



1  
00:01:05,750 --> 00:00:34,220

[Music]

2  
00:01:26,469 --> 00:01:08,340

this is nasa tv

3  
00:01:28,310 --> 00:01:26,479

[Music]

4  
00:01:29,749 --> 00:01:28,320  
good morning i'm nasa's gary jordan

5  
00:01:31,830 --> 00:01:29,759  
thank you for joining us remotely for

6  
00:01:34,310 --> 00:01:31,840  
the first in our series of briefings to

7  
00:01:36,469 --> 00:01:34,320  
preview the upcoming crew one mission

8  
00:01:38,149 --> 00:01:36,479  
the first crew rotation mission on a u.s

9  
00:01:40,469 --> 00:01:38,159  
commercial spacecraft to the

10  
00:01:42,630 --> 00:01:40,479  
international space station for nasa and

11  
00:01:44,069 --> 00:01:42,640  
for spacex this briefing will kick off

12  
00:01:46,149 --> 00:01:44,079  
today's agenda with updates from

13  
00:01:48,630 --> 00:01:46,159

leadership representing both nasa and

14  
00:01:50,230 --> 00:01:48,640  
spacex joining our esteemed panel coming

15  
00:01:51,749 --> 00:01:50,240  
from nasa's headquarters in washington

16  
00:01:54,389 --> 00:01:51,759  
we have nasa administrator jim

17  
00:01:55,910 --> 00:01:54,399  
bridenstine and kathy leaders associate

18  
00:01:57,910 --> 00:01:55,920  
administrator for nasa's human

19  
00:01:59,910 --> 00:01:57,920  
exploration and operations mission

20  
00:02:01,830 --> 00:01:59,920  
directorates representing spacex from

21  
00:02:03,910 --> 00:02:01,840  
hawthorne california we welcome hans

22  
00:02:05,990 --> 00:02:03,920  
kunigsman vice president of build and

23  
00:02:07,270 --> 00:02:06,000  
rely at flight reliability

24  
00:02:09,109 --> 00:02:07,280  
we'll first start with some opening

25  
00:02:10,869 --> 00:02:09,119  
comments from each of our briefers

26  
00:02:12,550 --> 00:02:10,879  
before opening it up for questions we'll

27  
00:02:15,190 --> 00:02:12,560  
be taking questions on our phone bridge

28  
00:02:16,710 --> 00:02:15,200  
as well as on our social media platforms

29  
00:02:18,390 --> 00:02:16,720  
if you're on the phone please press star

30  
00:02:20,390 --> 00:02:18,400  
one to add your name to our queue and

31  
00:02:23,110 --> 00:02:20,400  
ask a question if you're on social media

32  
00:02:24,869 --> 00:02:23,120  
use the hashtag ask nasa we'll begin

33  
00:02:28,470 --> 00:02:24,879  
with initial remarks from administrator

34  
00:02:33,750 --> 00:02:31,430  
mary um i think everybody knows we are

35  
00:02:35,750 --> 00:02:33,760  
now in this new era of human space

36  
00:02:37,990 --> 00:02:35,760  
flight where nasa is a customer not the

37  
00:02:40,470 --> 00:02:38,000  
owner and operator of the hardware and

38  
00:02:42,949 --> 00:02:40,480

so that's very exciting what's exciting

39

00:02:45,030 --> 00:02:42,959

about this upcoming mission is that we

40

00:02:47,670 --> 00:02:45,040

are actually going to fly a certified

41

00:02:49,990 --> 00:02:47,680

crew dragon and and and the idea that

42

00:02:53,190 --> 00:02:50,000

we're going from a test vehicle which

43

00:02:55,509 --> 00:02:53,200

was what we flew on dm2 to now a

44

00:02:56,869 --> 00:02:55,519

certified crew vehicle for regular

45

00:02:58,309 --> 00:02:56,879

rotation

46

00:03:00,470 --> 00:02:58,319

of flights

47

00:03:02,790 --> 00:03:00,480

this is a this is another milestone a

48

00:03:04,470 --> 00:03:02,800

critical milestone in the development of

49

00:03:06,149 --> 00:03:04,480

our ability to launch american

50

00:03:09,430 --> 00:03:06,159

astronauts on american rockets from

51  
00:03:11,430 --> 00:03:09,440  
american soil now sustainably so these

52  
00:03:13,190 --> 00:03:11,440  
are these are very exciting times a

53  
00:03:14,710 --> 00:03:13,200  
couple of things that make this mission

54  
00:03:16,949 --> 00:03:14,720  
even more exciting

55  
00:03:19,350 --> 00:03:16,959  
number one we're going to have

56  
00:03:23,110 --> 00:03:19,360  
an international partner with us on this

57  
00:03:24,390 --> 00:03:23,120  
very first crew mission soichi sun from

58  
00:03:26,470 --> 00:03:24,400  
japan

59  
00:03:28,149 --> 00:03:26,480  
he's of course a veteran astronaut he's

60  
00:03:30,550 --> 00:03:28,159  
done amazing work on on the

61  
00:03:33,030 --> 00:03:30,560  
international space station already

62  
00:03:36,070 --> 00:03:33,040  
and now he's going to go back with us

63  
00:03:37,670 --> 00:03:36,080

again this time on an american rocket

64

00:03:39,830 --> 00:03:37,680

the other big thing is we're actually

65

00:03:41,910 --> 00:03:39,840

increasing the capacity to do research

66

00:03:43,509 --> 00:03:41,920

on the international space station so

67

00:03:45,430 --> 00:03:43,519

when we increase the number of

68

00:03:46,390 --> 00:03:45,440

astronauts on board we're going to be

69

00:03:48,470 --> 00:03:46,400

able to get

70

00:03:50,229 --> 00:03:48,480

three times as much science done and

71

00:03:51,750 --> 00:03:50,239

three times as much technology

72

00:03:53,509 --> 00:03:51,760

development complete

73

00:03:56,149 --> 00:03:53,519

and all of that is critically important

74

00:03:58,710 --> 00:03:56,159

for for our artemis program and

75

00:04:00,470 --> 00:03:58,720

eventually our mars program so as we

76  
00:04:02,789 --> 00:04:00,480  
develop moon to mars we're going to be

77  
00:04:05,030 --> 00:04:02,799  
using low earth orbit to test all of

78  
00:04:06,869 --> 00:04:05,040  
these capabilities and technologies

79  
00:04:08,949 --> 00:04:06,879  
ultimately to create a sustainable

80  
00:04:10,309 --> 00:04:08,959  
return to the moon and then take all of

81  
00:04:13,270 --> 00:04:10,319  
that knowledge

82  
00:04:15,190 --> 00:04:13,280  
onto mars so so this particular mission

83  
00:04:16,789 --> 00:04:15,200  
is another critical milestone we're very

84  
00:04:18,390 --> 00:04:16,799  
excited about it

85  
00:04:20,310 --> 00:04:18,400  
and and of course we've got a great

86  
00:04:22,550 --> 00:04:20,320  
panel today to discuss these and other

87  
00:04:24,150 --> 00:04:22,560  
things so so thank you gary and i'll

88  
00:04:25,749 --> 00:04:24,160

look forward to answering questions a

89

00:04:27,510 --> 00:04:25,759

little later on

90

00:04:31,670 --> 00:04:27,520

thank you administrator will now hand it

91

00:04:34,870 --> 00:04:33,189

thank you so much i always hate to

92

00:04:36,469 --> 00:04:34,880

follow jim because he does such a great

93

00:04:38,550 --> 00:04:36,479

job so

94

00:04:40,230 --> 00:04:38,560

i wanted to kind of emphasize that as

95

00:04:43,430 --> 00:04:40,240

jim had mentioned this is a great

96

00:04:46,070 --> 00:04:43,440

milestone for us it's a culmination of

97

00:04:48,070 --> 00:04:46,080

many many years of work with nasa and

98

00:04:49,670 --> 00:04:48,080

spacex and

99

00:04:51,990 --> 00:04:49,680

there's a lot of folks out there that

100

00:04:54,230 --> 00:04:52,000

contributed to us getting where we are

101  
00:04:56,550 --> 00:04:54,240  
today and i really would like to thank

102  
00:04:59,030 --> 00:04:56,560  
the team that has gotten us here

103  
00:05:02,310 --> 00:04:59,040  
a tremendous amount of work

104  
00:05:03,670 --> 00:05:02,320  
and and obviously for my past job this

105  
00:05:05,510 --> 00:05:03,680  
means a lot

106  
00:05:08,469 --> 00:05:05,520  
but i'm really looking forward to my new

107  
00:05:11,350 --> 00:05:08,479  
role continued in to see the success of

108  
00:05:13,670 --> 00:05:11,360  
this commercial crew program

109  
00:05:15,590 --> 00:05:13,680  
as i was able to for the first time i

110  
00:05:17,909 --> 00:05:15,600  
think actually provide breaking news

111  
00:05:19,749 --> 00:05:17,919  
last night that we're moving towards the

112  
00:05:23,670 --> 00:05:19,759  
the launch being on

113  
00:05:25,189 --> 00:05:23,680

october 31st a nice halloween launch

114

00:05:27,909 --> 00:05:25,199

and

115

00:05:29,749 --> 00:05:27,919

moving towards this we've been the

116

00:05:33,029 --> 00:05:29,759

team's been carefully laying out

117

00:05:36,070 --> 00:05:33,039

planning working through the sequence of

118

00:05:39,110 --> 00:05:36,080

of the timing of the soyuz arrival it's

119

00:05:41,270 --> 00:05:39,120

a very busy october for us soyuz arrival

120

00:05:42,950 --> 00:05:41,280

getting everything ready and then and

121

00:05:44,550 --> 00:05:42,960

then obviously getting ready for crew

122

00:05:46,710 --> 00:05:44,560

one um

123

00:05:48,550 --> 00:05:46,720

we're very excited to be heading into

124

00:05:51,350 --> 00:05:48,560

our operational missions this has been

125

00:05:53,749 --> 00:05:51,360

this is a culmination of of a dream of

126

00:05:57,110 --> 00:05:53,759

us to have commercial crew

127

00:06:00,950 --> 00:05:57,120

rotation seats up on station and looking

128

00:06:07,670 --> 00:06:02,629

thank you kathy now we'll hand it over

129

00:06:12,070 --> 00:06:09,590

yeah good morning i'm honored to be here

130

00:06:13,830 --> 00:06:12,080

with the uh my nasa colleagues and i

131

00:06:16,390 --> 00:06:13,840

would like to thank them for working

132

00:06:18,309 --> 00:06:16,400

with us and entrusting us flying nasa

133

00:06:20,550 --> 00:06:18,319

astronaut um

134

00:06:22,950 --> 00:06:20,560

to do the international space station

135

00:06:23,830 --> 00:06:22,960

on the crew dragon first operational

136

00:06:26,790 --> 00:06:23,840

mission

137

00:06:28,950 --> 00:06:26,800

the uh as has been mentioned the uh

138

00:06:31,430 --> 00:06:28,960

the uh we're targeting right now the

139

00:06:33,110 --> 00:06:31,440

october 31st but uh it's very early in

140

00:06:34,650 --> 00:06:33,120

the morning it's 2 40. it's actually

141

00:06:36,230 --> 00:06:34,660

still the october 30 in

142

00:06:37,990 --> 00:06:36,240

[Music]

