,470 --> 00:24:51,039
to think of it we've attacked all the

724
00:24:53,990 --> 00:24:52,480
problems and done all the testing we can

725
00:24:55,990 --> 00:24:54,000
do

726
00:24:58,710 --> 00:24:56,000
and before we go to kennedy again uh

727
00:25:00,710 --> 00:24:58,720
just a reminder we do have briefings

728
00:25:03,350 --> 00:25:00,720
that will start on november 21 a whole

729
00:25:05,510 --> 00:25:03,360
series of briefings so we're going to

730
00:25:07,590 --> 00:25:05,520
keep this briefing and we have a limited

731
00:25:09,590 --> 00:25:07,600
time to msl questions only and if there

732
00:25:12,110 --> 00:25:09,600
are other questions on other related

733
00:25:14,230 --> 00:25:12,120
topics please contact

734
00:25:15,909 --> 00:25:14,240
202-358-1726 my office and we can get

735
00:25:16,710 --> 00:25:15,919
you the appropriate folks

736
00:25:26,549 --> 00:25:16,720
so

737
00:25:32,070 --> 00:25:29,750
hi dan billow from wesh tv

738
00:25:34,149 --> 00:25:32,080

uh would you talk a little bit about

739
00:25:37,110 --> 00:25:34,159
an extended mission

740
00:25:39,350 --> 00:25:37,120
how long do you think uh that

741
00:25:41,669 --> 00:25:39,360
that this rover could last and

742
00:25:43,350 --> 00:25:41,679
and i may have missed it but

743
00:25:45,750 --> 00:25:43,360
would you talk a little bit

744
00:25:48,950 --> 00:25:45,760
about its uh

745
00:25:51,990 --> 00:25:48,960
speed on on the planet how much

746
00:25:53,669 --> 00:25:52,000
faster if any faster can it can it go

747
00:25:55,510 --> 00:25:53,679
over the planet's surface than the other

748
00:25:57,510 --> 00:25:55,520
rovers

749
00:25:59,430 --> 00:25:57,520
uh it's it's speed is about a tenth of a

750
00:26:01,990 --> 00:25:59,440
mile an hour which is about the same as

751
00:26:03,830 --> 00:26:02,000
as the mars exploration rover uh we

752
00:26:06,789 --> 00:26:03,840
should be able to do better in terms of

753
00:26:09,430 --> 00:26:06,799
a daily how far can we go in a given day

754
00:26:11,750 --> 00:26:09,440
uh for two reasons one um we're

755
00:26:14,070 --> 00:26:11,760
basically limited for safe driving on

756
00:26:15,269 --> 00:26:14,080
how far ahead we can see

757
00:26:17,190 --> 00:26:15,279
reliably

758
00:26:19,830 --> 00:26:17,200
and and the rover since it's taller will

759
00:26:21,909 --> 00:26:19,840
give us a better a better uh vision in

760
00:26:23,430 --> 00:26:21,919
that standpoint also

761
00:26:25,430 --> 00:26:23,440
an advantage that we have now that we

762
00:26:27,669 --> 00:26:25,440
didn't have with the mars exploration

763
00:26:29,350 --> 00:26:27,679

rover benefit of the mars program is we

764
00:26:30,149 --> 00:26:29,360
have mars reconnaissance orbiter in

765
00:26:31,830 --> 00:26:30,159
place

766
00:26:33,510 --> 00:26:31,840
and the high-rise instrument is able to

767
00:26:35,909 --> 00:26:33,520
do 30 centimeter photography of the

768
00:26:37,990 --> 00:26:35,919
surface and has extensively covered our

769
00:26:39,669 --> 00:26:38,000
landing site and will continue to do so

770
00:26:42,789 --> 00:26:39,679
so we'll be able to

771
00:26:46,149 --> 00:26:42,799
um basically lay out the track far ahead

772
00:26:47,990 --> 00:26:46,159
of our daily traverses uh with looking

773
00:26:49,510 --> 00:26:48,000
at rocks that uh

774
00:26:52,710 --> 00:26:49,520
with good enough resolution so we could

775
00:26:54,549 --> 00:26:52,720
see things that might get in our way

776
00:26:56,149 --> 00:26:54,559
and so that's the diverse question oh a

777
00:26:57,430 --> 00:26:56,159
lifetime question well

778
00:26:59,430 --> 00:26:57,440
um

779
00:27:01,669 --> 00:26:59,440
i'm the project manager so my warranty

780
00:27:03,269 --> 00:27:01,679
expires at the day after the level one

781
00:27:04,630 --> 00:27:03,279
requirements but

782
00:27:06,470 --> 00:27:04,640
we do test

783
00:27:08,470 --> 00:27:06,480
all the mechanism equipment for three

784
00:27:10,950 --> 00:27:08,480
times its normal life

785
00:27:13,110 --> 00:27:10,960
there is no life limiting consumable per

786
00:27:15,269 --> 00:27:13,120
se of on the design

787
00:27:16,710 --> 00:27:15,279
um the the power source will last a

788
00:27:19,269 --> 00:27:16,720

great number of years we will not have

789
00:27:21,510 --> 00:27:19,279
the dust issues that we had with myrrh

790
00:27:24,389 --> 00:27:21,520
uh we'll be able to handle winter a lot

791
00:27:25,909 --> 00:27:24,399
better than we are on mers so so on the

