1
00:00:04,309 --> 00:00:02,389
good afternoon from the johnson space

2
00:00:06,869 --> 00:00:04,319
center here in houston texas i'm nasa's

3
00:00:08,150 --> 00:00:06,879
josh byerly coming up on december 21st

4
00:00:10,709 --> 00:00:08,160
we will have two crew members of

5
00:00:12,870 --> 00:00:10,719
expedition 38 rick mastracchio and mike

6
00:00:15,110 --> 00:00:12,880
hopkins are going to be going outside to

7
00:00:16,470 --> 00:00:15,120
conduct a series of spacewalks to

8
00:00:17,910 --> 00:00:16,480
swap out this ammonia pump that we've

9
00:00:19,990 --> 00:00:17,920
been talking about for the last few days

10
00:00:21,189 --> 00:00:20,000
here to talk about the decision process

11
00:00:22,950 --> 00:00:21,199
and also what's ahead for the crew

12
00:00:24,550 --> 00:00:22,960
members are mike saffordini the

13
00:00:27,269 --> 00:00:24,560

international space station program

14
00:00:28,630 --> 00:00:27,279
manager as well as dina contella the

15
00:00:29,990 --> 00:00:28,640
international space station flight

16
00:00:32,389 --> 00:00:30,000
director and we are also joined by

17
00:00:33,750 --> 00:00:32,399
allison bollinger the spacewalk officer

18
00:00:35,430 --> 00:00:33,760
who has helped choreographed what's

19
00:00:36,950 --> 00:00:35,440
ahead for the crew we'll get started

20
00:00:38,709 --> 00:00:36,960
with mike

21
00:00:40,790 --> 00:00:38,719
good afternoon i thought we'd spend a

22
00:00:41,910 --> 00:00:40,800
few moments kind of starting from the

23
00:00:43,750 --> 00:00:41,920
beginning

24
00:00:45,270 --> 00:00:43,760
when we first saw this anomaly then

25
00:00:46,229 --> 00:00:45,280
we'll walk you through the steps to get

26
00:00:48,150 --> 00:00:46,239
you

27
00:00:49,990 --> 00:00:48,160
to where we are today

28
00:00:51,510 --> 00:00:50,000
and then dina allison can talk to you

29
00:00:53,670 --> 00:00:51,520
about the eba itself and the

30
00:00:54,630 --> 00:00:53,680
preparations for the eva

31
00:00:56,389 --> 00:00:54,640
so the

32
00:00:59,670 --> 00:00:56,399
middle of last week

33
00:01:01,830 --> 00:00:59,680
the pump on one of our external coolant

34
00:01:04,149 --> 00:01:01,840
loops was shut down as you as you may

35
00:01:07,030 --> 00:01:04,159
recall the iss has two

36
00:01:09,030 --> 00:01:07,040
uh large uh coolant loops on both the

37
00:01:11,429 --> 00:01:09,040
starboard and the port side

38
00:01:14,310 --> 00:01:11,439

uh that we refer to of course as a and b

39
00:01:16,950 --> 00:01:14,320
for lack of creativity and naming

40
00:01:20,789 --> 00:01:18,710
the pumps cool

41
00:01:22,070 --> 00:01:20,799
external orus as well as a heat

42
00:01:24,149 --> 00:01:22,080
exchanger

43
00:01:25,990 --> 00:01:24,159
that exchanges heat with a water loop

44
00:01:28,149 --> 00:01:26,000
inside and cools the internal components

45
00:01:30,950 --> 00:01:28,159
on space station we do that

46
00:01:32,789 --> 00:01:30,960
because ammonia is a highly toxic

47
00:01:35,109 --> 00:01:32,799
substance and we don't want it to be

48
00:01:36,789 --> 00:01:35,119
inside the vehicle and so that's why

49
00:01:38,710 --> 00:01:36,799
we keep ammonia on the outside and the

50
00:01:40,630 --> 00:01:38,720
water on the inside

51
00:01:43,670 --> 00:01:40,640
of course the one area where you have a

52
00:01:45,429 --> 00:01:43,680
risk uh that you could introduce ammonia

53
00:01:47,109 --> 00:01:45,439
into the water loop and therefore

54
00:01:48,550 --> 00:01:47,119
eventually into the

55
00:01:50,149 --> 00:01:48,560
into the environment inside space

56
00:01:53,510 --> 00:01:50,159
station is through the heat exchanger

57
00:01:55,510 --> 00:01:53,520
and so we go to great pains to protect

58
00:01:56,870 --> 00:01:55,520
the case of accidentally freezing the

59
00:01:58,310 --> 00:01:56,880
heat exchanger

60
00:02:00,469 --> 00:01:58,320
freezing the water of course the water

61
00:02:01,990 --> 00:02:00,479
expands and you could fracture the heat

62
00:02:03,910 --> 00:02:02,000
exchanger and let the ammonia get into

63
00:02:05,590 --> 00:02:03,920

the water loop

64
00:02:07,830 --> 00:02:05,600
and so we have a number of systems that

65