143

00:06:39,670 --> 00:06:38,000

california

144

00:06:41,350 --> 00:06:39,680

for this particular launch

145

00:06:43,590 --> 00:06:41,360

we're happy to support nasa and any

146

00:06:46,790 --> 00:06:43,600

schedule that they need and we will use

147

00:06:49,670 --> 00:06:46,800

the additional time to review

148

00:06:51,510 --> 00:06:49,680

things build records whatever we have um

149

00:06:53,990 --> 00:06:51,520

over and over again until we're really

150

00:06:56,950 --> 00:06:54,000

sure that we are safe safe to fly in in

151  
00:06:58,710 --> 00:06:56,960  
general um you know we we will we will

152  
00:07:02,309 --> 00:06:58,720  
fly when we are ready to fly that's been

153  
00:07:04,710 --> 00:07:02,319  
our our promise all the time and that's

154  
00:07:06,070 --> 00:07:04,720  
what we did in the last mission

155  
00:07:07,670 --> 00:07:06,080  
um

156  
00:07:09,510 --> 00:07:07,680  
for the past year and and working

157  
00:07:12,230 --> 00:07:09,520  
closely with nasa we have been super

158  
00:07:14,710 --> 00:07:12,240  
busy and uh had a couple couple missions

159  
00:07:17,110 --> 00:07:14,720  
that got us to this point in time here

160  
00:07:19,110 --> 00:07:17,120  
we launched two cs mission among them

161  
00:07:21,510 --> 00:07:19,120  
the last um

162  
00:07:22,550 --> 00:07:21,520  
the last dragon one resupply mission

163  
00:07:27,510 --> 00:07:22,560

and uh

164

00:07:30,150 --> 00:07:27,520

everybody has been in service by now for

165

00:07:32,070 --> 00:07:30,160

10 years which seems seems incredible

166

00:07:34,230 --> 00:07:32,080

and it's been such a such a remarkable

167

00:07:36,710 --> 00:07:34,240

and successful program it uh

168

00:07:39,189 --> 00:07:36,720

helped us develop uh you know our

169

00:07:41,189 --> 00:07:39,199

capability on both building spacecraft

170

00:07:43,029 --> 00:07:41,199

operating spacecraft

171

00:07:44,790 --> 00:07:43,039

and last not least working with nasa and

172

00:07:46,790 --> 00:07:44,800

working with the the international space

173

00:07:49,670 --> 00:07:46,800

station it's all been super exciting and

174

00:07:51,670 --> 00:07:49,680

uh and and very important

175

00:07:53,430 --> 00:07:51,680

um we really like to thank nasa for all

176

00:07:56,390 --> 00:07:53,440

the support throughout the company's

177

00:07:58,390 --> 00:07:56,400

history and uh getting us to this point

178

00:08:01,189 --> 00:07:58,400

then we also did a in-flight escape

179

00:08:03,909 --> 00:08:01,199

demonstration in uh january and then of

180

00:08:06,869 --> 00:08:03,919

course if you if you recall in may uh

181

00:08:07,830 --> 00:08:06,879

this year we launched the demo 2 mission

182

00:08:12,150 --> 00:08:07,840

and

183

00:08:13,670 --> 00:08:12,160

united states for the first time since

184

00:08:15,589 --> 00:08:13,680

nine years

185

00:08:17,670 --> 00:08:15,599

it was an amazing mission and it was an

186

00:08:20,869 --> 00:08:17,680

incredible honor to fly doug

187

00:08:38,260 --> 00:08:20,879

bob and duck and i do have a quick demo

188

00:08:38,270 --> 00:08:58,070

[Music]

189

00:09:04,949 --> 00:09:00,790

good morning welcome aboard

190

00:09:07,509 --> 00:09:04,959

dragon spacex com check ground stations

191

00:09:09,590 --> 00:09:07,519

spacex dragon or go for launch let's

192

00:09:10,630 --> 00:09:09,600

light this candle

193

00:09:11,430 --> 00:09:10,640

three

194

00:09:12,389 --> 00:09:11,440

two

195

00:09:13,670 --> 00:09:12,399

one

196

00:09:15,990 --> 00:09:13,680

ignition

197

00:09:19,750 --> 00:09:16,000

liftoff there's a falcon line and crew

198

00:09:25,950 --> 00:09:19,760

dragon game nasa goes by next god speed

199

00:09:29,190 --> 00:09:27,509

[Music]

200

00:09:31,110 --> 00:09:29,200

on behalf of the entire launch team

201  
00:09:32,790 --> 00:09:31,120  
thanks for flying the falcon 9 today we

202  
00:09:33,990 --> 00:09:32,800  
hope you enjoyed the ride and wish you a

203  
00:09:36,230 --> 00:09:34,000  
great mission

204  
00:09:39,829 --> 00:09:36,240  
we would like to welcome you aboard

205  
00:09:41,269 --> 00:09:39,839  
capsule endeavor we do have a a friend

206  
00:09:43,509 --> 00:09:41,279  
on board with us

207  
00:09:45,990 --> 00:09:43,519  
tremor the apatosaurus i think i was

208  
00:09:47,750 --> 00:09:46,000  
requested to do a backflip good night

209  
00:09:53,110 --> 00:09:47,760  
megan and theo

210  
00:09:53,120 --> 00:10:04,389  
[Music]

211  
00:10:08,790 --> 00:10:06,550  
md houston's like houston is go for

212  
00:10:13,030 --> 00:10:08,800  
undocking departure

213  
00:10:18,870 --> 00:10:15,430

spacex dragon on dragon to ground we are

214

00:10:20,870 --> 00:10:18,880

ready for the systems briefing

215

00:10:22,870 --> 00:10:20,880

coffee as stated dragon's in a healthy

216

00:10:25,190 --> 00:10:22,880

state we are proceeding toward the

217

00:10:43,990 --> 00:10:25,200

primary landing site and your timeline

218

00:10:48,150 --> 00:10:46,310

on behalf of the spacex and nasa teams

219

00:10:51,510 --> 00:10:48,160

welcome back to planet earth and thanks

220

00:11:00,150 --> 00:10:58,069

[Music]