792
00:27:27,909 --> 00:27:25,919
face there's nothing

793
00:27:30,070 --> 00:27:27,919
you know bearing wear out and that could

794
00:27:31,669 --> 00:27:30,080
be any time you want to figure

795
00:27:33,590 --> 00:27:31,679
we should be good for quite an extended

796
00:27:35,669 --> 00:27:33,600
period of time

797
00:27:37,669 --> 00:27:35,679
okay i see a couple of folks here uh in

798
00:27:39,430 --> 00:27:37,679
the audience uh in our studio so if you

799
00:27:42,070 --> 00:27:39,440
give your name and affiliation thank you

800
00:27:43,669 --> 00:27:42,080
i'm joe palka from npr and i've got a

801
00:27:45,190 --> 00:27:43,679
question for joshua and a question for

802
00:27:47,990 --> 00:27:45,200
pete do you want me to do them serially

803
00:27:50,630 --> 00:27:48,000
or in parallel

804
00:27:53,269 --> 00:27:50,640
let's start with ashland in in the in

805
00:27:55,750 --> 00:27:53,279
the in the last set of missions

806
00:27:57,510 --> 00:27:55,760
we were waiting for signs of water and

807
00:27:59,190 --> 00:27:57,520
there were press conferences when we saw

808
00:28:00,389 --> 00:27:59,200
some chemical reaction that gave us a

809
00:28:01,750 --> 00:28:00,399
sense of

810
00:28:03,669 --> 00:28:01,760
refining it

811
00:28:04,710 --> 00:28:03,679
in this mission

812
00:28:06,310 --> 00:28:04,720
i know you don't know what you're going

813
00:28:08,870 --> 00:28:06,320

to find till you get there but what

814
00:28:10,710 --> 00:28:08,880
kinds of things would be oh this is

815
00:28:12,789 --> 00:28:10,720
worth a press conference because we

816
00:28:14,470 --> 00:28:12,799
found x

817
00:28:16,149 --> 00:28:14,480
well um

818
00:28:17,669 --> 00:28:16,159
as as doug was mentioning that you know

819
00:28:19,510 --> 00:28:17,679
the program's kind of transitioned from

820
00:28:21,110 --> 00:28:19,520
following the water and these as you

821
00:28:23,590 --> 00:28:21,120
mentioned the rovers that are currently

822
00:28:25,190 --> 00:28:23,600
on mars uh opportunity spirit uh they

823
00:28:26,630 --> 00:28:25,200
both found evidence for water in

824
00:28:28,310 --> 00:28:26,640
different forms water that has

825
00:28:30,470 --> 00:28:28,320
interacted with the soil and form

826
00:28:32,149 --> 00:28:30,480
minerals that require water evidence for

827
00:28:34,070 --> 00:28:32,159
actually flowing water on the surface so

828
00:28:35,990 --> 00:28:34,080
that is sort of in the rear view mirror

829
00:28:38,310 --> 00:28:36,000
now and we've moved on to this uh

830
00:28:40,070 --> 00:28:38,320
evidence of habitable environments so

831
00:28:42,070 --> 00:28:40,080
the kind of things that would

832
00:28:43,590 --> 00:28:42,080
i think generate excitement for us is

833
00:28:45,830 --> 00:28:43,600
really confirming first of all

834
00:28:48,149 --> 00:28:45,840
confirming what we saw from orbit

835
00:28:49,909 --> 00:28:48,159
so there's evidence from orbit for these

836
00:28:51,909 --> 00:28:49,919
clay minerals and the clay minerals in

837
00:28:53,190 --> 00:28:51,919
particular are fascinating because they

838
00:28:55,110 --> 00:28:53,200

do require

839
00:28:56,950 --> 00:28:55,120
water a lot of water to interact with

840
00:28:59,029 --> 00:28:56,960
rock over some time to form these

841
00:29:00,950 --> 00:28:59,039
minerals and it's done through

842
00:29:02,310 --> 00:29:00,960
spectroscopy from orbit there could be

843
00:29:04,230 --> 00:29:02,320
some errors there could be some things

844
00:29:06,789 --> 00:29:04,240
we don't understand about the data but

845
00:29:09,029 --> 00:29:06,799
we will have a definitive knowledge of

846
00:29:11,029 --> 00:29:09,039
the minerals with this rover so

847
00:29:13,430 --> 00:29:11,039
understanding that clay environment

848
00:29:14,870 --> 00:29:13,440
and actually trying to figure out what

849
00:29:16,710 --> 00:29:14,880
sort of the the rest of the

850
00:29:19,590 --> 00:29:16,720
environmental conditions on mars were

851
00:29:21,269 --> 00:29:19,600
that caused that clay to form uh what

852
00:29:23,510 --> 00:29:21,279
the weather was like three billion years

853
00:29:25,269 --> 00:29:23,520
ago uh what the temperatures were like

854
00:29:27,430 --> 00:29:25,279
and that gets at this whole issue of

855
00:29:29,029 --> 00:29:27,440
creating a habitable environment

856
00:29:30,549 --> 00:29:29,039
so you know we can't wait to drive

857
00:29:33,029 --> 00:29:30,559
across the ellipse over several months