00:02:10,070 --> 00:02:07,840
protect us from that

66
00:02:12,390 --> 00:02:10,080
so in the middle of last week at some

67
00:02:14,470 --> 00:02:12,400
point as the as the coolant loop was

68
00:02:16,229 --> 00:02:14,480
trying to manage uh the temperature of

69
00:02:18,150 --> 00:02:16,239
the ammonia

70
00:02:20,869 --> 00:02:18,160
it got to the point where the

71
00:02:22,790 --> 00:02:20,879
temperatures were remaining colder than

72
00:02:23,830 --> 00:02:22,800
it expected and so the loop was shut

73
00:02:25,830 --> 00:02:23,840
down

74
00:02:27,589 --> 00:02:25,840
as expected and the system

75
00:02:29,510 --> 00:02:27,599
reacted the way we wanted the system to

76
00:02:31,670 --> 00:02:29,520
react

77
00:02:32,550 --> 00:02:31,680
and this was caused by

78
00:03:21,750 --> 00:02:32,560
a

79
00:03:23,350 --> 00:03:21,760
depending on

80
00:03:24,789 --> 00:03:23,360
the environment we're in the radiators

81
00:03:26,229 --> 00:03:24,799
where they're at and other loads on

82
00:03:28,309 --> 00:03:26,239
there you can get to the point where the

83
00:03:30,470 --> 00:03:28,319
ammonia itself gets too cold

84
00:03:33,670 --> 00:03:30,480
to enter the heat exchanger

85
00:03:36,630 --> 00:03:33,680
and so um we have spent

86
00:03:38,229 --> 00:03:36,640
uh the last week today's wednesday so

87
00:03:39,910 --> 00:03:38,239
we've spent about the last week trying

88
00:03:42,710 --> 00:03:39,920

to figure out ways to either recover

89
00:03:44,550 --> 00:03:42,720
that that valve or find other ways to

90
00:03:45,830 --> 00:03:44,560
manage the loads on the outside so we

91
00:03:47,110 --> 00:03:45,840
could keep the temperature below

92
00:03:48,949 --> 00:03:47,120
freezing

93
00:03:50,869 --> 00:03:48,959
coming into the heat exchanger but also

94
00:03:52,390 --> 00:03:50,879
at the same time the heat load can't be

95
00:03:55,110 --> 00:03:52,400
too high or it doesn't do the cooling

96
00:03:57,110 --> 00:03:55,120
function it's supposed to provide

97
00:03:59,509 --> 00:03:57,120
the opposite engineering teams have done

98
00:04:01,509 --> 00:03:59,519
just an amazing job of sorting through

99
00:04:03,350 --> 00:04:01,519
all kinds of options to try to recover

100
00:04:05,509 --> 00:04:03,360
the valve and look at other ways to

101
00:04:07,110 --> 00:04:05,519
manage the flow over the last several

102
00:04:09,190 --> 00:04:07,120
days

103
00:04:10,710 --> 00:04:09,200
since we could not figure out a way to

104
00:04:13,030 --> 00:04:10,720
actually repair

105
00:04:15,190 --> 00:04:13,040
the valve or command the valve

106
00:04:17,349 --> 00:04:15,200
to overcome this bias

107
00:04:19,430 --> 00:04:17,359
we started working on a valve an

108
00:04:20,789 --> 00:04:19,440
isolation valve that's just upstream of

109
00:04:22,469 --> 00:04:20,799
the flow control valve and looking to

110
00:04:23,909 --> 00:04:22,479
see if we could use it to manage the

111
00:04:25,350 --> 00:04:23,919
flow

112
00:04:27,990 --> 00:04:25,360
we had tried

113
00:04:30,230 --> 00:04:28,000

to command it from the ground

114
00:04:32,790 --> 00:04:30,240
and due to latency and other factors we

115
00:04:35,430 --> 00:04:32,800
had a hard time managing the flow at the

116
00:04:38,070 --> 00:04:35,440
at the level and the repeatability uh

117
00:04:39,510 --> 00:04:38,080
that was necessary and you noticed

118
00:04:41,510 --> 00:04:39,520
probably notice a couple nights ago the

119
00:04:44,070 --> 00:04:41,520
pump shut down that was part of us

120
00:04:45,909 --> 00:04:44,080
trying to manage loads and and uh and

121
00:04:46,790 --> 00:04:45,919
really struggling with it

122
00:04:49,909 --> 00:04:46,800
um

123
00:04:52,870 --> 00:04:49,919
and so uh the last uh thing that we've

124
00:04:55,110 --> 00:04:52,880
done on board is we created a uh command

125
00:04:57,110 --> 00:04:55,120
patch that we sent on board and so when

126
00:04:58,950 --> 00:04:57,120
the ground commands this patch

127
00:05:01,430 --> 00:04:58,960
uh it's done in such a way basically

128
00:05:03,350 --> 00:05:01,440
that we've taken the latency out of the

129
00:05:05,510 --> 00:05:03,360
out of the commanding sequence

130