221

00:11:03,750 --> 00:11:00,160

so it's a humbling experience to be a

222

00:11:05,910 --> 00:11:03,760

part of what was accomplished

223

00:11:07,269 --> 00:11:05,920

it's great to see how excited everybody

224

00:11:08,710 --> 00:11:07,279

was

225

00:11:16,550 --> 00:11:08,720

we hope it brings a little bit of

226

00:11:21,110 --> 00:11:18,949

yeah i couldn't agree more with that

227

00:11:23,430 --> 00:11:21,120

it's always it's always amazing to see

228

00:11:25,670 --> 00:11:23,440

the videos of successful flights and

229

00:11:28,630 --> 00:11:25,680

admissions and launches and uh that

230

00:11:30,550 --> 00:11:28,640

gives me a little bit of goosebumps

231

00:11:33,509 --> 00:11:30,560

anyways the demo2 was extremely

232

00:11:36,310 --> 00:11:33,519

extremely clean for an inaugural mission

233

00:11:38,870 --> 00:11:36,320

bob and doc gave us great feedback and

234

00:11:41,030 --> 00:11:38,880

basically on everything from the ground

235

00:11:44,069 --> 00:11:41,040

ground supply all the way to

236

00:11:45,430 --> 00:11:44,079

uh the spacecraft itself and uh

237

00:11:47,590 --> 00:11:45,440

and uh

238

00:11:49,910 --> 00:11:47,600

it was a long way to get to the point

239

00:11:52,470 --> 00:11:49,920

but uh i really feel like we did the

240

00:11:54,710 --> 00:11:52,480

safely and and reliably and uh built a

241

00:11:56,710 --> 00:11:54,720

spit a great spacecraft um

242

00:11:58,870 --> 00:11:56,720

and they they tested it very well during

243

00:12:00,629 --> 00:11:58,880

the first mission so there are still

244

00:12:02,790 --> 00:12:00,639

there's always lessons learned and in

245

00:12:04,790 --> 00:12:02,800

this particular case we uh learned a

246

00:12:07,670 --> 00:12:04,800

couple lessons um one of them is related

247

00:12:09,509 --> 00:12:07,680

to the heat shield um we found on on a

248

00:12:12,550 --> 00:12:09,519

tile a little bit more erosion than we

249

00:12:14,629 --> 00:12:12,560

wanted to see and

250

00:12:17,750 --> 00:12:14,639

it had to do

251  
00:12:19,430 --> 00:12:17,760  
the heat shield itself where the

252  
00:12:20,389 --> 00:12:19,440  
spacecraft is mounted to the trunk

253  
00:12:21,670 --> 00:12:20,399  
basically

254  
00:12:23,269 --> 00:12:21,680  
and

255  
00:12:26,069 --> 00:12:23,279  
in that in that particular area we

256  
00:12:29,509 --> 00:12:26,079  
redesigned the uh the heat shield tile

257  
00:12:30,230 --> 00:12:29,519  
and um and and uh

258  
00:12:31,829 --> 00:12:30,240  
and

259  
00:12:33,829 --> 00:12:31,839  
at this point in time everything has

260  
00:12:35,829 --> 00:12:33,839  
been tested and is ready to go for the

261  
00:12:36,790 --> 00:12:35,839  
next mission the other lesson learned

262  
00:12:38,790 --> 00:12:36,800  
was

263  
00:12:42,470 --> 00:12:38,800

related to how we measure the altitude

264

00:12:44,550 --> 00:12:42,480

during the parachute deploy

265

00:12:46,790 --> 00:12:44,560

last time we deployed we deployed inside

266

00:12:48,550 --> 00:12:46,800

the allowable box absolutely no problem

267

00:12:49,670 --> 00:12:48,560

but just a little bit lower than we

268

00:12:52,710 --> 00:12:49,680

expected

269

00:12:55,269 --> 00:12:52,720

and so we improved the barometric

270

00:12:56,949 --> 00:12:55,279

altitude measurement and we improve the

271

00:12:59,350 --> 00:12:56,959

crosstrack with all the other navigation

272

00:13:02,310 --> 00:12:59,360

sensors for the next mission

273

00:13:04,550 --> 00:13:02,320

and then last not least we closely

274

00:13:07,750 --> 00:13:04,560

coordinate between nasa spacex with the

275

00:13:11,269 --> 00:13:07,760

u.s coast guard to establish a 10 mile

276

00:13:13,829 --> 00:13:11,279

keep out zone for for any boaters

277

00:13:16,069 --> 00:13:13,839

to make sure that the recovery is safe

278

00:13:19,190 --> 00:13:16,079

and that our crew is safe the astronauts

279

00:13:21,030 --> 00:13:19,200

are safe and and the public the public

280

00:13:22,629 --> 00:13:21,040

itself is safe and so we're going to

281

00:13:24,790 --> 00:13:22,639

have more boats

282

00:13:27,190 --> 00:13:24,800

on the next go around and

283

00:13:32,230 --> 00:13:27,200

make sure that the area is really

284

00:13:36,790 --> 00:13:35,509

we already implemented that um we we are

285

00:13:38,790 --> 00:13:36,800

at this point in time reviewing

286

00:13:41,750 --> 00:13:38,800

documentation uh making sure everything

287

00:13:43,590 --> 00:13:41,760

is good to go we do have a static fire

288

00:13:47,030 --> 00:13:43,600

ahead of us and uh

289

00:13:49,670 --> 00:13:47,040

several um simulations also to keep the

290

00:13:51,910 --> 00:13:49,680

the crew and uh and ourselves uh you

291

00:13:54,310 --> 00:13:51,920

know sharp and uh good to go

292

00:13:56,629 --> 00:13:54,320

and uh so um

293

00:13:58,389 --> 00:13:56,639

i'm definitely looking forward uh to

294

00:14:00,629 --> 00:13:58,399

moving into the operational phase with

295

00:14:02,949 --> 00:14:00,639

dragon and uh having more and more

296

00:14:04,069 --> 00:14:02,959

operational flights over the next coming

297

00:14:04,870 --> 00:14:04,079

years

298

00:14:07,829 --> 00:14:04,880

um

299

00:14:10,710 --> 00:14:07,839

talking about uh the next coming years i

300

00:14:13,670 --> 00:14:10,720

also want to talk about quickly uh about

301  
00:14:15,350 --> 00:14:13,680  
the cargo dragon tool we had a picture a

302  
00:14:20,790 --> 00:14:15,360  
while back i'm not sure if you can show

303  
00:14:24,230 --> 00:14:22,150  
um well

304  
00:14:26,310 --> 00:14:24,240  
it's uh there it is exactly that's the

305  
00:14:28,470 --> 00:14:26,320  
uh that's the new cargo dragon right

306  
00:14:32,470 --> 00:14:28,480  
this is a crs-21

307  
00:14:35,030 --> 00:14:32,480  
or in in nasa language spacex 21 i guess

308  
00:14:36,870 --> 00:14:35,040  
um and it's it's very similar to the old

309  
00:14:38,790 --> 00:14:36,880  
dragon and the way that we load the

310  
00:14:41,750 --> 00:14:38,800  
cargo inside basically and there's a

311  
00:14:43,670 --> 00:14:41,760  
trunk that has external cargos um very

312  
00:14:46,870 --> 00:14:43,680  
similar the difference is that we use

313  
00:14:49,110 --> 00:14:46,880

the um the arm on the uh on the tower

314

00:14:50,550 --> 00:14:49,120

now to just walk in and uh and load it

315

00:14:52,470 --> 00:14:50,560

there it's going to be a little bit

316

00:14:53,350 --> 00:14:52,480

easier for the for the crew to do this

317

00:14:55,110 --> 00:14:53,360

um

318

00:14:57,990 --> 00:14:55,120

and uh but

319

00:15:00,389 --> 00:14:58,000

yeah it's essentially uh you know

320

00:15:03,430 --> 00:15:00,399

improve technology on our side with a

321

00:15:05,670 --> 00:15:03,440

um you know updated and new vehicle um

322

00:15:07,189 --> 00:15:05,680

that's very very similar to the to the

323

00:15:09,030 --> 00:15:07,199

true uh

324

00:15:11,110 --> 00:15:09,040

crew version

325

00:15:12,710 --> 00:15:11,120

um once this dragon attaches to the

326

00:15:14,150 --> 00:15:12,720

station that docks actually like the

327

00:15:15,829 --> 00:15:14,160

crew driver does

328

00:15:17,509 --> 00:15:15,839

it will be the first time that you have

329

00:15:19,430 --> 00:15:17,519

two dragons on

330

00:15:21,350 --> 00:15:19,440

on the uh on the international space

331

00:15:23,750 --> 00:15:21,360

station that's uh that's pretty amazing

332

00:15:25,430 --> 00:15:23,760

and if you think about it we going

333

00:15:28,230 --> 00:15:25,440

forward we actually anticipate right now

334

00:15:30,629 --> 00:15:28,240

that during 2021 we will always have at

335

00:15:31,910 --> 00:15:30,639

least one dragon attached to the space

336

00:15:34,470 --> 00:15:31,920

station

337

00:15:36,710 --> 00:15:34,480

either you know bringing bringing

338

00:15:39,590 --> 00:15:36,720

astronauts to the space station or

339

00:15:43,110 --> 00:15:39,600

bringing the resupply cargo

340

00:15:45,269 --> 00:15:43,120

depending on which vehicle it is

341

00:15:47,829 --> 00:15:45,279

again we're honored to work with nasa

342

00:15:49,269 --> 00:15:47,839

it's international partners and the

343

00:15:50,949 --> 00:15:49,279

you know and support the important

344

00:15:52,550 --> 00:15:50,959

research and experiments on board of the

345

00:15:54,150 --> 00:15:52,560

space station

346

00:15:56,629 --> 00:15:54,160

it's been a great pleasure we're humble

347

00:16:02,470 --> 00:15:56,639

to be the nation's premier provider to

348

00:16:06,550 --> 00:16:03,910

thanks to all of our briefers for those

349

00:16:08,069 --> 00:16:06,560

initial remarks we'll now open it up for

350

00:16:10,310 --> 00:16:08,079

questions again if you're on our phone

351

00:16:12,550 --> 00:16:10,320

bridge please press star 1 to submit a

352

00:16:14,389 --> 00:16:12,560

question once your name is called please

353

00:16:16,069 --> 00:16:14,399

state to whom you'd like to direct your

354

00:16:17,829 --> 00:16:16,079

question we'll have a lot of questions

355

00:16:20,389 --> 00:16:17,839

so if you find that yours has already

356

00:16:22,310 --> 00:16:20,399

been answered press star 2 to withdraw

357

00:16:25,430 --> 00:16:22,320

it on social media please use the

358

00:16:27,430 --> 00:16:25,440

hashtag ask nasa let's start on our

359

00:16:31,430 --> 00:16:27,440

phone bridge with joey roulette from

360

00:16:37,829 --> 00:16:34,150

for doing this um question is for hans

361

00:16:42,150 --> 00:16:40,150

i was just wondering generally what uh

362

00:16:44,550 --> 00:16:42,160

work is needed before we can officially

363

00:16:46,870 --> 00:16:44,560

certify crew dragon um and if there's

364

00:16:48,150 --> 00:16:46,880

any specific details about that that you

365

00:16:50,069 --> 00:16:48,160

could provide that you learned from the

366

00:16:56,550 --> 00:16:50,079

dnc mission that would be um great

367

00:16:59,590 --> 00:16:57,910

jim bridenstine why don't we start with

368

00:17:02,230 --> 00:16:59,600

you

369

00:17:04,710 --> 00:17:02,240

yeah so i'll look i'll defer this to uh

370

00:17:06,069 --> 00:17:04,720

to kathy i know it's uh it was her

371

00:17:07,750 --> 00:17:06,079

program until i pulled her up to

372

00:17:09,990 --> 00:17:07,760

headquarters to run the entire human

373

00:17:12,870 --> 00:17:10,000

exploration program so kathy i'll i'll

374

00:17:18,470 --> 00:17:15,990

yeah i think the the major work is in a

375

00:17:20,230 --> 00:17:18,480

couple of different areas one is in

376

00:17:22,230 --> 00:17:20,240

updating the design

377

00:17:25,189 --> 00:17:22,240

in the two areas that hans already

378

00:17:29,029 --> 00:17:25,199

mentioned which is

379

00:17:32,230 --> 00:17:29,039

some very localized upgrades of the

380

00:17:34,390 --> 00:17:32,240

tps and those attach points and i know

381

00:17:36,630 --> 00:17:34,400

in the press conference following this

382

00:17:38,630 --> 00:17:36,640

steve stitch even though i hate the fact

383

00:17:40,150 --> 00:17:38,640

that he gets to do this

384

00:17:42,150 --> 00:17:40,160

i'm sure he'll talk about it a whole

385

00:17:44,150 --> 00:17:42,160

bunch so but you know obviously we had

386

00:17:46,789 --> 00:17:44,160

to update that certification you know we

387

00:17:48,310 --> 00:17:46,799

did a demo flight to learn and so we

388

00:17:50,950 --> 00:17:48,320

found out that in those particular

389

00:17:52,390 --> 00:17:50,960

locations we'd like to have an updated

390

00:17:54,950 --> 00:17:52,400

design and so

391

00:17:57,750 --> 00:17:54,960

the the new work isn't is focused in

392

00:18:01,029 --> 00:17:57,760

that area and then we did make a design

393

00:18:01,909 --> 00:18:01,039

change to to

394

00:18:06,549 --> 00:18:01,919

change

395

00:18:09,750 --> 00:18:06,559

like han said how we were measuring the

396

00:18:12,310 --> 00:18:09,760

barometric pressure to um determine

397

00:18:15,750 --> 00:18:12,320

what's the right altitude to be able to

398

00:18:19,510 --> 00:18:15,760

deploy the drug shoots and so really the

399

00:18:22,710 --> 00:18:19,520

big chunk of the certification is in

400

00:18:24,630 --> 00:18:22,720

those upgrades and then any deltas you

401  
00:18:27,669 --> 00:18:24,640  
know demo two

402  
00:18:29,830 --> 00:18:27,679  
provide a capability to be able to dock

403  
00:18:31,909 --> 00:18:29,840  
on the forward element

404  
00:18:33,430 --> 00:18:31,919  
on the forward docking

405  
00:18:36,070 --> 00:18:33,440  
area and

406  
00:18:38,230 --> 00:18:36,080  
crew one because it's a full

407  
00:18:40,789 --> 00:18:38,240  
increment crew is giving us a new

408  
00:18:43,590 --> 00:18:40,799  
capability to also be able to

409  
00:18:45,029 --> 00:18:43,600  
dock on the zenith port and so those

410  
00:18:53,190 --> 00:18:45,039  
were

411  
00:18:55,029 --> 00:18:53,200  
safely fly crew for a demo 2 mission so

412  
00:18:57,110 --> 00:18:55,039  
the team's kind of doing their delta

413  
00:19:03,110 --> 00:18:57,120

certification efforts the big chunk of

414

00:19:07,430 --> 00:19:04,710

thank you for that answer we'll now pass

415

00:19:10,549 --> 00:19:07,440

it over to salem bauer from gannet

416

00:19:15,510 --> 00:19:12,710

thank you my question is for nasa

417

00:19:18,310 --> 00:19:15,520

administrator jim brady

418

00:19:21,270 --> 00:19:18,320

sir how historic is this first

419

00:19:25,830 --> 00:19:21,280

operational mission of crew one in the

420

00:19:28,230 --> 00:19:25,840

history of human space flight thank you

421

00:19:31,669 --> 00:19:28,240

oh you bet well look here's the thing in

422

00:19:33,430 --> 00:19:31,679

november we're celebrating 20 years

423

00:19:35,750 --> 00:19:33,440

of having people living and working on

424

00:19:38,230 --> 00:19:35,760

the international space station and it

425

00:19:41,510 --> 00:19:38,240

just so happens that when we launch on

426

00:19:44,710 --> 00:19:41,520

october 31st early in the morning on

427

00:19:48,150 --> 00:19:44,720

halloween it will be 20 years since the

428

00:19:50,230 --> 00:19:48,160

launch of expeditionary mission 1 em-1

429

00:19:52,710 --> 00:19:50,240

so this is uh this is a very exciting

430

00:19:54,710 --> 00:19:52,720

time for the agency in general

431

00:19:57,110 --> 00:19:54,720

but it just demonstrates the value of

432

00:19:59,909 --> 00:19:57,120

the international space station

433

00:20:01,750 --> 00:19:59,919

without this this uh this tool that we

434

00:20:04,710 --> 00:20:01,760

have not just a tool of diplomacy but

435

00:20:06,950 --> 00:20:04,720

also science and technology development

436

00:20:08,950 --> 00:20:06,960

we've been able to to go from you know

437

00:20:12,149 --> 00:20:08,960

flying space shuttles and now flying

438

00:20:13,750 --> 00:20:12,159

commercial vehicles um demonstrating

439

00:20:15,190 --> 00:20:13,760

that we can drive down costs and

440

00:20:17,430 --> 00:20:15,200

increase access

441

00:20:19,909 --> 00:20:17,440

so i think probably from a historical

442

00:20:21,590 --> 00:20:19,919

perspective the most important thing is

443

00:20:23,909 --> 00:20:21,600

we have fundamentally changed the

444

00:20:25,110 --> 00:20:23,919

business model for how nasa does

445

00:20:26,950 --> 00:20:25,120

business

446

00:20:28,549 --> 00:20:26,960

we want to be a customer especially when

447

00:20:30,710 --> 00:20:28,559

it comes to low earth orbit we want to

448

00:20:32,149 --> 00:20:30,720

be one customer of many and we want to

449

00:20:34,630 --> 00:20:32,159

have numerous providers that are

450

00:20:37,029 --> 00:20:34,640

competing on cost and innovation we have

451  
00:20:39,430 --> 00:20:37,039  
proven that out with commercial crew and

452  
00:20:42,310 --> 00:20:39,440  
now we're getting into these regular

453  
00:20:45,110 --> 00:20:42,320  
regularly scheduled missions for dragon

454  
00:20:46,710 --> 00:20:45,120  
and of course starliner is is coming up

455  
00:20:49,510 --> 00:20:46,720  
soon in fact the crew that's about to

456  
00:20:52,390 --> 00:20:49,520  
launch on october 31st they're going to

457  
00:20:53,909 --> 00:20:52,400  
be there when the very first starliner

458  
00:20:55,909 --> 00:20:53,919  
attaches to the international space

459  
00:20:59,190 --> 00:20:55,919  
station so we're going to have two

460  
00:21:01,270 --> 00:20:59,200  
independent uh companies that are you

461  
00:21:03,830 --> 00:21:01,280  
know have very uh

462  
00:21:05,430 --> 00:21:03,840  
solution sets to achieve space flight

463  
00:21:06,630 --> 00:21:05,440

and docking at the international space

464

00:21:08,950 --> 00:21:06,640  
station

465

00:21:10,710 --> 00:21:08,960  
and i think that's that's really uh

466

00:21:12,549 --> 00:21:10,720  
there's a lot of a lot of historic

467

00:21:14,390 --> 00:21:12,559  
firsts that are about to take place

468

00:21:17,270 --> 00:21:14,400  
especially with this crew so it's it's

469

00:21:22,470 --> 00:21:17,280  
an exciting time

470

00:21:25,110 --> 00:21:24,149  
hi thank you so much for taking my

471

00:21:28,070 --> 00:21:25,120  
question

472

00:21:30,230 --> 00:21:28,080  
i recall with dm2 there are constraints

473

00:21:32,070 --> 00:21:30,240  
on the crew dragon's lifetime in orbit

474

00:21:33,669 --> 00:21:32,080  
because of its solar panels i'm

475

00:21:35,750 --> 00:21:33,679  
wondering if those uh similar

476

00:21:37,510 --> 00:21:35,760

constraints are on this mission or if

477

00:21:41,590 --> 00:21:37,520

the crew dragon's lifetime in orbit have

478

00:21:45,430 --> 00:21:43,830

so the these the solar panels are

479

00:21:48,230 --> 00:21:45,440

different for a longer duration i'll

480

00:21:50,710 --> 00:21:48,240

i'll leave it to kathy

481

00:21:51,990 --> 00:21:50,720

oh sorry about that um stepping on you

482

00:21:54,549 --> 00:21:52,000

there

483

00:21:56,830 --> 00:21:54,559

it's a fully certified vehicle so 210

484

00:21:58,549 --> 00:21:56,840

days

485

00:22:01,110 --> 00:21:58,559

and

486

00:22:03,350 --> 00:22:01,120

so as jim said you know there's an

487

00:22:05,990 --> 00:22:03,360

upgraded solar

488

00:22:09,520 --> 00:22:06,000

panel design and so every aspect of the

489

00:22:13,430 --> 00:22:11,510

[Music]