858
00:29:34,710 --> 00:29:33,039
and get to that first clay out crop

859
00:29:36,549 --> 00:29:34,720
and then we'd go up the hill and look at

860
00:29:38,149 --> 00:29:36,559
the sulfate salt area

861
00:29:40,070 --> 00:29:38,159
which should represent a different

862
00:29:41,590 --> 00:29:40,080
environment and so i think you know we

863
00:29:42,310 --> 00:29:41,600

have a lot of steps that we'll go

864
00:29:43,909 --> 00:29:42,320
through

865
00:29:45,350 --> 00:29:43,919
really we're reading the history of

866
00:29:47,590 --> 00:29:45,360
early mars in several different

867
00:29:49,190 --> 00:29:47,600
environments and if any of those look

868
00:29:51,590 --> 00:29:49,200
definite no i don't know i won't say

869
00:29:53,350 --> 00:29:51,600
definitively but many of those really

870
00:29:55,029 --> 00:29:53,360
scream out that this was a potentially

871
00:29:58,710 --> 00:29:55,039
habitable environment

872
00:30:02,470 --> 00:29:59,830
enjoy you have another question yeah

873
00:30:04,230 --> 00:30:02,480
well for pete um in my experience with

874
00:30:05,590 --> 00:30:04,240
engineers they always have a list going

875
00:30:07,350 --> 00:30:05,600
somewhere in their heads of the things

876
00:30:10,230 --> 00:30:07,360
they're most concerned about

877
00:30:11,990 --> 00:30:10,240
um i'm wondering uh what things are at

878
00:30:14,389 --> 00:30:12,000
the top of your list in terms of what

879
00:30:16,230 --> 00:30:14,399
you're concerned about and also

880
00:30:18,630 --> 00:30:16,240
in the myrrh experience there was a lot

881
00:30:20,630 --> 00:30:18,640
of testing and getting ready right

882
00:30:22,870 --> 00:30:20,640
through the cruise stage

883
00:30:24,310 --> 00:30:22,880
because there was the timeline was such

884
00:30:26,470 --> 00:30:24,320
that there was still a lot to go now you

885
00:30:27,990 --> 00:30:26,480
had two years extra on this mission so

886
00:30:29,590 --> 00:30:28,000
maybe you're not quite as up against it

887
00:30:30,950 --> 00:30:29,600
with some of the software but i wonder

888
00:30:33,350 --> 00:30:30,960

if you could talk about what's at the

889
00:30:35,190 --> 00:30:33,360
top of your concern list and will you be

890
00:30:37,750 --> 00:30:35,200
doing additional testing of equipment on

891
00:30:39,830 --> 00:30:37,760
the cruise on the cruise phase i think i

892
00:30:42,230 --> 00:30:39,840
think the thing at the top of my concern

893
00:30:43,029 --> 00:30:42,240
list is is what i don't know

894
00:30:43,909 --> 00:30:43,039
um

895
00:30:45,909 --> 00:30:43,919
you know these things are very

896
00:30:48,149 --> 00:30:45,919
complicated beasts and and you test the

897
00:30:49,909 --> 00:30:48,159
heck out of them but but you can't test

898
00:30:50,950 --> 00:30:49,919
all their interactions you can't test

899
00:30:53,190 --> 00:30:50,960
them for the length of time of the

900
00:30:54,549 --> 00:30:53,200
mission you just can't do all that kind

901
00:30:56,870 --> 00:30:54,559
of intensive things and so there's

902
00:30:58,950 --> 00:30:56,880
always going to be surprises

903
00:31:00,070 --> 00:30:58,960
sometimes engineers call them features

904
00:31:01,750 --> 00:31:00,080
and um

905
00:31:03,750 --> 00:31:01,760
and and what you worry about is that

906
00:31:05,110 --> 00:31:03,760
there's something there that's really

907
00:31:06,870 --> 00:31:05,120
serious

908
00:31:08,950 --> 00:31:06,880
you know

909
00:31:10,230 --> 00:31:08,960
when murr launched we had done what we

910
00:31:11,990 --> 00:31:10,240
thought was a conference was a

911
00:31:13,029 --> 00:31:12,000
comprehensive test program but we had

912
00:31:14,789 --> 00:31:13,039
four

913
00:31:16,470 --> 00:31:14,799

surprises after we launched that we had

914
00:31:18,230 --> 00:31:16,480
to fix operationally and we were able to

915
00:31:19,669 --> 00:31:18,240
do that

916
00:31:21,110 --> 00:31:19,679
what's that's what you worry about that

917
00:31:22,549 --> 00:31:21,120
there's something in the design that you

918
00:31:24,230 --> 00:31:22,559
haven't caught yet

919
00:31:25,590 --> 00:31:24,240
that's something in the interaction with

920
00:31:27,509 --> 00:31:25,600
the mars environment that you're not

921
00:31:29,590 --> 00:31:27,519
able to test on earth

922
00:31:31,830 --> 00:31:29,600
that there's something in long-duration

923
00:31:33,509 --> 00:31:31,840
exposure that you're not able to do

924
00:31:34,230 --> 00:31:33,519