00:05:08,870 --> 00:05:05,520
uh and we've we've found that we do have

131
00:05:11,029 --> 00:05:08,880
uh a way to repeatably uh move this

132
00:05:12,150 --> 00:05:11,039
valve around so now we've done that

133
00:05:14,150 --> 00:05:12,160
we're trying to figure out how to

134
00:05:15,350 --> 00:05:14,160
introduce the loads and see if we indeed

135
00:05:17,189 --> 00:05:15,360
can manage

136
00:05:18,950 --> 00:05:17,199
not only the nominal scenarios but the

137
00:05:20,950 --> 00:05:18,960
off nominal scenarios and and the ground

138
00:05:22,870 --> 00:05:20,960

continues to do that

139
00:05:25,270 --> 00:05:22,880
meanwhile as you know we've been

140
00:05:29,510 --> 00:05:25,280
marching towards a launch of the first

141
00:05:31,590 --> 00:05:29,520
crs mission orbital crs mission to iss

142
00:05:32,950 --> 00:05:31,600
that was scheduled to launch here on the

143
00:05:35,110 --> 00:05:32,960
19th

144
00:05:37,189 --> 00:05:35,120
and we had been trying to see if we

145
00:05:38,870 --> 00:05:37,199
could get to the point where we could

146
00:05:41,510 --> 00:05:38,880
reliably manage

147
00:05:43,749 --> 00:05:41,520
the flow of the ammonia so that we could

148
00:05:45,909 --> 00:05:43,759
rely on this loop in the event of the

149
00:05:48,950 --> 00:05:45,919
next worst failure the next worst way of

150
00:05:50,310 --> 00:05:48,960
course would be loss of loop b

151
00:05:53,909 --> 00:05:50,320
and

152
00:05:56,070 --> 00:05:53,919
figure that out we

153
00:05:57,510 --> 00:05:56,080
we carried both scenarios both the

154
00:05:59,029 --> 00:05:57,520
scenario where we let orbital fly

155
00:06:00,230 --> 00:05:59,039
because we've managed the loop to the

156
00:06:01,830 --> 00:06:00,240
point that we

157
00:06:03,510 --> 00:06:01,840
we think we've gotten ourselves to a

158
00:06:05,830 --> 00:06:03,520
point we think we can control the loop

159
00:06:08,309 --> 00:06:05,840
well enough to handle the next failure

160
00:06:10,309 --> 00:06:08,319
and and allowed orbital come up we'd get

161
00:06:12,629 --> 00:06:10,319
on the other side of the of the beta cut

162
00:06:15,909 --> 00:06:12,639
out we have a very high

163
00:06:17,590 --> 00:06:15,919

beta angle period that occurs always

164
00:06:19,590 --> 00:06:17,600
around this time of year

165
00:06:22,150 --> 00:06:19,600
that we that we go into it about

166
00:06:23,510 --> 00:06:22,160
december 30th and so we were trying to

167
00:06:25,270 --> 00:06:23,520
get ourselves to the position where

168
00:06:27,430 --> 00:06:25,280
either we let orbital come up we were

169
00:06:28,950 --> 00:06:27,440
able to control the flow we wait till we

170
00:06:32,309 --> 00:06:28,960
get to the other side and then replace

171
00:06:34,710 --> 00:06:32,319
the pump or if we can't reliably uh

172
00:06:36,469 --> 00:06:34,720
figure out how to control uh the system

173
00:06:38,629 --> 00:06:36,479
then we would go ahead and ask the

174
00:06:40,309 --> 00:06:38,639
orbital folks to stand down and go ahead

175
00:06:41,670 --> 00:06:40,319
and get the eba done

176
00:06:44,309 --> 00:06:41,680
so we sort of reached that point

177
00:06:46,710 --> 00:06:44,319
yesterday yesterday afternoon we

178
00:06:49,189 --> 00:06:46,720
we realized that

179
00:06:50,230 --> 00:06:49,199
if we continue to press

180
00:06:51,830 --> 00:06:50,240
we're starting to get to the point where

181
00:06:53,270 --> 00:06:51,840
we have to pick one path or the other we

182
00:06:55,029 --> 00:06:53,280
have to get the crew ready we have to

183
00:06:58,390 --> 00:06:55,039
get the ground team focused

184
00:07:00,950 --> 00:06:58,400
um and uh and if we focused on a flying

185
00:07:04,230 --> 00:07:00,960
orbital and found uh that we couldn't

186
00:07:05,830 --> 00:07:04,240
control uh the flow even if we thought

187
00:07:07,830 --> 00:07:05,840
we were going to be successful if we

188
00:07:09,510 --> 00:07:07,840

weren't we'd lost the opportunity to do

189
00:07:11,350 --> 00:07:09,520
the eba and change out the pump before

190
00:07:13,350 --> 00:07:11,360
the beta cut out

191
00:07:15,189 --> 00:07:13,360
and so we chose that

192
00:07:16,870 --> 00:07:15,199