490

00:22:15,190 --> 00:22:13,440

thank you uh friendly reminder for our

491

00:22:16,870 --> 00:22:15,200

callers to please state to whom you'd

492

00:22:21,350 --> 00:22:16,880

like to direct your question next we

493

00:22:24,470 --> 00:22:22,950

hi all uh

494

00:22:26,470 --> 00:22:24,480

i just wanted to

495

00:22:29,909 --> 00:22:26,480

ask a quick question that could be

496

00:22:30,870 --> 00:22:29,919

answered by either kathy or hans i i

497

00:22:33,669 --> 00:22:30,880

know that

498

00:22:36,870 --> 00:22:33,679

crew drags get designed to hold up to

499

00:22:38,470 --> 00:22:36,880

seven passengers i'm i'm wondering why

500

00:22:41,590 --> 00:22:38,480

at this point

501  
00:22:44,390 --> 00:22:41,600  
when you might expect to see that full

502  
00:22:46,870 --> 00:22:44,400  
capability utilized i know this is a big

503  
00:22:48,870 --> 00:22:46,880  
step from two to four but i'm wondering

504  
00:22:50,390 --> 00:22:48,880  
uh whether or not you have any missions

505  
00:22:52,230 --> 00:22:50,400  
planned in the near future that would

506  
00:22:58,310 --> 00:22:52,240  
expand that all the way up to the full

507  
00:23:02,470 --> 00:23:00,310  
so from a nasa perspective i'll answer

508  
00:23:05,190 --> 00:23:02,480  
first and then let hans talk about the

509  
00:23:07,430 --> 00:23:05,200  
capacity for seven

510  
00:23:09,909 --> 00:23:07,440  
you know our capability is for four but

511  
00:23:11,750 --> 00:23:09,919  
we also have this unique

512  
00:23:14,630 --> 00:23:11,760  
we have unique requirements for us to

513  
00:23:16,630 --> 00:23:14,640

also fly powered cargo payloads that

514

00:23:18,710 --> 00:23:16,640

take up extra room and then additional

515

00:23:19,750 --> 00:23:18,720

cargo right where

516

00:23:22,630 --> 00:23:19,760

um

517

00:23:24,549 --> 00:23:22,640

other missions in low earth orbit may or

518

00:23:26,870 --> 00:23:24,559

may not have that

519

00:23:28,230 --> 00:23:26,880

those types of requirements also

520

00:23:30,710 --> 00:23:28,240

so um

521

00:23:32,470 --> 00:23:30,720

the nasa capability is is for that the

522

00:23:34,950 --> 00:23:32,480

full complement of four crew members

523

00:23:38,630 --> 00:23:34,960

like jim talked about

524

00:23:40,789 --> 00:23:38,640

and but that that's what trades off

525

00:23:45,909 --> 00:23:40,799

our crew and cargo requirements for

526  
00:23:49,669 --> 00:23:47,350  
yeah

527  
00:23:52,310 --> 00:23:49,679  
we always have the option um but as for

528  
00:23:54,549 --> 00:23:52,320  
nasa missions we uh we use the space

529  
00:23:57,110 --> 00:23:54,559  
right now for cargo and

530  
00:23:59,590 --> 00:23:57,120  
an extra capability and uh

531  
00:24:02,870 --> 00:23:59,600  
we we will continue to fly for arsenal

532  
00:24:04,630 --> 00:24:02,880  
so the international space station um as

533  
00:24:06,789 --> 00:24:04,640  
and and also on the first on the first

534  
00:24:09,510 --> 00:24:06,799  
mission we will learn and how how well

535  
00:24:10,390 --> 00:24:09,520  
the uh eclipse the life support system

536  
00:24:12,710 --> 00:24:10,400  
uh

537  
00:24:14,950 --> 00:24:12,720  
continues to work with four people

538  
00:24:18,870 --> 00:24:14,960

and um and then going forward we will

539

00:24:24,549 --> 00:24:21,430

next we have andrea leinfelder from the

540

00:24:29,350 --> 00:24:26,310

hi thanks for taking my call this

541

00:24:30,950 --> 00:24:29,360

morning um so i recall demo two oh and

542

00:24:33,990 --> 00:24:30,960

this question is for kathy

543

00:24:35,669 --> 00:24:34,000

i recall of demo two that we launched in

544

00:24:37,190 --> 00:24:35,679

the afternoon partly because of the

545

00:24:38,950 --> 00:24:37,200

astronaut sleep schedule you know we

546

00:24:40,789 --> 00:24:38,960

need everyone to be able to get a good

547

00:24:42,710 --> 00:24:40,799

night's rest and to sleep at the right

548

00:24:44,789 --> 00:24:42,720

time so i was curious as to why we

549

00:24:48,230 --> 00:24:44,799

decided to launch this one at 2 40 in

550

00:24:53,350 --> 00:24:50,789

well i wish i wish for

551  
00:24:55,830 --> 00:24:53,360  
my boss's sake i could launch this this

552  
00:24:57,590 --> 00:24:55,840  
mission in the afternoon i think

553  
00:25:00,549 --> 00:24:57,600  
because really what drives when we

554  
00:25:02,470 --> 00:25:00,559  
launch is the phasing so when

555  
00:25:05,029 --> 00:25:02,480  
when the rocket and the international

556  
00:25:07,909 --> 00:25:05,039  
space station kind of line up together

557  
00:25:10,149 --> 00:25:07,919  
in the best way for us to get there so

558  
00:25:12,230 --> 00:25:10,159  
really physics kind of drives the time

559  
00:25:13,669 --> 00:25:12,240  
frame for when we launch during

560  
00:25:18,870 --> 00:25:13,679  
particular

561  
00:25:21,909 --> 00:25:18,880  
really nicely for us on our launch in

562  
00:25:25,190 --> 00:25:21,919  
may that we were able to provide

563  
00:25:26,870 --> 00:25:25,200

a nice launch window in the afternoon

564

00:25:29,110 --> 00:25:26,880

i was hoping i'd be able to do the same

565

00:25:31,269 --> 00:25:29,120

thing for this mission but

566

00:25:33,269 --> 00:25:31,279

we're going to have a great launch

567

00:25:34,390 --> 00:25:33,279

excuse me early in the morning instead

568

00:25:39,269 --> 00:25:34,400

so

569

00:25:39,279 --> 00:25:43,909

next we have paul brinkman from upi

570

00:25:49,350 --> 00:25:46,630

uh yeah hello thanks for doing this um

571

00:25:50,310 --> 00:25:49,360

i guess my question is for hans um

572

00:25:52,630 --> 00:25:50,320

or

573

00:25:54,149 --> 00:25:52,640

actually about the four four person

574

00:25:55,669 --> 00:25:54,159

capacity

575

00:25:58,549 --> 00:25:55,679

i'm just wondering if you could kind of

576  
00:25:59,830 --> 00:25:58,559  
go through how egress of the capsule

577  
00:26:01,669 --> 00:25:59,840  
will work

578  
00:26:03,669 --> 00:26:01,679  
and um i'm also wondering if anybody

579  
00:26:05,430 --> 00:26:03,679  
there knows whether

580  
00:26:12,680 --> 00:26:05,440  
this is the first time in history that a

581  
00:26:17,430 --> 00:26:15,350  
[Music]