that that something like that will catch

925
00:31:37,029 --> 00:31:34,240
you

926
00:31:38,870 --> 00:31:37,039
and um and and it'll be a software thing

927
00:31:40,950 --> 00:31:38,880
more than likely that's that's what you

928
00:31:43,430 --> 00:31:40,960
worry about more than anything else

929
00:31:44,470 --> 00:31:43,440
um you asked the second question and i

930
00:31:46,149 --> 00:31:44,480
agree

931
00:31:47,269 --> 00:31:46,159
yeah well it would nice to be say that

932
00:31:49,190 --> 00:31:47,279
the two years allowed us to be

933
00:31:51,029 --> 00:31:49,200
completely done uh on the friday after

934
00:31:52,710 --> 00:31:51,039
thanksgiving but that's not true

935
00:31:54,389 --> 00:31:52,720
um we have a lot of work to do to

936
00:31:56,230 --> 00:31:54,399
characterize the sample handling and

937
00:31:57,909 --> 00:31:56,240
sample processing system as ashwin

938
00:31:59,990 --> 00:31:57,919

pointed out one of the things we've

939
00:32:00,870 --> 00:32:00,000
discovered in the last year of testing

940
00:32:05,110 --> 00:32:00,880
is

941
00:32:06,870 --> 00:32:05,120
with the rocks very dependent on

942
00:32:08,710 --> 00:32:06,880
temperature very dependent on pressure

943
00:32:09,669 --> 00:32:08,720
very dependent on the composition of the

944
00:32:11,669 --> 00:32:09,679
rocks

945
00:32:13,909 --> 00:32:11,679
so we're laying out a very

946
00:32:15,750 --> 00:32:13,919
comprehensive test program to basically

947
00:32:17,590 --> 00:32:15,760
lay out for us what are going to be the

948
00:32:19,430 --> 00:32:17,600
operational rules of the road

949
00:32:21,750 --> 00:32:19,440
uh and as we interact with rocks what

950
00:32:23,990 --> 00:32:21,760
will we have to do to to do first-time

951
00:32:26,230 --> 00:32:24,000
activities what we say and and to be

952
00:32:28,389 --> 00:32:26,240
able to do those things so so that's a

953
00:32:30,230 --> 00:32:28,399
test program that we've got laid out we

954
00:32:32,470 --> 00:32:30,240
will continue to do development for

955
00:32:35,269 --> 00:32:32,480
entry scent landing in the sense of

956
00:32:37,430 --> 00:32:35,279
running the software again and again and

957
00:32:39,269 --> 00:32:37,440
again and testing all the corners of the

958
00:32:41,909 --> 00:32:39,279
environmental box to make sure that

959
00:32:43,590 --> 00:32:41,919
you're very robust in terms of what mars

960
00:32:45,110 --> 00:32:43,600
could throw at us from an atmosphere or

961
00:32:46,950 --> 00:32:45,120
dust storm sense we don't expect dust

962
00:32:49,350 --> 00:32:46,960
storms we're in the wrong season but

963
00:32:50,389 --> 00:32:49,360

we'd like to be prepared for everything

964
00:32:53,110 --> 00:32:50,399
and then

965
00:32:55,350 --> 00:32:53,120
development for the surface mission to

966
00:32:56,789 --> 00:32:55,360
engage in so

967
00:32:58,630 --> 00:32:56,799
we're a little bit thankful murr was a

968
00:33:00,549 --> 00:32:58,640
seven month cruise we're thankful we

969
00:33:02,789 --> 00:33:00,559
have eight and a half we'll use it all

970
00:33:05,350 --> 00:33:02,799
um but we will we will be busy over the

971
00:33:07,830 --> 00:33:05,360
cruise period for sure

972
00:33:09,990 --> 00:33:07,840
okay now we're going to transition to

973
00:33:11,669 --> 00:33:10,000
the telephone lines and

974
00:33:13,669 --> 00:33:11,679
we're going to wrap up after the phone

975
00:33:15,269 --> 00:33:13,679
lines but let's see if we can take a few

976
00:33:17,110 --> 00:33:15,279
questions there and i believe first up

977
00:33:22,710 --> 00:33:17,120
is irene klotz from

978
00:33:26,710 --> 00:33:24,870
yes um thanks duane i have uh two

979
00:33:28,470 --> 00:33:26,720
questions the first um

980
00:33:31,110 --> 00:33:28,480
there's i think that there was another

981
00:33:32,950 --> 00:33:31,120
instrument added um with the delay in

982
00:33:35,909 --> 00:33:32,960
the mars science lab launch that

983
00:33:38,230 --> 00:33:35,919
actually was very much uh

984
00:33:40,710 --> 00:33:38,240
targeted to looking at the types of

985
00:33:41,990 --> 00:33:40,720
organics if any are found which is maybe

986
00:33:44,230 --> 00:33:42,000
a little closer than what you've

987
00:33:46,549 --> 00:33:44,240
described so far as far as being able to

988
00:33:48,389 --> 00:33:46,559

assess life can you um can you talk

989
00:33:52,149 --> 00:33:48,399
about that a little bit and then i do

990
00:33:54,230 --> 00:33:52,159
have a related question thanks

991