that the better part of valor

193
00:07:19,270 --> 00:07:16,880
was to go ahead and

194
00:07:21,270 --> 00:07:19,280
pick a path and so as i said we picked

195
00:07:22,309 --> 00:07:21,280
the path to ask the orbital guys to

196
00:07:24,790 --> 00:07:22,319
stand down

197
00:07:27,510 --> 00:07:24,800
and we'll focus on getting the eva done

198
00:07:31,110 --> 00:07:27,520
so as josh mentioned the first eva will

199
00:07:33,189 --> 00:07:31,120
be on the 21st this saturday

200
00:07:34,469 --> 00:07:33,199
we think it'll take

201
00:07:36,790 --> 00:07:34,479
let's just say it'll take about three

202
00:07:38,790 --> 00:07:36,800
evas could take a little less if we get

203
00:07:41,189 --> 00:07:38,800
lucky with the uh

204
00:07:42,950 --> 00:07:41,199
with the qd's and uh could take a little

205
00:07:44,390 --> 00:07:42,960
more if we're not lucky with qd's or we

206
00:07:45,670 --> 00:07:44,400
have any other kind of challenges that

207
00:07:47,110 --> 00:07:45,680
come up

208
00:07:49,749 --> 00:07:47,120
and so we'll we'll work our way through

209
00:07:52,390 --> 00:07:49,759
there but that the plan shows um the

210
00:07:54,629 --> 00:07:52,400
ebas today shows them every other

211
00:07:56,230 --> 00:07:54,639
day and uh and our plan is to go do the

212
00:07:58,550 --> 00:07:56,240
first eva and then we'll we'll look to

213
00:08:00,390 --> 00:07:58,560

see when the next one needs to happen

214
00:08:02,710 --> 00:08:00,400
based on reacting to what

215
00:08:04,150 --> 00:08:02,720
what may occur on orbit

216
00:08:06,390 --> 00:08:04,160
meanwhile our

217
00:08:08,230 --> 00:08:06,400
our orbital friends are are

218
00:08:10,390 --> 00:08:08,240
rolling back

219
00:08:12,469 --> 00:08:10,400
and they'll get ready for a launch after

220
00:08:14,629 --> 00:08:12,479
the beta cutout we'll have to work that

221
00:08:16,390 --> 00:08:14,639
with the range out of wallops and and

222
00:08:18,150 --> 00:08:16,400
orbital's doing that now and so we we

223
00:08:20,550 --> 00:08:18,160
don't have a launch date yet

224
00:08:22,390 --> 00:08:20,560
uh for our orbital folks but we believe

225
00:08:24,550 --> 00:08:22,400
we'll get the pump changeout done before

226
00:08:26,309 --> 00:08:24,560
the beta cut out and we'd be ready to

227
00:08:27,350 --> 00:08:26,319
accept the orbital guys just as soon as

228
00:08:30,150 --> 00:08:27,360
they uh

229
00:08:32,469 --> 00:08:30,160
we can get the range set up and get them

230
00:08:35,190 --> 00:08:32,479
up to iss

231
00:08:37,110 --> 00:08:35,200
as you know um this pump has been

232
00:08:38,070 --> 00:08:37,120
changed out before this is the starboard

233
00:08:41,990 --> 00:08:38,080
side

234
00:08:43,750 --> 00:08:42,000
back in august of 2010 we did a pump rnr

235
00:08:45,430 --> 00:08:43,760
for a different failure that was

236
00:08:48,470 --> 00:08:45,440
actually a failure of the pump this is a

237
00:08:50,230 --> 00:08:48,480
valve inside the pump module itself

238
00:08:52,310 --> 00:08:50,240

and so this this particular pump's about

239
00:08:55,190 --> 00:08:52,320
three years old

240
00:08:57,670 --> 00:08:55,200
and so this is not an iss aging vehicle

241
00:08:58,949 --> 00:08:57,680
issue it's a it's an unfortunate anomaly

242
00:09:00,870 --> 00:08:58,959
with the system

243
00:09:02,470 --> 00:09:00,880
uh with a relatively

244
00:09:04,150 --> 00:09:02,480
young a pump

245
00:09:05,750 --> 00:09:04,160
uh but it's when you do mean time

246
00:09:07,030 --> 00:09:05,760
between failures it's all about the

247
00:09:08,870 --> 00:09:07,040
averages and so these are the kinds of

248
00:09:10,310 --> 00:09:08,880
things that can happen

249
00:09:11,350 --> 00:09:10,320
so we're prepared to deal with it we

250
00:09:13,670 --> 00:09:11,360
have three

251
00:09:15,269 --> 00:09:13,680
spare pumps on orbit and so we'll take

252
00:09:18,550 --> 00:09:15,279
one of those pumps

253
00:09:21,030 --> 00:09:18,560
also this particular failure mode

254
00:09:23,110 --> 00:09:21,040
is one we think we can overcome with an

255
00:09:24,070 --> 00:09:23,120
external valve and so we'll save this

256
00:09:26,310 --> 00:09:24,080
pump

257
00:09:28,550 --> 00:09:26,320