582  
00:26:20,470 --> 00:26:17,440  
yeah i'm thinking really fast here

583  
00:26:24,230 --> 00:26:22,390  
if there's any other capsule with four

584  
00:26:26,230 --> 00:26:24,240  
people i mean

585  
00:26:27,830 --> 00:26:26,240  
going in into the capsule and getting

586  
00:26:29,909 --> 00:26:27,840  
out of doesn't change with four people

587  
00:26:32,149 --> 00:26:29,919  
it just takes uh probably twice as long

588  
00:26:34,789 --> 00:26:32,159

as with two one after the other

589

00:26:36,070 --> 00:26:34,799

and um we have a crew that supports um

590

00:26:38,149 --> 00:26:36,080

you know the astronauts and how they

591

00:26:39,750 --> 00:26:38,159

settle in their in their seats and make

592

00:26:41,110 --> 00:26:39,760

sure they're all you know buckled up and

593

00:26:44,470 --> 00:26:41,120

uh comfortable

594

00:26:47,190 --> 00:26:44,480

and uh and so i don't see any um any

595

00:26:50,070 --> 00:26:47,200

changes here and also if you if you keep

596

00:26:53,110 --> 00:26:50,080

keep in mind and dragon is relatively

597

00:26:56,230 --> 00:26:53,120

you know roomy for a space capsule

598

00:26:58,470 --> 00:26:56,240

um for for uh two people and also for

599

00:27:00,549 --> 00:26:58,480

four people um you can still walk around

600

00:27:03,350 --> 00:27:00,559

there a little bit so i don't i don't

601  
00:27:05,669 --> 00:27:03,360  
anticipate any any uh you know space

602  
00:27:08,230 --> 00:27:05,679  
constraints um for people at this point

603  
00:27:11,510 --> 00:27:08,240  
in time and regarding your question um

604  
00:27:13,590 --> 00:27:11,520  
for four four people in the capsule i

605  
00:27:19,029 --> 00:27:13,600  
i think you're right but i'm absolutely

606  
00:27:21,750 --> 00:27:20,470  
the american sure

607  
00:27:24,630 --> 00:27:21,760  
you had you know

608  
00:27:26,789 --> 00:27:24,640  
gemini mercury apollo none of them had

609  
00:27:28,230 --> 00:27:26,799  
four you had the space shuttle which was

610  
00:27:30,310 --> 00:27:28,240  
not a capsule

611  
00:27:33,029 --> 00:27:30,320  
um and now we're back to the capsule

612  
00:27:35,430 --> 00:27:33,039  
model i i would have to from an american

613  
00:27:37,510 --> 00:27:35,440

perspective i'm pretty pretty sure that

614

00:27:38,950 --> 00:27:37,520

this is the first time we've launched

615

00:27:39,909 --> 00:27:38,960

four in a capsule

616

00:27:41,909 --> 00:27:39,919

um

617

00:27:43,830 --> 00:27:41,919

and i think that's probably true for our

618

00:27:48,070 --> 00:27:43,840

our our international partners as well

619

00:27:53,830 --> 00:27:50,310

one of the things we did on demo two to

620

00:27:55,750 --> 00:27:53,840

make sure that this design was certified

621

00:27:58,310 --> 00:27:55,760

was we actually did it on orbit checkout

622

00:28:00,870 --> 00:27:58,320

where we even though bob and doug flew

623

00:28:03,190 --> 00:28:00,880

up we actually went and put four crew in

624

00:28:05,269 --> 00:28:03,200

the capsule on orbit and did all the

625

00:28:07,510 --> 00:28:05,279

operations and made sure that we could

626  
00:28:10,230 --> 00:28:07,520  
meet all of our requirements which also

627  
00:28:11,510 --> 00:28:10,240  
include like being able to get out in 90

628  
00:28:13,510 --> 00:28:11,520  
seconds and a bunch of other

629  
00:28:14,870 --> 00:28:13,520  
requirements too to make sure

630  
00:28:17,190 --> 00:28:14,880  
that we can

631  
00:28:18,230 --> 00:28:17,200  
live and work and safely operate the

632  
00:28:22,230 --> 00:28:18,240  
capsule

633  
00:28:27,830 --> 00:28:24,389  
next we have stephen clark from space

634  
00:28:31,669 --> 00:28:29,350  
i thank you for taking my question

635  
00:28:33,750 --> 00:28:31,679  
stephen clark from space flight now

636  
00:28:35,909 --> 00:28:33,760  
for kathy leaders or jim breinstein i

637  
00:28:38,149 --> 00:28:35,919  
know the plan going into the commercial

638  
00:28:40,389 --> 00:28:38,159

crew was to have mixed crews on u.s and

639

00:28:42,549 --> 00:28:40,399

russian spacecraft like a russian

640

00:28:45,190 --> 00:28:42,559

cosmonaut on all u.s commissions and

641

00:28:47,430 --> 00:28:45,200

nasa crew member on all soyuz missions

642

00:28:48,789 --> 00:28:47,440

through a barter agreement uh that

643

00:28:50,549 --> 00:28:48,799

doesn't seem to be happening at least

644

00:28:53,510 --> 00:28:50,559

with these first few

645

00:28:55,190 --> 00:28:53,520

uh operational uh crew dragon missions

646

00:28:56,830 --> 00:28:55,200

uh the one crew one and crude two uh

647

00:28:59,430 --> 00:28:56,840

doesn't have a russian

648

00:29:01,269 --> 00:28:59,440

cosmonaut um so just wondering if you

649

00:29:03,190 --> 00:29:01,279

can update me on uh securing an

650

00:29:05,909 --> 00:29:03,200

agreement for for mixed cruise on future

651  
00:29:07,590 --> 00:29:05,919  
crew launches both u.s and russian uh

652  
00:29:13,190 --> 00:29:07,600  
you know beyond the seat you have

653  
00:29:15,029 --> 00:29:13,200  
secured for the soyuz next month thanks

654  
00:29:17,350 --> 00:29:15,039  
so we we still believe it's critically

655  
00:29:19,190 --> 00:29:17,360  
important um that when we have an

656  
00:29:20,789 --> 00:29:19,200  
international space station where you

657  
00:29:22,789 --> 00:29:20,799  
know half of it is american and the

658  
00:29:25,350 --> 00:29:22,799  
other half is is russian

659  
00:29:26,789 --> 00:29:25,360  
um that we have crews where we have you

660  
00:29:28,789 --> 00:29:26,799  
know

661  
00:29:31,029 --> 00:29:28,799  
russian cosmonauts launch with american

662  
00:29:32,870 --> 00:29:31,039  
astronauts on the american vehicle and

663  
00:29:35,350 --> 00:29:32,880

american astronauts launch with russian

664

00:29:37,110 --> 00:29:35,360

cosmonauts on the on the the russian

665

00:29:39,830 --> 00:29:37,120

soyuz we think that's critically

666

00:29:41,990 --> 00:29:39,840

important i know our partners over at

667

00:29:43,669 --> 00:29:42,000

russia also believe that that is

668

00:29:44,870 --> 00:29:43,679

important and i know that we're working

669

00:29:47,029 --> 00:29:44,880

towards that

670

00:29:48,149 --> 00:29:47,039

between our our two agencies day in and

671

00:29:50,070 --> 00:29:48,159

day out

672

00:29:51,590 --> 00:29:50,080

but i think i think there's broad

673

00:29:54,389 --> 00:29:51,600

agreement that

674

00:29:55,830 --> 00:29:54,399

if if both countries want to maintain

675

00:29:57,990 --> 00:29:55,840

a permanent presence on the

676  
00:30:00,549 --> 00:29:58,000  
international space station that is that

677  
00:30:02,230 --> 00:30:00,559  
is the end state we need to achieve

678  
00:30:03,909 --> 00:30:02,240  
so so we're working towards it and i

679  
00:30:05,669 --> 00:30:03,919  
think we will get there

680  
00:30:08,230 --> 00:30:05,679  
kathy if you have any more details feel

681  
00:30:10,789 --> 00:30:08,240  
free

682  
00:30:13,190 --> 00:30:10,799  
uh yeah you're exactly right we're in

683  
00:30:15,190 --> 00:30:13,200  
the process of uh coordinating

684  
00:30:17,269 --> 00:30:15,200  
implementing agreement to work towards

685  
00:30:19,590 --> 00:30:17,279  
that it's um

686  
00:30:22,710 --> 00:30:19,600  
right now it's about which mission do we

687  
00:30:24,470 --> 00:30:22,720  
implement that and um but as far as i'm

688  
00:30:26,149 --> 00:30:24,480

concerned the sooner the better right

689

00:30:27,510 --> 00:30:26,159

but jim's exactly right it's very

690

00:30:29,190 --> 00:30:27,520

important to us

691

00:30:31,669 --> 00:30:29,200

we feel like it's critical for our

692

00:30:35,510 --> 00:30:31,679

maintenance on orbit and

693

00:30:40,630 --> 00:30:37,590

next we have chris davenport from the

694

00:30:45,029 --> 00:30:42,710

hey guys thanks for doing this i guess

695

00:30:47,190 --> 00:30:45,039

my questions is for uh hans just a

696

00:30:49,830 --> 00:30:47,200

technical question that follow up on the

697

00:30:52,389 --> 00:30:49,840

heat shield i wonder if you could say

698

00:30:54,789 --> 00:30:52,399

how much erosion there was and it sounds

699

00:30:57,190 --> 00:30:54,799

like you still had plenty of margin

700

00:30:59,350 --> 00:30:57,200

uh was it across the entire heat shield

701  
00:31:00,710 --> 00:30:59,360  
or just in a localized area

702  
00:31:02,549 --> 00:31:00,720  
and when you said i think you said you

703  
00:31:08,710 --> 00:31:02,559  
updated the screen design i wonder if

704  
00:31:14,549 --> 00:31:12,149  
certainly um so first of all this was a

705  
00:31:16,230 --> 00:31:14,559  
small area in the in the heat shield and

706  
00:31:19,590 --> 00:31:16,240  
particularly the area around what we

707  
00:31:22,070 --> 00:31:19,600  
call the tension ties which hold

708  
00:31:24,070 --> 00:31:22,080  
the trunk and the dragon spacecraft

709  
00:31:26,389 --> 00:31:24,080  
together

710  
00:31:28,310 --> 00:31:26,399  
in this particular area we saw some flow

711  
00:31:29,909 --> 00:31:28,320  
phenomenon that

712  
00:31:32,230 --> 00:31:29,919  
i guess we didn't really expect and we

713  
00:31:34,070 --> 00:31:32,240

saw erosion to be deeper than than we

714

00:31:36,070 --> 00:31:34,080

anticipated however i mean this this

715

00:31:38,070 --> 00:31:36,080

heat shield is massive and over the

716

00:31:40,149 --> 00:31:38,080

entire acreage there was was very little

717

00:31:42,549 --> 00:31:40,159

erosion in this particular area as it

718

00:31:44,630 --> 00:31:42,559

was a little bit deeper and

719

00:31:46,789 --> 00:31:44,640

and uh but nothing nothing to be

720

00:31:49,110 --> 00:31:46,799

concerned at all times the astronauts

721

00:31:51,110 --> 00:31:49,120

were safe and and the vehicle was

722

00:31:53,029 --> 00:31:51,120

working um perfectly so this is

723

00:31:54,950 --> 00:31:53,039

something that we just in the inspection

724

00:31:57,269 --> 00:31:54,960

found and uh looked at it and then

725

00:31:59,269 --> 00:31:57,279

decided okay we should probably uh you

726  
00:32:01,509 --> 00:31:59,279  
know and reinforce the heat shield on

727  
00:32:04,070 --> 00:32:01,519  
this particular area and it's actually

728  
00:32:05,269 --> 00:32:04,080  
four areas just around the tension ties

729  
00:32:07,430 --> 00:32:05,279  
a very

730  
00:32:10,389 --> 00:32:07,440  
uh very small area compared to the oval

731  
00:32:13,029 --> 00:32:10,399  
acreage of the heat shield and then i

732  
00:32:14,710 --> 00:32:13,039  
think kathy's comment regarding screen

733  
00:32:16,789 --> 00:32:14,720  
refers to a

734  
00:32:18,389 --> 00:32:16,799  
sort of a filter that

735  
00:32:20,710 --> 00:32:18,399  
filters the air going into the

736  
00:32:23,029 --> 00:32:20,720  
barometric pressure sensor

737  
00:32:24,870 --> 00:32:23,039  
that particular filter has been opened

738  
00:32:26,789 --> 00:32:24,880

up a little bit so that it's a less

739

00:32:29,190 --> 00:32:26,799

constrained and that has the effect that

740

00:32:31,350 --> 00:32:29,200

we measure the barometric pressure more

741

00:32:34,070 --> 00:32:31,360

accurately and we come down and deploy

742

00:32:34,870 --> 00:32:34,080

the parachute um right on time

743

00:32:37,029 --> 00:32:34,880

um

744

00:32:39,430 --> 00:32:37,039

that that is something that you know was

745

00:32:41,750 --> 00:32:39,440

also not not a particular problem the

746

00:32:44,070 --> 00:32:41,760

last time but you know going forward it

747

00:32:46,549 --> 00:32:44,080

is uh it is a safety improvement and

748

00:32:48,870 --> 00:32:46,559

we'll make sure that um we will launch

749

00:32:51,269 --> 00:32:48,880

astronauts um and and land them of

750

00:32:54,470 --> 00:32:51,279

course uh safely you know in the

751

00:32:58,630 --> 00:32:56,070

we'll now take a few questions from

752

00:33:00,789 --> 00:32:58,640

social media using the hashtag ask nasa

753

00:33:02,870 --> 00:33:00,799

this first one comes from israel on

754

00:33:06,070 --> 00:33:02,880

twitter who directed his question to

755

00:33:11,750 --> 00:33:06,080

kathy what value can the taxpayer expect

756

00:33:17,830 --> 00:33:14,630

well i think you know like jim said you

757

00:33:19,909 --> 00:33:17,840

know our goal is to one day be able to

758

00:33:22,470 --> 00:33:19,919

buy services

759

00:33:23,430 --> 00:33:22,480

in low earth orbit right so this is one

760

00:33:27,029 --> 00:33:23,440

step

761

00:33:29,269 --> 00:33:27,039

on our process for us to get there

762

00:33:31,750 --> 00:33:29,279

you know we're we're taking this in

763

00:33:34,789 --> 00:33:31,760

careful steps but but

764

00:33:36,549 --> 00:33:34,799

for us to be able to continue to

765

00:33:39,669 --> 00:33:36,559

do what we feel is our charter which is