00:33:56,149 --> 00:33:54,240
sure there is uh

992
00:33:58,389 --> 00:33:56,159
one of the real cornerstone laboratories

993
00:33:59,750 --> 00:33:58,399
that it's located inside the rover

994
00:34:01,590 --> 00:33:59,760
has been with the mission since its

995
00:34:03,990 --> 00:34:01,600
inception in fact the mission was really

996
00:34:06,230 --> 00:34:04,000
designed uh partially or the rover was

997
00:34:07,590 --> 00:34:06,240
really designed around this instrument

998
00:34:10,389 --> 00:34:07,600
it's the workhorse laboratory it's

999
00:34:12,869 --> 00:34:10,399
called sam sample analysis at mars it's

1000
00:34:15,829 --> 00:34:12,879
a suite of instruments that analyzes

1001
00:34:18,069 --> 00:34:15,839
that powdered rock or soil sample and

1002
00:34:19,829 --> 00:34:18,079
even the air as well and looks element

1003
00:34:21,909 --> 00:34:19,839
by element what the composition is and

1004
00:34:23,909 --> 00:34:21,919
it also has the capability to detect any

1005
00:34:26,230 --> 00:34:23,919
organic material that's in the rocks or

1006
00:34:28,069 --> 00:34:26,240
soil now we consider that kind of a

1007
00:34:29,510 --> 00:34:28,079
science home run that sort of gets at

1008
00:34:31,430 --> 00:34:29,520
joe's question too

1009
00:34:33,190 --> 00:34:31,440
uh that is something you know we that

1010
00:34:35,190 --> 00:34:33,200
would make the papers but we're also not

1011
00:34:37,510 --> 00:34:35,200
banking the mission on that we don't

1012
00:34:39,589 --> 00:34:37,520
know if mars has the ability

1013
00:34:41,669 --> 00:34:39,599

to retain any organic material even if

1014
00:34:44,149 --> 00:34:41,679
it's there so part of this mission also

1015
00:34:46,629 --> 00:34:44,159
is understanding you know now looking at

1016
00:34:48,149 --> 00:34:46,639
ancient mars three billion years later

1017
00:34:50,230 --> 00:34:48,159
what sorts of evidence does mars

1018
00:34:51,909 --> 00:34:50,240
preserve for us to study today from when

1019
00:34:52,869 --> 00:34:51,919
it was probably more habitable in the

1020
00:34:54,710 --> 00:34:52,879
past

1021
00:34:56,790 --> 00:34:54,720
so we do have a fabulous organic

1022
00:35:01,030 --> 00:34:56,800
detection capability on the rover

1023
00:35:05,510 --> 00:35:03,430
i'd like to call her clara

1024
00:35:07,670 --> 00:35:05,520
oscowitz um thanks very much and i think

1025
00:35:09,829 --> 00:35:07,680
the other questions for doug has russia

1026
00:35:11,829 --> 00:35:09,839
requested any assistance from nasa in

1027
00:35:15,109 --> 00:35:11,839
trying to track or do anything to

1028
00:35:18,390 --> 00:35:15,119
recover the phobos grunt mission

1029
00:35:20,550 --> 00:35:18,400
uh we have offered assistance um and if

1030
00:35:22,550 --> 00:35:20,560
they need it we will provide to the best

1031
00:35:24,230 --> 00:35:22,560
of our ability with our uh space

1032
00:35:26,390 --> 00:35:24,240
communications network

1033
00:35:28,069 --> 00:35:26,400
um i that's a different organization

1034
00:35:29,670 --> 00:35:28,079
than ours i'm not sure if they've asked

1035
00:35:32,069 --> 00:35:29,680
for the assistance but we have offered

1036
00:35:36,150 --> 00:35:34,470
okay thank you and i apologize irene uh

1037
00:35:39,270 --> 00:35:36,160
that you had a follow-up okay now we can

1038
00:35:44,069 --> 00:35:39,280

go to claire moskowitz from space.com

1039
00:35:47,910 --> 00:35:45,990
yes hi this is a question for anybody

1040
00:35:49,990 --> 00:35:47,920
who wants to take it um

1041
00:35:52,150 --> 00:35:50,000
you know based on all you know right now

1042
00:35:53,990 --> 00:35:52,160
just how likely do you think it is that

1043
00:35:56,230 --> 00:35:54,000
you're going to find evidence that mars

1044
00:36:01,109 --> 00:35:56,240
was habitable and and just how likely is

1045
00:36:05,910 --> 00:36:02,710
i i'm not sure that any of us want to

1046
00:36:09,990 --> 00:36:07,349
um

1047
00:36:11,829 --> 00:36:10,000
i'll you can add to this okay sure

1048
00:36:13,670 --> 00:36:11,839
it's that's kind of a request for

1049
00:36:15,990 --> 00:36:13,680
speculation and i really kind of hate to

1050
00:36:17,910 --> 00:36:16,000
do that um

1051
00:36:19,349 --> 00:36:17,920
let's take mer as an example nobody

1052
00:36:21,190 --> 00:36:19,359
would have expected to see the

1053
00:36:22,790 --> 00:36:21,200
blueberries that we see that we see by

1054
00:36:25,750 --> 00:36:22,800
the millions

1055
00:36:28,230 --> 00:36:25,760