and and stow it and protect it

258
00:09:31,430 --> 00:09:28,560
throughout the eva

259
00:09:32,790 --> 00:09:31,440
such that in the future we perhaps could

260
00:09:35,990 --> 00:09:32,800
put a uh

261
00:09:37,269 --> 00:09:36,000
an external valve upstream of the inlet

262
00:09:39,590 --> 00:09:37,279
to the pump

263
00:09:41,750 --> 00:09:39,600

and and wire it and control it with that

264
00:09:43,829 --> 00:09:41,760
valve so these are this is a very large

265
00:09:45,910 --> 00:09:43,839
oru i can't bring it in to fix it i

266
00:09:47,509 --> 00:09:45,920
can't return it home to fix it i don't

267
00:09:50,070 --> 00:09:47,519
want to throw it away if i can help it

268
00:09:52,550 --> 00:09:50,080
and and given this failure mode we think

269
00:09:54,310 --> 00:09:52,560
we have a path through the woods that

270
00:09:56,070 --> 00:09:54,320
in the future when

271
00:09:57,430 --> 00:09:56,080
when we need this one that perhaps we

272
00:09:59,509 --> 00:09:57,440
could we could put a valve on the

273
00:10:02,150 --> 00:09:59,519
outside and continue to use it the pump

274
00:10:03,990 --> 00:10:02,160
itself was running very very well very

275
00:10:06,150 --> 00:10:04,000
smooth was doing a good job and and we

276
00:10:08,630 --> 00:10:06,160
think has a lot of life left in it so

277
00:10:10,949 --> 00:10:08,640
that's our our plan forward so i'll stop

278
00:10:15,030 --> 00:10:10,959
there and let dina and allison walk you

279
00:10:19,670 --> 00:10:17,750
okay well i'll start it off um

280
00:10:21,110 --> 00:10:19,680
so first i want to give you kind of the

281
00:10:23,910 --> 00:10:21,120
general lay of the land in terms of our

282
00:10:25,269 --> 00:10:23,920
current um status on board iss

283
00:10:27,590 --> 00:10:25,279
we're a little bit better off than we

284
00:10:29,670 --> 00:10:27,600
were in 2010 because as mr sefertini

285
00:10:32,310 --> 00:10:29,680
mentioned the pump is actually running

286
00:10:34,630 --> 00:10:32,320
so our external

287
00:10:36,949 --> 00:10:34,640
power boxes are getting cooling it's the

288
00:10:40,389 --> 00:10:36,959

fact that we can't integrate with the

289
00:10:42,069 --> 00:10:40,399
internal water loop that is the problem

290
00:10:43,670 --> 00:10:42,079
because of course um

291
00:10:45,990 --> 00:10:43,680
you know we're running cold that's the

292
00:10:48,389 --> 00:10:46,000
issue and so we we want to be able to

293
00:10:49,590 --> 00:10:48,399
close a valve and can't do so and that

294
00:10:51,829 --> 00:10:49,600
that valve

295
00:10:53,269 --> 00:10:51,839
allows cold water cold ammonia to come

296
00:10:55,430 --> 00:10:53,279
in from the radiators and so if you

297
00:10:56,069 --> 00:10:55,440
can't regulate that valve then you end

298
00:10:57,990 --> 00:10:56,079
up

299
00:10:59,750 --> 00:10:58,000
in a scenario where you don't want to

300
00:11:01,110 --> 00:10:59,760
uh allow your water loop to come in

301
00:11:03,110 --> 00:11:01,120
contact so

302
00:11:04,630 --> 00:11:03,120
um anyway so as you've mentioned we've

303
00:11:06,550 --> 00:11:04,640
been looking at other valves and we're

304
00:11:08,870 --> 00:11:06,560
uh are on console team right now and

305
00:11:10,389 --> 00:11:08,880
mission control has been working uh with

306
00:11:11,990 --> 00:11:10,399
hand in hand with engineering folks to

307
00:11:14,310 --> 00:11:12,000
try to come up with different ways to

308
00:11:16,389 --> 00:11:14,320
try to command it

309
00:11:18,230 --> 00:11:16,399
and our software folks have put a patch

310
00:11:21,269 --> 00:11:18,240
on board that allows for

311
00:11:23,269 --> 00:11:21,279
finer control of that upstream valve the

312
00:11:24,069 --> 00:11:23,279
isolation valve that he was talking

313
00:11:25,750 --> 00:11:24,079

about

314
00:11:27,750 --> 00:11:25,760
so

315
00:11:29,990 --> 00:11:27,760
you know in the meantime our goal has

316
00:11:32,870 --> 00:11:30,000
been to try to get some of the

317
00:11:33,990 --> 00:11:32,880
heat rejected out onto that external

318
00:11:36,150 --> 00:11:34,000
water loop

319
00:11:38,150 --> 00:11:36,160
and see how much load it can take and

320
00:11:39,670 --> 00:11:38,160