766

00:33:41,430 --> 00:33:39,679

to go and do deep space exploration

767

00:33:43,830 --> 00:33:41,440

us moving towards

768

00:33:45,509 --> 00:33:43,840

a commercial a commercial platform in

769

00:33:47,190 --> 00:33:45,519

low earth orbit and being able to use

770

00:33:50,149 --> 00:33:47,200

commercial services

771

00:33:51,029 --> 00:33:50,159

is is a goal of ours and so

772

00:33:52,310 --> 00:33:51,039

us

773

00:33:55,110 --> 00:33:52,320

taking this first step with the

774

00:33:57,430 --> 00:33:55,120

commercial service for our crew and

775

00:34:01,110 --> 00:33:57,440

cargo capabilities now is an important

776

00:34:04,950 --> 00:34:03,350

this next ask nasa question comes from

777

00:34:07,350 --> 00:34:04,960

jim on twitter this one's for the

778

00:34:09,109 --> 00:34:07,360

administrator with crew one and a

779

00:34:10,869 --> 00:34:09,119

russian launched the international space

780

00:34:13,190 --> 00:34:10,879

station uh the station will have a

781

00:34:15,270 --> 00:34:13,200

larger population than it has in quite a

782

00:34:18,230 --> 00:34:15,280

while any impacts from that that are

783

00:34:22,629 --> 00:34:20,869

yes some significant impacts um once

784

00:34:24,389 --> 00:34:22,639

once we have you know a bigger

785

00:34:26,629 --> 00:34:24,399

complement of astronauts on the

786

00:34:29,109 --> 00:34:26,639

international space station we can do a

787

00:34:31,430 --> 00:34:29,119

lot more science um and that's gonna

788

00:34:32,950 --> 00:34:31,440

that's gonna give us a return

789

00:34:34,710 --> 00:34:32,960

even faster

790

00:34:36,710 --> 00:34:34,720

make no mistake we've had huge returns

791

00:34:38,629 --> 00:34:36,720

from the international space station

792

00:34:40,149 --> 00:34:38,639

already but now we can get even more

793

00:34:41,829 --> 00:34:40,159

even faster

794

00:34:43,270 --> 00:34:41,839

you know the the previous question was

795

00:34:45,669 --> 00:34:43,280

about what are the returns we're going

796

00:34:47,669 --> 00:34:45,679

to see for the american taxpayer from

797

00:34:50,230 --> 00:34:47,679

the the commercial crew program or the

798

00:34:51,669 --> 00:34:50,240

spacex crew dragon

799

00:34:53,349 --> 00:34:51,679

bottom line is

800

00:34:55,589 --> 00:34:53,359

you know we are we are making every

801  
00:34:57,510 --> 00:34:55,599  
effort to industrialize space as fast as

802  
00:34:59,750 --> 00:34:57,520  
possible so we look at advanced

803  
00:35:01,589 --> 00:34:59,760  
materials and we look at industrialized

804  
00:35:04,230 --> 00:35:01,599  
biomedicine

805  
00:35:06,710 --> 00:35:04,240  
the compounding of pharmaceuticals or

806  
00:35:09,750 --> 00:35:06,720  
the creating of of immunizations the

807  
00:35:12,069 --> 00:35:09,760  
value here is microgravity we can't

808  
00:35:14,710 --> 00:35:12,079  
create microgravity here on earth you

809  
00:35:17,349 --> 00:35:14,720  
can you can do you know drop towers you

810  
00:35:18,790 --> 00:35:17,359  
can send airplanes on you know parabolic

811  
00:35:20,390 --> 00:35:18,800  
trajectories in order to get

812  
00:35:22,230 --> 00:35:20,400  
microgravity

813  
00:35:24,390 --> 00:35:22,240

but ultimately it's a very short

814

00:35:27,510 --> 00:35:24,400

duration when we get to orbit we can

815

00:35:31,109 --> 00:35:27,520

have microgravity for months

816

00:35:33,190 --> 00:35:31,119

even even up to you know a year um

817

00:35:34,550 --> 00:35:33,200

well we can have it for 20 years as is

818

00:35:36,790 --> 00:35:34,560

evidenced with the international space

819

00:35:38,470 --> 00:35:36,800

station but any individual astronaut up

820

00:35:40,950 --> 00:35:38,480

you know up to a year

821

00:35:44,630 --> 00:35:40,960

and so what this means is we get to

822

00:35:47,750 --> 00:35:44,640

maximize the utility of microgravity for

823

00:35:50,390 --> 00:35:47,760

research and ultimately we're focusing

824

00:35:52,790 --> 00:35:50,400

our research for a day when that

825

00:35:55,430 --> 00:35:52,800

research becomes applied

826

00:35:58,870 --> 00:35:55,440

so when we think about the ability to

827

00:36:01,190 --> 00:35:58,880

create human tissue for people that that

828

00:36:03,670 --> 00:36:01,200

maybe need new tissue whether it's you

829

00:36:06,470 --> 00:36:03,680

know skin or or something else using

830

00:36:08,870 --> 00:36:06,480

your own adult stem cells we can create

831

00:36:10,870 --> 00:36:08,880

your own tissue in the microgravity of

832

00:36:13,109 --> 00:36:10,880

space when you do it in the gravity well

833

00:36:15,109 --> 00:36:13,119

of earth it just goes flat

834

00:36:17,349 --> 00:36:15,119

so there's a lot of benefits you know i

835

00:36:19,349 --> 00:36:17,359

like to talk about advanced materials

836

00:36:21,109 --> 00:36:19,359

creating an artificial retina for the

837

00:36:23,190 --> 00:36:21,119

human eyeball so people have macular

838

00:36:25,589 --> 00:36:23,200

degeneration don't have to lose their

839

00:36:26,390 --> 00:36:25,599

eyesight and there's so so so many more

840

00:36:28,470 --> 00:36:26,400

things

841

00:36:30,870 --> 00:36:28,480

um that that we get from from these kind

842

00:36:32,950 --> 00:36:30,880

of activities and of course when we

843

00:36:35,270 --> 00:36:32,960

think about kibo and our partners on the

844

00:36:36,790 --> 00:36:35,280

international space station from japan

845

00:36:37,990 --> 00:36:36,800

and some of the capabilities that

846

00:36:39,430 --> 00:36:38,000

they've put

847

00:36:41,510 --> 00:36:39,440

that give us the ability to put

848

00:36:44,069 --> 00:36:41,520

instruments on the outside of the space

849

00:36:46,310 --> 00:36:44,079

station both for for astrophysics and

850

00:36:48,790 --> 00:36:46,320

the study of the earth uh to increase

851  
00:36:51,670 --> 00:36:48,800  
crop yields while reducing water usage

852  
00:36:53,829 --> 00:36:51,680  
to transform how we do agriculture

853  
00:36:56,069 --> 00:36:53,839  
there there are so many benefits to

854  
00:36:58,310 --> 00:36:56,079  
commercialization the international

855  
00:37:00,230 --> 00:36:58,320  
space station is really the place to

856  
00:37:02,069 --> 00:37:00,240  
prove all of these things out and then

857  
00:37:03,750 --> 00:37:02,079  
it's up to the private sector to make

858  
00:37:05,270 --> 00:37:03,760  
determinations that it's worth

859  
00:37:07,430 --> 00:37:05,280  
capitalizing

860  
00:37:09,589 --> 00:37:07,440  
and then and then using these commercial

861  
00:37:11,510 --> 00:37:09,599  
capabilities that we've built but make

862  
00:37:13,990 --> 00:37:11,520  
no mistake nasa has a long history of

863  
00:37:15,670 --> 00:37:14,000

commercial capabilities we think about

864

00:37:17,430 --> 00:37:15,680

you know people watching this right now

865

00:37:19,750 --> 00:37:17,440

on the internet for example internet

866

00:37:21,349 --> 00:37:19,760

broadband from space dish network

867

00:37:24,150 --> 00:37:21,359

directv

868

00:37:26,310 --> 00:37:24,160

you know gps how do we navigate how do

869

00:37:29,589 --> 00:37:26,320

we produce food and energy and do

870

00:37:31,589 --> 00:37:29,599

disaster release relief predict weather

871

00:37:34,150 --> 00:37:31,599

understand climate

872

00:37:36,630 --> 00:37:34,160

the returns here are really astonishing

873

00:37:39,270 --> 00:37:36,640

the international space station is is an

874

00:37:40,950 --> 00:37:39,280

amazing capability for the country um

875

00:37:43,030 --> 00:37:40,960

and and of course

876

00:37:44,790 --> 00:37:43,040

having more crew on the international

877

00:37:47,190 --> 00:37:44,800

space station makes all of these

878

00:37:49,430 --> 00:37:47,200

advancements happen faster and that gets

879

00:37:51,829 --> 00:37:49,440

us to a day of commercialization faster

880

00:37:53,349 --> 00:37:51,839

than we could have done otherwise so

881

00:37:54,470 --> 00:37:53,359

so this is really it's a it's it's a

882

00:37:58,470 --> 00:37:54,480

great time

883

00:38:00,710 --> 00:37:58,480

to see all of the amazing developments

884

00:38:02,550 --> 00:38:00,720

happen

885

00:38:06,790 --> 00:38:02,560

we'll now return to our phone bridge

886

00:38:08,870 --> 00:38:06,800

over to jeff faust from space news

887

00:38:11,829 --> 00:38:08,880

good morning i wanted to return to the

888

00:38:14,870 --> 00:38:11,839

issue of uh certification and uh when

889

00:38:16,310 --> 00:38:14,880

this is for kathy when you expect

890

00:38:19,589 --> 00:38:16,320

had everything wrapped up and have that

891

00:38:21,349 --> 00:38:19,599

certification review and how soon can

892

00:38:26,150 --> 00:38:21,359

that certification review take place

893

00:38:30,870 --> 00:38:28,710

so we've actually had our program level

894

00:38:33,109 --> 00:38:30,880

certification review already

895

00:38:35,829 --> 00:38:33,119

and we had our status at the agency

896

00:38:39,030 --> 00:38:35,839

level so right now we're

897

00:38:41,750 --> 00:38:39,040

just in the process of finalizing

898

00:38:44,230 --> 00:38:41,760

the last few pieces of

899

00:38:46,230 --> 00:38:44,240

documentation that we need to close out

900

00:38:48,310 --> 00:38:46,240

our human range certification plan which

901  
00:38:50,230 --> 00:38:48,320  
i view that will be done probably in the

902  
00:38:53,030 --> 00:38:50,240  
next week to 10 days

903  
00:38:55,589 --> 00:38:53,040  
and then our final final search we will

904  
00:38:57,670 --> 00:38:55,599  
be doing that are

905  
00:38:58,550 --> 00:38:57,680  
as part of our flight readiness review

906  
00:39:01,750 --> 00:38:58,560  
for

907  
00:39:03,910 --> 00:39:01,760  
crew one so we're kind of doing it and

908  
00:39:05,829 --> 00:39:03,920  
two phases finishing up our human rating

909  
00:39:08,069 --> 00:39:05,839  
certification plan which i think which

910  
00:39:10,390 --> 00:39:08,079  
should be in the next week to 10 days

911  
00:39:12,550 --> 00:39:10,400  
and then

912  
00:39:14,950 --> 00:39:12,560  
finalizing kind of

913  
00:39:16,870 --> 00:39:14,960

got in the eyes crossing the t's at our

914

00:39:17,829 --> 00:39:16,880

flight readiness review

915

00:39:19,589 --> 00:39:17,839

um

916

00:39:25,270 --> 00:39:19,599

that will be coming up about a week

917

00:39:30,950 --> 00:39:27,589

next we have eric berger from rs

918

00:39:34,470 --> 00:39:32,390

yeah hi thanks very much for doing this

919

00:39:36,550 --> 00:39:34,480

so my question is about commercial space

920

00:39:37,990 --> 00:39:36,560

i think all of you are true believers um

921

00:39:40,069 --> 00:39:38,000

hans and kathy obviously you guys have

922

00:39:41,430 --> 00:39:40,079

been doing this for a long time

923

00:39:43,510 --> 00:39:41,440

jim i think everyone on the phone could

924

00:39:45,750 --> 00:39:43,520

chant along with nasa wants to be one of

925

00:39:47,190 --> 00:39:45,760

many many customers but i'd like to know

926  
00:39:49,430 --> 00:39:47,200  
whether jim you know in the four months

927  
00:39:51,270 --> 00:39:49,440  
since demo two you've seen a shift from

928  
00:39:52,550 --> 00:39:51,280  
the non-believers in commercial space so

929  
00:39:54,390 --> 00:39:52,560  
the skeptics

930  
00:39:57,030 --> 00:39:54,400  
who maybe thought commercial space was

931  
00:39:59,109 --> 00:39:57,040  
an opposite task have have you seen any

932  
00:40:04,150 --> 00:39:59,119  
signs that sort of you know maybe more

933  
00:40:08,790 --> 00:40:06,630  
absolutely um you know i i can tell you

934  
00:40:12,470 --> 00:40:08,800  
that the enthusiasm for what happened on

935  
00:40:14,309 --> 00:40:12,480  
demo 2 was extremely robust

936  
00:40:16,150 --> 00:40:14,319  
among

937  
00:40:17,430 --> 00:40:16,160  
people within the u.s government of

938  
00:40:19,349 --> 00:40:17,440

course

939

00:40:21,829 --> 00:40:19,359

among members of congress that fund

940

00:40:23,910 --> 00:40:21,839

nasa's budgets but people

941

00:40:25,589 --> 00:40:23,920

but that enthusiasm was not just in the

942

00:40:27,990 --> 00:40:25,599

government it was also

943

00:40:30,790 --> 00:40:28,000

uh nationwide i mean the entire world

944

00:40:32,950 --> 00:40:30,800

watched and and was in awe of of the

945

00:40:34,790 --> 00:40:32,960

accomplishment so so i do believe that

946

00:40:37,510 --> 00:40:34,800

there is there is a very

947

00:40:41,430 --> 00:40:37,520

robust there's a lot of support

948

00:40:43,349 --> 00:40:41,440

for um for these capabilities um and so

949

00:40:46,069 --> 00:40:43,359

yeah i i think it's i think it's as

950

00:40:49,430 --> 00:40:46,079

strong now as it's ever been i think um

951  
00:40:50,630 --> 00:40:49,440  