um and and that was a huge discovery

1056
00:36:30,390 --> 00:36:28,240
mars reconnaissance orbiter has found

1057
00:36:31,670 --> 00:36:30,400
evidence in in mid-latitudes actually a

1058
00:36:34,550 --> 00:36:31,680
little higher latitudes than we'd ever

1059
00:36:36,630 --> 00:36:34,560
thought of uh briny waters that could

1060
00:36:38,550 --> 00:36:36,640
actually uh be

1061
00:36:40,870 --> 00:36:38,560
liquid on the surface for short periods

1062
00:36:42,790 --> 00:36:40,880
in certain seasons so every time you

1063
00:36:45,270 --> 00:36:42,800

turn around there's something that mars

1064
00:36:48,550 --> 00:36:45,280
does for us or shows us or or

1065
00:36:49,829 --> 00:36:48,560
reluctantly uh hands to us that uh maybe

1066
00:36:51,349 --> 00:36:49,839
we're looking for it maybe we're not

1067
00:36:53,910 --> 00:36:51,359
looking for it but it's always exciting

1068
00:36:55,430 --> 00:36:53,920
and it always feeds the science

1069
00:36:57,589 --> 00:36:55,440
so i really don't want to speculate on

1070
00:36:59,109 --> 00:36:57,599
how likely it is that we'll find these

1071
00:37:00,390 --> 00:36:59,119
things because we may not find those we

1072
00:37:03,190 --> 00:37:00,400
may find some

1073
00:37:04,790 --> 00:37:03,200
something completely different so it's a

1074
00:37:07,430 --> 00:37:04,800
little tough to speculate so now let our

1075
00:37:09,750 --> 00:37:07,440
scientists speculate for just a second

1076
00:37:11,430 --> 00:37:09,760
uh first thing i'll do is clarify for

1077
00:37:12,470 --> 00:37:11,440
the for the people new to mars

1078
00:37:17,990 --> 00:37:12,480
exploration that we didn't find

1079
00:37:24,150 --> 00:37:19,510
yeah those are hematite crystals but

1080
00:37:26,870 --> 00:37:25,190
but

1081
00:37:28,870 --> 00:37:26,880
i'll just say i i was going to say the

1082
00:37:29,910 --> 00:37:28,880
same thing as the caveat which that that

1083
00:37:32,069 --> 00:37:29,920
would be sort of in the realm of

1084
00:37:33,829 --> 00:37:32,079
speculation but uh you know on the

1085
00:37:35,510 --> 00:37:33,839
positive side the reason we're excited

1086
00:37:36,870 --> 00:37:35,520
about mars exploration and going to gale

1087
00:37:39,190 --> 00:37:36,880
crater is that when we look in the

1088
00:37:41,190 --> 00:37:39,200

distant past sort of the early

1089
00:37:43,589 --> 00:37:41,200
billion or two years of mars history

1090
00:37:46,390 --> 00:37:43,599
we've known now for decades that there's

1091
00:37:48,790 --> 00:37:46,400
evidence for rivers flowing and

1092
00:37:50,310 --> 00:37:48,800
possible lakes even a possible evidence

1093
00:37:52,230 --> 00:37:50,320
of a lake in the crater we're going to

1094
00:37:53,510 --> 00:37:52,240
we're not sure about that but that's why

1095
00:37:55,270 --> 00:37:53,520
we're going there we're trying to find

1096
00:37:57,510 --> 00:37:55,280
out if there were

1097
00:37:59,430 --> 00:37:57,520
these habitable environments which

1098
00:38:01,829 --> 00:37:59,440
would involve liquid water

1099
00:38:03,270 --> 00:38:01,839
and so uh you know we're targeting

1100
00:38:04,790 --> 00:38:03,280
i guess the best way to say it is you

1101
00:38:05,990 --> 00:38:04,800
know through the science community

1102
00:38:07,829 --> 00:38:06,000
through hundreds of scientists that have

1103
00:38:09,910 --> 00:38:07,839
helped select this landing site we've

1104
00:38:11,430 --> 00:38:09,920
chosen the best possible place to

1105
00:38:14,710 --> 00:38:11,440
discover a potentially habitable

1106
00:38:17,990 --> 00:38:14,720
environment and we'll see if we find one

1107
00:38:21,270 --> 00:38:18,000
good oh we find blueberries with msl i

1108
00:38:23,349 --> 00:38:21,280
can write the press release there you go

1109
00:38:25,670 --> 00:38:23,359
okay

1110
00:38:27,109 --> 00:38:25,680
i like that all right next caller dan

1111
00:38:33,589 --> 00:38:27,119
leon from

1112
00:38:37,510 --> 00:38:35,430
right here thanks a question for anybody

1113
00:38:39,670 --> 00:38:37,520

who wants to tackle it

1114
00:38:42,630 --> 00:38:39,680
uh we know that the planetary science

1115
00:38:44,230 --> 00:38:42,640
budget was going to go down anyway and

1116
00:38:47,270 --> 00:38:44,240
now we know to save james webb it's

1117
00:38:49,430 --> 00:38:47,280
going to go down a little bit more

1118
00:38:51,910 --> 00:38:49,440
what contingency plans if any have you

1119
00:38:55,190 --> 00:38:51,920
made to support the primary msl science