can we actually regulate it within the

321
00:11:41,509 --> 00:11:39,680
right temperature so you're adding heat

322
00:11:42,790 --> 00:11:41,519
load to a loop and it's a little bit

323
00:11:44,790 --> 00:11:42,800
experimental

324
00:11:45,910 --> 00:11:44,800
so we're not there yet but i'll just say

325
00:11:47,750 --> 00:11:45,920
you know our teams have been working

326
00:11:49,829 --> 00:11:47,760
very hard and are getting incrementally

327
00:11:51,509 --> 00:11:49,839
a little bit better each time but

328
00:11:53,910 --> 00:11:51,519
unfortunately we're not at a fully

329
00:11:55,269 --> 00:11:53,920
recovered kind of state

330
00:11:56,790 --> 00:11:55,279
so um

331
00:11:57,990 --> 00:11:56,800
one of the you know we talked about

332
00:12:00,069 --> 00:11:58,000
orbital and that could have been an

333
00:12:03,350 --> 00:12:00,079
impact to try to fly in that particular

334
00:12:04,550 --> 00:12:03,360
situation uh and uh but

335
00:12:06,069 --> 00:12:04,560
kind of one of the things we're focused

336
00:12:07,829 --> 00:12:06,079
on right now is what would happen if we

337
00:12:09,990 --> 00:12:07,839
had an additional failure

338
00:12:11,190 --> 00:12:10,000

so for example uh if flute bravo were to

339
00:12:13,990 --> 00:12:11,200
go down

340
00:12:16,870 --> 00:12:14,000
then we would um have kind of this

341
00:12:18,790 --> 00:12:16,880
state quasi state of usefulness of the

342
00:12:20,629 --> 00:12:18,800
loop alpha and then we'd also have loop

343
00:12:22,629 --> 00:12:20,639
bravo that went down so we have a group

344
00:12:23,590 --> 00:12:22,639
of people called the next worst failure

345
00:12:25,750 --> 00:12:23,600
team

346
00:12:27,990 --> 00:12:25,760
and they just try to get us in a good

347
00:12:29,350 --> 00:12:28,000
posture to make sure that we have

348
00:12:30,550 --> 00:12:29,360
everything configured just in case

349
00:12:31,670 --> 00:12:30,560
something went down and make sure we

350
00:12:33,430 --> 00:12:31,680
have a procedure of what we're going to

351
00:12:34,790 --> 00:12:33,440
go run and that team has really come

352
00:12:36,790 --> 00:12:34,800
done a good job of figuring out what

353
00:12:38,790 --> 00:12:36,800
we're going to go do so for example you

354
00:12:41,030 --> 00:12:38,800
can cool some of your internal avionics

355
00:12:42,949 --> 00:12:41,040
equipment using fans uh we can hook up

356
00:12:45,350 --> 00:12:42,959
jumpers and that kind of thing so we

357
00:12:46,870 --> 00:12:45,360
have we know what we would go do uh if

358
00:12:48,150 --> 00:12:46,880
we were to get into that scenario but

359
00:12:51,190 --> 00:12:48,160
the goal at that point would be to go

360
00:12:52,389 --> 00:12:51,200
eva and fix one of the two loops so

361
00:12:55,110 --> 00:12:52,399
you know here we are we're trucking

362
00:12:56,949 --> 00:12:55,120
basically towards the eva uh and i think

363
00:12:58,870 --> 00:12:56,959

um you know this is this will be a good

364
00:13:01,430 --> 00:12:58,880
direction to go to get us into uh more

365
00:13:02,150 --> 00:13:01,440
of a nominal state of affairs

366
00:13:04,150 --> 00:13:02,160
so

367
00:13:07,269 --> 00:13:04,160
just to kind of briefly talk about um

368
00:13:10,230 --> 00:13:07,279
eva in general you know the last cva uh

369
00:13:13,030 --> 00:13:10,240
was uh eva 23 and of course we did have

370
00:13:14,629 --> 00:13:13,040
the water entering into luca's helmet in

371
00:13:15,990 --> 00:13:14,639
that eva and you can imagine that after

372
00:13:19,269 --> 00:13:16,000
that we

373
00:13:20,710 --> 00:13:19,279
kicked off a team to go take a look at

374
00:13:23,190 --> 00:13:20,720
how we can you know what is the root

375
00:13:24,949 --> 00:13:23,200
cause what was the problem that we saw

376
00:13:26,870 --> 00:13:24,959
and try to figure out what we would do

377
00:13:28,870 --> 00:13:26,880
if we uh saw it again

378
00:13:31,110 --> 00:13:28,880
and so in terms of the root cause that

379
00:13:31,910 --> 00:13:31,120
investigation is still ongoing so you

380
00:13:32,710 --> 00:13:31,920
know

381
00:13:37,590 --> 00:13:32,720
we

382
00:13:39,110 --> 00:13:37,600