some of the doubters um have have um you

952  
00:40:52,790 --> 00:40:50,640  
know maybe

953  
00:40:55,190 --> 00:40:52,800  
been made to not doubt so much because

954  
00:40:57,190 --> 00:40:55,200  
it has now happened

955  
00:40:59,589 --> 00:40:57,200  
but i i also think look

956  
00:41:01,270 --> 00:40:59,599  
commercial crew was was was really the

957  
00:41:03,430 --> 00:41:01,280  
second part we were resupplying the

958  
00:41:05,270 --> 00:41:03,440  
international space station commercially

959  
00:41:07,829 --> 00:41:05,280  
with northrop grumman

960  
00:41:09,510 --> 00:41:07,839  
and spacex ahead of that so

961  
00:41:11,510 --> 00:41:09,520  
the next big thing eric and i know you

962  
00:41:14,230 --> 00:41:11,520  
know this the next big thing is

963  
00:41:16,309 --> 00:41:14,240

commercial habitation uh apart from the

964

00:41:18,150 --> 00:41:16,319

international space station which is

965

00:41:20,230 --> 00:41:18,160

something that we need we need members

966

00:41:22,069 --> 00:41:20,240

of congress to be willing to fund we've

967

00:41:23,829 --> 00:41:22,079

put it in the budget request

968

00:41:25,829 --> 00:41:23,839

every year and it never gets funded at

969

00:41:27,750 --> 00:41:25,839

the level that is necessary to achieve

970

00:41:28,870 --> 00:41:27,760

the end states here's what we know eric

971

00:41:30,790 --> 00:41:28,880

there's going to come a day in the

972

00:41:33,190 --> 00:41:30,800

future when the international space

973

00:41:35,270 --> 00:41:33,200

station is going to have to end we don't

974

00:41:36,790 --> 00:41:35,280

like to think about it because we really

975

00:41:39,030 --> 00:41:36,800

really love the international space

976

00:41:40,790 --> 00:41:39,040

station but we also do have to think

977

00:41:43,510 --> 00:41:40,800

about the fact that 20 years is a long

978

00:41:45,190 --> 00:41:43,520

time and it can't last forever we have

979

00:41:47,589 --> 00:41:45,200

to be making the investments right now

980

00:41:50,150 --> 00:41:47,599

today so that we don't have a gap in low

981

00:41:51,990 --> 00:41:50,160

earth orbit that's what's been lacking

982

00:41:53,829 --> 00:41:52,000

we haven't had the investment necessary

983

00:41:55,670 --> 00:41:53,839

to guarantee that we don't have a gap in

984

00:41:58,150 --> 00:41:55,680

low earth orbit and it's critically

985

00:41:59,990 --> 00:41:58,160

important that we make those investments

986

00:42:01,990 --> 00:42:00,000

and i think i think right now more than

987

00:42:03,910 --> 00:42:02,000

ever we do have those believers that

988

00:42:06,309 --> 00:42:03,920

you're talking about they are willing to

989

00:42:07,910 --> 00:42:06,319

step up to the fl up to the plate and

990

00:42:10,230 --> 00:42:07,920

fund the budget request at the level

991

00:42:12,309 --> 00:42:10,240

necessary to eventually you know get

992

00:42:14,390 --> 00:42:12,319

commercial habitation so that there will

993

00:42:15,510 --> 00:42:14,400

be no gap and that's uh that's one of

994

00:42:17,030 --> 00:42:15,520

the things that

995

00:42:20,790 --> 00:42:17,040

we're working on every day to make sure

996

00:42:24,870 --> 00:42:23,270

next is marcia dunn from the associated

997

00:42:28,390 --> 00:42:24,880

press

998

00:42:30,230 --> 00:42:28,400

yes hi this question is for hans please

999

00:42:33,510 --> 00:42:30,240

i think when people hear certified and

1000

00:42:35,510 --> 00:42:33,520

operational for this upcoming flight um

1001  
00:42:38,150 --> 00:42:35,520  
many at least in the public are going to

1002  
00:42:40,710 --> 00:42:38,160  
think that all of a sudden dragon flight

1003  
00:42:42,550 --> 00:42:40,720  
for humans is routine

1004  
00:42:44,150 --> 00:42:42,560  
if you will in that kind of phrase and

1005  
00:42:45,349 --> 00:42:44,160  
got nasa in trouble in the shuttle

1006  
00:42:47,109 --> 00:42:45,359  
program

1007  
00:42:50,230 --> 00:42:47,119  
how do you how do you know do you look

1008  
00:42:53,109 --> 00:42:50,240  
at this as a routine now that you've got

1009  
00:42:55,510 --> 00:42:53,119  
one under your belt and and also do you

1010  
00:42:57,829 --> 00:42:55,520  
feel a lot of the pressure is off now

1011  
00:43:02,230 --> 00:42:57,839  
that you had a successful test flight on

1012  
00:43:06,550 --> 00:43:04,390  
well um that that's a that's a great

1013  
00:43:09,430 --> 00:43:06,560

question actually and then honestly

1014

00:43:11,109 --> 00:43:09,440

um i i don't feel that this is over at

1015

00:43:12,470 --> 00:43:11,119

all i feel like we need to actually step

1016

00:43:14,550 --> 00:43:12,480

it up

1017

00:43:16,870 --> 00:43:14,560

the transition from a test vehicle to an

1018

00:43:19,829 --> 00:43:16,880

operational vehicle to a production

1019

00:43:22,630 --> 00:43:19,839

vehicle is is very difficult um getting

1020

00:43:25,030 --> 00:43:22,640

this um you know in in

1021

00:43:27,190 --> 00:43:25,040

an operational phase that is safe and

1022

00:43:30,309 --> 00:43:27,200

and has all the scrutiny and the rigor

1023

00:43:32,390 --> 00:43:30,319

of human spaceflight um is is a lot of

1024

00:43:35,589 --> 00:43:32,400

work and and very very difficult in

1025

00:43:37,750 --> 00:43:35,599

itself so i feel like um we actually and

1026

00:43:41,030 --> 00:43:37,760

and we responded that way within within

1027

00:43:43,670 --> 00:43:41,040

spacex we we stepped it up we um we do

1028

00:43:45,750 --> 00:43:43,680

more reviews than ever we uh we pay

1029

00:43:48,870 --> 00:43:45,760

incredibly scrutiny to the flight data

1030

00:43:51,109 --> 00:43:48,880

of uh demo two and um there's a huge

1031

00:43:54,550 --> 00:43:51,119

effort going going on to make sure that

1032

00:43:56,630 --> 00:43:54,560

both falcon 9 and then and also um

1033

00:43:59,030 --> 00:43:56,640

dragon is safe for all the future

1034

00:44:01,270 --> 00:43:59,040

missions and and can actually stand up

1035

00:44:03,829 --> 00:44:01,280

for this huge task of uh

1036

00:44:05,829 --> 00:44:03,839

of supplying the station both with cargo

1037

00:44:07,910 --> 00:44:05,839

and also you know bringing astronauts up

1038

00:44:11,030 --> 00:44:07,920

and down that's a it's it's a it's a

1039

00:44:12,870 --> 00:44:11,040

great responsibility and um and we like

1040

00:44:16,230 --> 00:44:12,880

i said earlier we're honored by this but

1041

00:44:18,230 --> 00:44:16,240

it's also you know uh

1042

00:44:20,550 --> 00:44:18,240

at least at least i personally feel that

1043

00:44:27,510 --> 00:44:20,560

it's based on me and and we have to work

1044

00:44:31,750 --> 00:44:29,510

it's about staying vigilant you know

1045

00:44:33,910 --> 00:44:31,760

stay vigilant and

1046

00:44:35,190 --> 00:44:33,920

as a team we need to stay vigilant we

1047

00:44:37,349 --> 00:44:35,200

need to keep

1048

00:44:40,470 --> 00:44:37,359

going we need to operate in a safe

1049

00:44:41,829 --> 00:44:40,480

manner it's a it's it's a very important

1050

00:44:43,430 --> 00:44:41,839

for us to

1051  
00:44:46,150 --> 00:44:43,440  
not kind of

1052  
00:44:50,710 --> 00:44:46,160  
take our foot off the gas right we gotta

1053  
00:44:54,710 --> 00:44:50,720  
we gotta keep operating in a safe and

1054  
00:45:00,390 --> 00:44:57,030  
next we have douglas messier from

1055  
00:45:05,349 --> 00:45:03,510  
um yeah i had a question for hans

1056  
00:45:07,349 --> 00:45:05,359  
and

1057  
00:45:08,710 --> 00:45:07,359  
did this problem come up on the first

1058  
00:45:10,870 --> 00:45:08,720  
demo mission

1059  
00:45:12,710 --> 00:45:10,880  
with the heat shield and exactly what

1060  
00:45:16,069 --> 00:45:12,720  
did happen did you have

1061  
00:45:17,990 --> 00:45:16,079  
problems on all four connections

1062  
00:45:19,349 --> 00:45:18,000  
where the the capsule is connected with

1063  
00:45:23,750 --> 00:45:19,359

the uh

1064

00:45:27,670 --> 00:45:25,510

yeah the best way i can explain it

1065

00:45:30,630 --> 00:45:27,680

without you know slides and and lots of

1066

00:45:32,710 --> 00:45:30,640

data is that these um these tension ties

1067

00:45:34,630 --> 00:45:32,720

that connect the the trunk and the

1068

00:45:36,470 --> 00:45:34,640

spacecraft they cause some uh

1069

00:45:38,710 --> 00:45:36,480

disturbance in the airflow around them

1070

00:45:40,309 --> 00:45:38,720

and then there's a little bit it digs a

1071

00:45:41,829 --> 00:45:40,319

deeper hole into the heat shield right

1072

00:45:43,670 --> 00:45:41,839

after that because there's probably a

1073

00:45:45,750 --> 00:45:43,680

vortex or something like that i don't

1074

00:45:48,470 --> 00:45:45,760

know the the exact technical details on

1075

00:45:50,710 --> 00:45:48,480

this one but the the effect is basically

1076

00:45:53,190 --> 00:45:50,720

that one one particular tile has

1077

00:45:55,750 --> 00:45:53,200

basically more erosion than the others

1078

00:45:58,470 --> 00:45:55,760

it tunnels basically into the tile

1079

00:46:00,390 --> 00:45:58,480

um and and like i said earlier this was

1080

00:46:01,270 --> 00:46:00,400

always the same situation it never got

1081

00:46:06,390 --> 00:46:01,280

to

1082

00:46:08,710 --> 00:46:06,400

shield was working great um

1083

00:46:11,349 --> 00:46:08,720

so it is something that that will is

1084

00:46:13,589 --> 00:46:11,359

relatively easy to fix by

1085

00:46:15,990 --> 00:46:13,599

putting a more resistant or erosion

1086

00:46:16,870 --> 00:46:16,000

resistant material in that particular

1087

00:46:18,309 --> 00:46:16,880

place

1088

00:46:19,589 --> 00:46:18,319

because you want to be careful you don't

1089

00:46:21,430 --> 00:46:19,599

want to make too many changes at this

1090

00:46:23,589 --> 00:46:21,440

point in time either

1091

00:46:25,670 --> 00:46:23,599

and then and then basically uh test it

1092

00:46:27,510 --> 00:46:25,680

and we did that last week and it uh it

1093

00:46:29,510 --> 00:46:27,520

came out great and

1094

00:46:34,390 --> 00:46:29,520

so i'm confident that

1095

00:46:40,150 --> 00:46:37,030

next we'll go over to irene klotz from

1096

00:46:43,990 --> 00:46:42,390

hi i'm actually had a similar question

1097

00:46:46,470 --> 00:46:44,000

from doug who i think i'll just continue

1098

00:46:47,270 --> 00:46:46,480

his for a minute is uh hans

1099

00:46:48,150 --> 00:46:47,280

um

1100

00:46:54,069 --> 00:46:48,160

what

1101  
00:46:56,630 --> 00:46:54,079  
relative to your predictions and why

1102  
00:46:58,390 --> 00:46:56,640  
didn't this show up on demo one

1103  
00:47:01,750 --> 00:46:58,400  
and then also for kathy are you

1104  
00:47:08,069 --> 00:47:01,760  
expecting to process any waivers for the

1105  
00:47:13,109 --> 00:47:12,069  
yeah so um the uh

1106  
00:47:15,510 --> 00:47:13,119  
um

1107  
00:47:16,790 --> 00:47:15,520  
i'm not sure i can i can say it's an

1108  
00:47:19,670 --> 00:47:16,800  
estimate because it's really just

1109  
00:47:21,829 --> 00:47:19,680  
locally and in one particular spot um

1110  
00:47:24,390 --> 00:47:21,839  
it's a good good reminder um regarding

1111  
00:47:27,510 --> 00:47:24,400  
demo one we didn't see this on demo one

1112  
00:47:29,510 --> 00:47:27,520  
um at least not to the extent this extent

1113  
00:47:31,510 --> 00:47:29,520

that we noticed something

1114

00:47:33,430 --> 00:47:31,520

um it's a good question demo one was

1115

00:47:35,670 --> 00:47:33,440

slightly lighter um had a slightly

1116

00:47:37,030 --> 00:47:35,680

different trajectory maybe that um that

1117

00:47:39,270 --> 00:47:37,040

caused this

1118

00:47:41,589 --> 00:47:39,280

at the end of the day it's great um that

1119

00:47:42,390 --> 00:47:41,599

we found it on this flight and you know

1120

00:47:44,790 --> 00:47:42,400

um

1121

00:47:47,190 --> 00:47:44,800

can can basically take corrective action

1122

00:47:49,510 --> 00:47:47,200

going forward um and also like i said

1123

00:47:51,190 --> 00:47:49,520

this was not not an unsafe situation at

1124

00:47:52,790 --> 00:47:51,200

all this is just something that you

1125

00:47:54,630 --> 00:47:52,800

observed and uh

1126

00:47:56,470 --> 00:47:54,640

and then basically uh

1127

00:47:59,510 --> 00:47:56,480

change to make sure that nothing nothing

1128

00:48:00,870 --> 00:47:59,520

bad will ever happen so um that that

1129

00:48:03,829 --> 00:48:00,880

that's the

1130

00:48:05,430 --> 00:48:03,839

like i said on demo demo one um

1131

00:48:06,549 --> 00:48:05,440

if you look at it with hindsight you

1132

00:48:09,190 --> 00:48:06,559

might see

1133

00:48:14,710 --> 00:48:09,200

some erosion but but honestly it's uh

1134

00:48:17,589 --> 00:48:16,390

and irene

1135

00:48:21,270 --> 00:48:17,599

[Music]