1120
00:38:57,270 --> 00:38:55,200
objectives uh in

1121
00:38:58,950 --> 00:38:57,280
the likely situation that the budget for

1122
00:39:01,349 --> 00:38:58,960
this division is is going to fall off a

1123
00:39:03,270 --> 00:39:01,359
cliff a little bit next year anybody

1124
00:39:05,030 --> 00:39:03,280
who'd like to take it

1125
00:39:08,390 --> 00:39:05,040
yeah i'll take that

1126
00:39:10,630 --> 00:39:08,400
msl is an incredibly important flagship

1127
00:39:13,430 --> 00:39:10,640
mission for this agency

1128
00:39:14,710 --> 00:39:13,440
we've been in the build and test phase

1129
00:39:17,510 --> 00:39:14,720
for years

1130
00:39:19,430 --> 00:39:17,520
uh it is that bridge mission and it's as

1131
00:39:21,030 --> 00:39:19,440
important to this agency i would

1132
00:39:23,430 --> 00:39:21,040
personal opinion a little biased maybe

1133
00:39:26,550 --> 00:39:23,440
as hubble

1134
00:39:29,670 --> 00:39:26,560
the funding for msl is stable

1135
00:39:31,589 --> 00:39:29,680
the agency pmc the administrator um has

1136
00:39:32,950 --> 00:39:31,599
signed the uh the current budget

1137
00:39:34,550 --> 00:39:32,960
estimates that we've got for it that

1138
00:39:36,950 --> 00:39:34,560

money is set aside

1139
00:39:39,349 --> 00:39:36,960
uh if there are funding reductions in

1140
00:39:40,829 --> 00:39:39,359
the 2012 budget uh once it gets passed

1141
00:39:43,270 --> 00:39:40,839
by congress and in the current budget

1142
00:39:46,310 --> 00:39:43,280
uncertainties who knows

1143
00:39:49,030 --> 00:39:46,320
but if there are the msl uh operations

1144
00:39:51,190 --> 00:39:49,040
funding is safe

1145
00:39:53,510 --> 00:39:51,200
okay we have time for a couple of more

1146
00:39:55,510 --> 00:39:53,520
questions from our phone lines and then

1147
00:39:57,109 --> 00:39:55,520
we'll take one last question from our

1148
00:39:57,990 --> 00:39:57,119
studio audience

1149
00:39:59,750 --> 00:39:58,000
um

1150
00:40:02,310 --> 00:39:59,760
let's go to

1151
00:40:04,710 --> 00:40:02,320
raphael jeffer and i'm sorry i'm having

1152
00:40:06,390 --> 00:40:04,720
problems with names today um

1153
00:40:19,510 --> 00:40:06,400
jaffy

1154
00:40:23,510 --> 00:40:21,670
okay all right i'll tell you what let's

1155
00:40:26,550 --> 00:40:23,520
uh let's see if we can come back here

1156
00:40:30,710 --> 00:40:28,870
i'm sorry kitty felder with kpcc public

1157
00:40:32,870 --> 00:40:30,720
radio in los angeles could you talk a

1158
00:40:35,349 --> 00:40:32,880
little bit about um the propulsion

1159
00:40:38,790 --> 00:40:35,359
system since you're not using the solar

1160
00:40:40,550 --> 00:40:38,800
panels that the earlier rovers had used

1161
00:40:42,710 --> 00:40:40,560
because if you say nuclear people seem

1162
00:40:44,630 --> 00:40:42,720
to have a problem with that you talk

1163
00:40:49,430 --> 00:40:44,640

about the safety issues of launching

1164
00:40:53,589 --> 00:40:51,589
let's see we're using the power sources

1165
00:40:56,309 --> 00:40:53,599
on multi-emission radioisotope thermal

1166
00:40:57,510 --> 00:40:56,319
generator uses plutonium dioxide

1167
00:41:06,390 --> 00:40:57,520
in

1168
00:41:07,829 --> 00:41:06,400
it's a direct heritage of designs for

1169
00:41:09,910 --> 00:41:07,839
such gender generators that have been

1170
00:41:12,870 --> 00:41:09,920
used on a lot of deep space missions and

1171
00:41:15,510 --> 00:41:12,880
in fact used on on apollo

1172
00:41:16,790 --> 00:41:15,520
on for science missions on the moon

1173
00:41:19,430 --> 00:41:16,800
it is

1174
00:41:21,430 --> 00:41:19,440
designed with safety in mind to

1175
00:41:23,270 --> 00:41:21,440
withstand severe environments including

1176
00:41:24,550 --> 00:41:23,280
reentry

1177
00:41:26,230 --> 00:41:24,560
there is

1178
00:41:27,910 --> 00:41:26,240
a process we go through that perhaps

1179
00:41:30,069 --> 00:41:27,920
doesn't speak more to where we go

1180
00:41:32,390 --> 00:41:30,079
through a a very

1181
00:41:34,150 --> 00:41:32,400
sophisticated safety analysis involving

1182
00:41:36,230 --> 00:41:34,160
launch vehicle people and doe and

1183
00:41:37,589 --> 00:41:36,240
independent reviewers to define

1184
00:41:38,790 --> 00:41:37,599
the environments and to look at the

1185
00:41:40,309 --> 00:41:38,800
safety of this device with the

1186
00:41:42,230 --> 00:41:40,319
environment and to make a judgment as to

1187
00:41:43,829 --> 00:41:42,240
whether it's safe to go and

1188