the emu suit guys they really wanted to

383
00:13:40,790 --> 00:13:39,120
get hardware on the ground let's just

384
00:13:41,829 --> 00:13:40,800
try to see what we can do to get stuff

385
00:13:43,829 --> 00:13:41,839
on the ground

386
00:13:46,629 --> 00:13:43,839
we tried to look at changing out items

387
00:13:48,150 --> 00:13:46,639
on board um on you know inside the emu

388
00:13:49,670 --> 00:13:48,160

we changed out a really critical valve

389
00:13:51,590 --> 00:13:49,680
and filter and determined that was not

390
00:13:54,550 --> 00:13:51,600
the problem and we changed out

391
00:13:57,110 --> 00:13:54,560
a fan pump separator unit inside luca's

392
00:13:58,870 --> 00:13:57,120
suit and we had a new one and installed

393
00:14:00,310 --> 00:13:58,880
that and then we did not we were not

394
00:14:02,629 --> 00:14:00,320
able to repeat the water and helmet

395
00:14:04,629 --> 00:14:02,639
situation on that particular suit so we

396
00:14:06,870 --> 00:14:04,639
know that when we brought down the fan

397
00:14:08,629 --> 00:14:06,880
pump separator in november that root

398
00:14:10,470 --> 00:14:08,639
cause investigation continued and those

399
00:14:12,069 --> 00:14:10,480
folks took a

400
00:14:14,230 --> 00:14:12,079
detailed look at that

401
00:14:16,389 --> 00:14:14,240
particular unit they determined that

402
00:14:19,030 --> 00:14:16,399
they did find contamination had plugged

403
00:14:21,110 --> 00:14:19,040
the tiny holes inside that unit inside

404
00:14:23,030 --> 00:14:21,120
the water separator portion of that unit

405
00:14:24,550 --> 00:14:23,040
and the clogging of those holes would

406
00:14:26,069 --> 00:14:24,560
cause water to back up and basically

407
00:14:27,269 --> 00:14:26,079
enter the fan and then get into the vent

408
00:14:29,910 --> 00:14:27,279
loop and would be able to enter the

409
00:14:31,509 --> 00:14:29,920
helmet so that's not the root cause to

410
00:14:33,990 --> 00:14:31,519
figure out what the

411
00:14:35,829 --> 00:14:34,000
contamination is and unfortunately it's

412
00:14:37,430 --> 00:14:35,839
a pretty complicated water chemistry

413
00:14:38,949 --> 00:14:37,440

problem and there was not one particular

414
00:14:39,910 --> 00:14:38,959
constituent that you could take a look

415
00:14:41,350 --> 00:14:39,920
at and say

416
00:14:42,470 --> 00:14:41,360
that's the problem right there on the

417
00:14:44,389 --> 00:14:42,480
suit

418
00:14:46,069 --> 00:14:44,399
and so the team has still been trying to

419
00:14:48,470 --> 00:14:46,079
get more data on the ground um

420
00:14:49,990 --> 00:14:48,480
specifically we have a couple of filters

421
00:14:51,910 --> 00:14:50,000
uh well we have several filters that

422
00:14:54,629 --> 00:14:51,920
have made it onto the ground we

423
00:14:57,030 --> 00:14:54,639
periodically scrub the suits using an

424
00:14:58,550 --> 00:14:57,040
external line to try to keep them clean

425
00:15:00,310 --> 00:14:58,560
and we were able to retrieve some of

426
00:15:01,910 --> 00:15:00,320
those filters and bring them down and

427
00:15:03,189 --> 00:15:01,920
well we've essentially

428
00:15:05,750 --> 00:15:03,199
taken a look at the filters that we

429
00:15:08,150 --> 00:15:05,760
already had and noticed that

430
00:15:09,509 --> 00:15:08,160
one of them was saturated with

431
00:15:12,069 --> 00:15:09,519
particulate

432
00:15:13,829 --> 00:15:12,079
the interesting thing being it might be

433
00:15:14,550 --> 00:15:13,839
some sort of detergent kind of material

434
00:15:17,430 --> 00:15:14,560
but

435
00:15:19,030 --> 00:15:17,440
the the um the filter itself was full

436
00:15:21,430 --> 00:15:19,040
and so the the bad part of that is that

437
00:15:23,430 --> 00:15:21,440
it was kicking out um some

438
00:15:25,030 --> 00:15:23,440

some particles that might combine

439
00:15:27,350 --> 00:15:25,040
especially in something like a water

440
00:15:28,870 --> 00:15:27,360
separator or something like a centrifuge

441
00:15:31,269 --> 00:15:28,880
and create a lot of precipitate which

442
00:15:33,030 --> 00:15:31,279
would cause our contamination issue so

443
00:15:35,670 --> 00:15:33,040
we're still really

444
00:15:36,710 --> 00:15:35,680