1136

00:48:23,750 --> 00:48:21,280

i do not know the final count for the

1137

00:48:25,589 --> 00:48:23,760

waivers so i would ask i would maybe

1138

00:48:29,990 --> 00:48:25,599

hold that question and ask that question

1139

00:48:35,589 --> 00:48:32,390

next we have rachel joy from florida

1140

00:48:38,390 --> 00:48:36,870

hey there this question is for

1141

00:48:40,470 --> 00:48:38,400

bridenstine

1142

00:48:43,750 --> 00:48:40,480

back during demo two

1143

00:48:45,910 --> 00:48:43,760

due to krovat 19 you asked that launch

1144

00:48:47,190 --> 00:48:45,920

spectators and visitors not visit the

1145

00:48:49,349 --> 00:48:47,200

space coast

1146

00:48:52,309 --> 00:48:49,359

to watch the launch here we are five

1147

00:48:55,109 --> 00:48:52,319

months later what is nasa's approach or

1148

00:48:59,750 --> 00:48:55,119

messaging for launch spectators for this

1149

00:49:04,549 --> 00:49:02,230

yeah so we have to remember that even

1150

00:49:06,549 --> 00:49:04,559

though we suggested uh for demo two

1151

00:49:07,990 --> 00:49:06,559

people not come to the launch uh it

1152

00:49:10,790 --> 00:49:08,000

certainly didn't prevent them from

1153

00:49:12,950 --> 00:49:10,800

coming and and there were massive crowds

1154

00:49:13,829 --> 00:49:12,960

you know outside of the kennedy space

1155

00:49:16,549 --> 00:49:13,839

center

1156

00:49:17,829 --> 00:49:16,559

um so what we're asking people to do is

1157

00:49:20,230 --> 00:49:17,839

is follow

1158

00:49:22,790 --> 00:49:20,240

cdc guidelines to follow the guidelines

1159

00:49:25,030 --> 00:49:22,800

from the state of florida um and keep

1160

00:49:27,430 --> 00:49:25,040

keep do do what is necessary to keep

1161

00:49:29,670 --> 00:49:27,440

safe i mean that's that's ultimately

1162

00:49:31,829 --> 00:49:29,680

what our objective is i will tell you

1163

00:49:33,829 --> 00:49:31,839

that we are limiting um the amount of

1164

00:49:36,230 --> 00:49:33,839

visitors that can come onto the kennedy

1165

00:49:37,829 --> 00:49:36,240

space center we have a lot of as you're

1166

00:49:40,069 --> 00:49:37,839

aware we have a lot of very important

1167

00:49:41,670 --> 00:49:40,079

missions coming up my number one

1168

00:49:43,430 --> 00:49:41,680

objective is to make sure that we don't

1169

00:49:45,430 --> 00:49:43,440

have an outbreak at the kennedy space

1170

00:49:47,670 --> 00:49:45,440

center we've been very successful

1171

00:49:49,990 --> 00:49:47,680

keeping our people safe so far we want

1172

00:49:51,910 --> 00:49:50,000

to make sure that we we keep them safe

1173

00:49:53,349 --> 00:49:51,920

so that ultimately we can continue to do

1174

00:49:58,710 --> 00:49:53,359

the mission

1175

00:50:03,670 --> 00:50:00,950

we'll now go over to megan bartles from

1176

00:50:05,910 --> 00:50:03,680

space.com

1177

00:50:07,910 --> 00:50:05,920

hi thanks so much for taking my question

1178

00:50:10,309 --> 00:50:07,920

this is megan bartels with space.com

1179

00:50:13,510 --> 00:50:10,319

with a question for i think hans you

1180

00:50:15,910 --> 00:50:13,520

mentioned recently that the new heat

1181

00:50:18,150 --> 00:50:15,920

shield the new heat shield design was

1182

00:50:21,190 --> 00:50:18,160

tested last week could you talk a little

1183

00:50:23,510 --> 00:50:21,200

bit more about what that process was and

1184

00:50:25,990 --> 00:50:23,520

how closely it mimics what the capsule

1185

00:50:31,510 --> 00:50:26,000

will undergo when the crew one

1186

00:50:37,589 --> 00:50:34,710

yes of course so um the test we do is a

1187

00:50:42,150 --> 00:50:37,599

um it's called an arc jet test and uh it

1188

00:50:43,910 --> 00:50:42,160

is in the nasa facility in moffett

1189

00:50:45,589 --> 00:50:43,920

i don't remember the center right now

1190

00:50:47,910 --> 00:50:45,599

it's uh it's up here in california

1191

00:50:49,510 --> 00:50:47,920

really embarrassed by uh by not knowing

1192

00:50:51,349 --> 00:50:49,520

the name right now but i actually wasn't

1193

00:50:53,670 --> 00:50:51,359

there i did i did look at the uh the

1194

00:50:54,950 --> 00:50:53,680

wind tunnel at that arctic tunnel uh a

1195

00:50:57,589 --> 00:50:54,960

while back and it's it's pretty

1196

00:51:00,150 --> 00:50:57,599

impressive because it can can very well

1197

00:51:03,349 --> 00:51:00,160

recreate the uh the situation but then

1198

00:51:06,069 --> 00:51:03,359

the the the size of the area you can

1199

00:51:07,270 --> 00:51:06,079

test is uh is obviously not very very

1200

00:51:10,549 --> 00:51:07,280

large it's a

1201  
00:51:13,430 --> 00:51:10,559  
relatively small area so i think we um

1202  
00:51:15,829 --> 00:51:13,440  
in terms of of as realistic testing as

1203  
00:51:17,190 --> 00:51:15,839  
you can we did what we could um

1204  
00:51:19,030 --> 00:51:17,200  
and uh

1205  
00:51:21,750 --> 00:51:19,040  
and then we also do uh you know a lot of

1206  
00:51:24,309 --> 00:51:21,760  
analysis and uh make sure that we got

1207  
00:51:26,150 --> 00:51:24,319  
any any flow phenomenon uh

1208  
00:51:28,790 --> 00:51:26,160  
worked out from the analysis side based

1209  
00:51:30,950 --> 00:51:28,800  
on the flight data we saw with uh demo

1210  
00:51:32,870 --> 00:51:30,960  
two and uh

1211  
00:51:35,670 --> 00:51:32,880  
and then you know last not least um

1212  
00:51:36,790 --> 00:51:35,680  
there i also mentioned that uh crs-31

1213  
00:51:39,190 --> 00:51:36,800

the uh

1214

00:51:40,870 --> 00:51:39,200

the new cargo dragon will go up a month

1215

00:51:44,230 --> 00:51:40,880

after um

1216

00:51:46,309 --> 00:51:44,240

after uh crew one and this particular

1217

00:51:48,230 --> 00:51:46,319

dragon will come back earlier so that

1218

00:51:50,549 --> 00:51:48,240

gives us another chance to validate the

1219

00:51:51,589 --> 00:51:50,559

design and to make sure that everything

1220

00:51:52,950 --> 00:51:51,599

is

1221

00:51:58,390 --> 00:51:52,960

safe and

1222

00:52:01,990 --> 00:51:59,829

it was done at the

1223

00:52:02,950 --> 00:52:02,000

ames research center

1224

00:52:07,750 --> 00:52:02,960

and

1225

00:52:09,990 --> 00:52:07,760

spacex folks have been looking at it we

1226  
00:52:11,670 --> 00:52:10,000  
have a lot of thermal protection system

1227  
00:52:14,150 --> 00:52:11,680  
experts too and

1228  
00:52:16,150 --> 00:52:14,160  
everybody understands kind of how to

1229  
00:52:18,470 --> 00:52:16,160  
correlate the data from those samples

1230  
00:52:22,630 --> 00:52:18,480  
and be able to understand it and i think

1231  
00:52:27,270 --> 00:52:24,790  
we have time for one or two more

1232  
00:52:32,150 --> 00:52:27,280  
questions we'll next go to morgan mcfaul

1233  
00:52:37,430 --> 00:52:34,150  
hi thanks so much for taking my question

1234  
00:52:38,790 --> 00:52:37,440  
this one is for kathy or jim maybe um

1235  
00:52:40,549 --> 00:52:38,800  
you've got a whole bunch of data back

1236  
00:52:42,470 --> 00:52:40,559  
from demo too now

1237  
00:52:44,630 --> 00:52:42,480  
uh i'm just wondering if you found any

1238  
00:52:46,549 --> 00:52:44,640

pleasant surprises in looking over that

1239

00:52:49,430 --> 00:52:46,559

and relatedly do you have a new average

1240

00:52:51,430 --> 00:52:49,440

estimated llc and loom numbers for crew

1241

00:52:54,870 --> 00:52:51,440

one and if so what drove that change

1242

00:53:02,549 --> 00:52:58,069

kathy i'll let you answer this

1243

00:53:04,309 --> 00:53:02,559

okay um so the lock requirements that we

1244

00:53:06,069 --> 00:53:04,319

had were design requirements and so

1245

00:53:08,390 --> 00:53:06,079

those are closed out they'll be closed

1246

00:53:09,109 --> 00:53:08,400

out during our certification phase it's

1247

00:53:33,990 --> 00:53:09,119

a

1248

00:53:36,230 --> 00:53:34,000

pieces

1249

00:53:37,670 --> 00:53:36,240

but honestly the spacecraft the launch

1250

00:53:43,190 --> 00:53:37,680

went beautifully

1251  
00:53:45,430 --> 00:53:43,200  
like i talked about we were able to do

1252  
00:53:49,109 --> 00:53:45,440  
the four crew tests the habitability

1253  
00:53:50,790 --> 00:53:49,119  
test while the vehicle was on orbit

1254  
00:53:51,990 --> 00:53:50,800  
you know the

1255  
00:53:54,150 --> 00:53:52,000  
return

1256  
00:53:55,990 --> 00:53:54,160  
you know went beautifully first time

1257  
00:53:58,230 --> 00:53:56,000  
coming back

1258  
00:53:59,910 --> 00:53:58,240  
and bob and doug were able to give us

1259  
00:54:01,670 --> 00:53:59,920  
great insight on how the vehicle

1260  
00:54:03,270 --> 00:54:01,680  
operated through all the phases of

1261  
00:54:04,790 --> 00:54:03,280  
flight so

1262  
00:54:06,950 --> 00:54:04,800  
i don't think i'm

1263  
00:54:09,829 --> 00:54:06,960

you know it would be a great mission if

1264

00:54:12,390 --> 00:54:09,839

crew one goes exactly the same way so

1265

00:54:14,390 --> 00:54:12,400

i'm counting on it hans

1266

00:54:17,430 --> 00:54:14,400

i'm counting on a beautiful mission the

1267

00:54:19,109 --> 00:54:17,440

exact same way so

1268

00:54:24,549 --> 00:54:19,119

i'm we're looking forward to this this

1269

00:54:28,390 --> 00:54:26,549

thanks to all who submitted questions

1270

00:54:30,390 --> 00:54:28,400

today and thanks to today's briefers for

1271

00:54:32,790 --> 00:54:30,400

taking the time to discuss this historic

1272

00:54:34,870 --> 00:54:32,800

event this is the first in our series of

1273

00:54:37,430 --> 00:54:34,880

briefings today next up is a briefing to

1274

00:54:40,230 --> 00:54:37,440

discuss the crew one mission overview

1275

00:54:41,910 --> 00:54:40,240

that's at 12 30 pm eastern and will host

1276

00:54:44,549 --> 00:54:41,920

the astronauts of crew 1 for a news

1277

00:54:46,069 --> 00:54:44,559

conference at 2pm for details on these

1278

00:54:48,470 --> 00:54:46,079

briefings and for the latest on this

1279

00:54:50,710 --> 00:54:48,480

mission please visit [nasa.gov](http://nasa.gov)

1280

00:55:10,470 --> 00:54:50,720

commercial crew thanks again for joining