00:41:46,309 --> 00:41:43,839

we've been very safe using these kind of

1189
00:41:48,150 --> 00:41:46,319
generators for the past 50 years

1190
00:41:50,150 --> 00:41:48,160
and this program is no different in the

1191
00:41:52,390 --> 00:41:50,160
sense of uh the process we have used in

1192
00:41:54,230 --> 00:41:52,400
nature to judge its safety and and uh

1193
00:41:57,190 --> 00:41:54,240
commit to issues

1194
00:41:58,630 --> 00:41:57,200
let me add that we we expect

1195
00:42:00,710 --> 00:41:58,640
a safe

1196
00:42:02,230 --> 00:42:00,720
and successful launch and as you said

1197
00:42:04,230 --> 00:42:02,240
we've been flying these power sources

1198
00:42:05,670 --> 00:42:04,240
for for 50 years and if you have any

1199
00:42:07,190 --> 00:42:05,680
more details you like we'll get you with

1200
00:42:09,750 --> 00:42:07,200
the appropriate department of energy

1201
00:42:13,990 --> 00:42:09,760
officials on their power source

1202
00:42:19,670 --> 00:42:14,000
let's uh go back to kennedy

1203
00:42:23,910 --> 00:42:20,790
thank you

1204
00:42:25,670 --> 00:42:23,920
just a couple of quick factoid questions

1205
00:42:27,750 --> 00:42:25,680
i think you mentioned a couple hundred

1206
00:42:30,069 --> 00:42:27,760
meters above the surface of mars for the

1207
00:42:32,230 --> 00:42:30,079
sky crane to start operating do

1208
00:42:33,270 --> 00:42:32,240
everything more precise than that how

1209
00:42:35,109 --> 00:42:33,280
high

1210
00:42:36,710 --> 00:42:35,119
will the rover be when the sky cream

1211
00:42:39,430 --> 00:42:36,720
pops out

1212
00:42:41,670 --> 00:42:39,440
secondly how deep into the rock or dirt

1213
00:42:43,910 --> 00:42:41,680

will the drill go when they're looking

1214
00:42:45,109 --> 00:42:43,920
for samples and lastly if you lose a

1215
00:42:48,870 --> 00:42:45,119
wheel or two

1216
00:42:52,230 --> 00:42:51,030
go along the surface and do some science

1217
00:42:54,069 --> 00:42:52,240
thank you

1218
00:42:56,230 --> 00:42:54,079
if you contact wayne's office i'll get

1219
00:42:58,069 --> 00:42:56,240
you the actual hard number for the

1220
00:43:00,069 --> 00:42:58,079
deployment of the sky crane i don't have

1221
00:43:01,910 --> 00:43:00,079
it on the tip of my tongue

1222
00:43:04,150 --> 00:43:01,920
the drill goes i believe five to six

1223
00:43:06,790 --> 00:43:04,160
centimeters into the rock surface

1224
00:43:09,190 --> 00:43:06,800
uh and you had one more

1225
00:43:11,510 --> 00:43:09,200
oh if i lose the wheel i'm i'm

1226
00:43:13,030 --> 00:43:11,520
i'm certainly fine if we lose a wheel

1227
00:43:16,069 --> 00:43:13,040
this is the situation a little bit

1228
00:43:18,470 --> 00:43:16,079
better than mer because we actually have

1229
00:43:20,230 --> 00:43:18,480
we can release the the braking of the of

1230
00:43:22,069 --> 00:43:20,240
the motors on on

1231
00:43:23,829 --> 00:43:22,079
on this vehicle and we're not able to do

1232
00:43:25,829 --> 00:43:23,839
it so much on mer so we don't have to

1233
00:43:27,990 --> 00:43:25,839
drag the wheel like we had to do in mer

1234
00:43:29,589 --> 00:43:28,000
we can actually freewheel the wheel uh

1235
00:43:31,670 --> 00:43:29,599
we certainly are okay if we lose one

1236
00:43:33,829 --> 00:43:31,680
depending on the terrain we're we're

1237
00:43:35,990 --> 00:43:33,839
probably okay if we lose two

1238
00:43:37,750 --> 00:43:36,000

um each of the wheels has its own drive

1239
00:43:39,349 --> 00:43:37,760
motor so we have six drive motors and

1240
00:43:41,109 --> 00:43:39,359
the four corner wheels have independent

1241
00:43:43,270 --> 00:43:41,119
steering motors so got a lot of

1242
00:43:45,670 --> 00:43:43,280
flexibility enabled in order to maintain

1243
00:43:47,990 --> 00:43:45,680
mobility in in the event of a of a motor

1244
00:43:49,750 --> 00:43:48,000
gearbox failure

1245
00:43:52,230 --> 00:43:49,760
okay folks what i'm going to do here uh

1246
00:43:55,030 --> 00:43:52,240
we're going to wrap this up and i again

1247
00:43:56,710 --> 00:43:55,040
want to remind you of the series of

1248
00:43:58,309 --> 00:43:56,720
detailed briefings that will be coming

1249
00:44:00,150 --> 00:43:58,319
out of the kennedy space center on

1250
00:44:02,150 --> 00:44:00,160
launch week

1251
00:44:04,390 --> 00:44:02,160
in summary

1252
00:44:07,670 --> 00:44:04,400
right now we're green across the board

1253
00:44:12,710 --> 00:44:10,710
please go to www.nasa.gov

1254
00:44:14,870 --> 00:44:12,720
msl