we have not at all come to conclusion on

445
00:15:38,230 --> 00:15:36,720
which

446
00:15:39,670 --> 00:15:38,240
what kind of contamination or what the

447
00:15:41,189 --> 00:15:39,680
source might be so i don't want to

448
00:15:42,710 --> 00:15:41,199
mislead you but i'm telling you that we

449
00:15:44,870 --> 00:15:42,720
did we have done quite a bit of research

450
00:15:46,949 --> 00:15:44,880
on this and we

451
00:15:48,550 --> 00:15:46,959
have decided to um

452
00:15:50,230 --> 00:15:48,560
take take a look at using luca's suit

453
00:15:52,310 --> 00:15:50,240
again because it has the fresh fan pump

454
00:15:54,069 --> 00:15:52,320
separator in it and that's what we spent

455
00:15:56,710 --> 00:15:54,079
overnight doing is trying to get that

456
00:15:58,150 --> 00:15:56,720
suit ready to to go back out so

457
00:16:00,389 --> 00:15:58,160
mike hopkins will be wearing that

458
00:16:02,230 --> 00:16:00,399
particular suit and

459
00:16:04,710 --> 00:16:02,240
we think that that's an extremely clean

460
00:16:06,629 --> 00:16:04,720
suit and it's ready to go so

461
00:16:08,790 --> 00:16:06,639
i believe that we've completed either

462
00:16:10,790 --> 00:16:08,800
most or all of our preparations on that

463
00:16:11,590 --> 00:16:10,800

we did do kind of a return to service

464
00:16:13,509 --> 00:16:11,600
check

465
00:16:15,189 --> 00:16:13,519
after the fan pump stuff was changed out

466
00:16:16,870 --> 00:16:15,199
we have um

467
00:16:18,790 --> 00:16:16,880
high confidence that

468
00:16:20,150 --> 00:16:18,800
it's you know essentially just like a

469
00:16:21,749 --> 00:16:20,160
unit that was

470
00:16:23,110 --> 00:16:21,759
refurbished on the ground so the crew

471
00:16:24,470 --> 00:16:23,120
did a really good job changing it out

472
00:16:26,230 --> 00:16:24,480
and then we did a full return to service

473
00:16:28,870 --> 00:16:26,240
check on the suit

474
00:16:29,749 --> 00:16:28,880
and uh are ready to go with those suits

475
00:16:30,710 --> 00:16:29,759
so

476
00:16:32,710 --> 00:16:30,720
um

477
00:16:35,110 --> 00:16:32,720
let's see in terms of the evas that

478
00:16:37,350 --> 00:16:35,120
we're about to go do

479
00:16:39,990 --> 00:16:37,360
as he mentioned we've got um

480
00:16:42,629 --> 00:16:40,000
two to four evas that we're anticipating

481
00:16:44,629 --> 00:16:42,639
and you know for for two evas we would

482
00:16:46,470 --> 00:16:44,639
have to have a really really good day uh

483
00:16:48,790 --> 00:16:46,480
in the first eba and allison will

484
00:16:51,749 --> 00:16:48,800
probably talk about that but um you know

485
00:16:52,870 --> 00:16:51,759
of course we could run into issues um if

486
00:16:54,629 --> 00:16:52,880
but right now i would just say we're

487
00:16:57,350 --> 00:16:54,639
nominally planning for three so that

488
00:16:58,790 --> 00:16:57,360

would be our plan um

489
00:17:05,590 --> 00:16:58,800
the

490
00:17:06,789 --> 00:17:05,600
at a very high fidelity state where

491
00:17:08,309 --> 00:17:06,799
we're basically putting the final

492
00:17:09,110 --> 00:17:08,319
procedures on board

493
00:17:10,309 --> 00:17:09,120
uh

494
00:17:12,150 --> 00:17:10,319
in some ways we were lucky that we had

495
00:17:13,829 --> 00:17:12,160
the 2010 incident because that's really

496
00:17:14,870 --> 00:17:13,839
prepared us we have already lessons

497
00:17:16,789 --> 00:17:14,880
learned all of that's already been

498
00:17:19,110 --> 00:17:16,799
incorporated and we had a team called

499
00:17:21,510 --> 00:17:19,120
the failure i think it's response

500
00:17:23,829 --> 00:17:21,520
assessment team the frat team and that

501
00:17:24,630 --> 00:17:23,839
team had already put all those lessons

502
00:17:26,630 --> 00:17:24,640
learned

503
00:17:28,230 --> 00:17:26,640
into all of our documentation

504
00:17:29,510 --> 00:17:28,240
and we've had a chance to get together

505
00:17:30,789 --> 00:17:29,520
with that team and

506
00:17:32,950 --> 00:17:30,799
figure out

507
00:17:34,789 --> 00:17:32,960
what else is still open so a lot of that

508
00:17:35,909 --> 00:17:34,799
has been analysis um that our

509
00:17:38,230 --> 00:17:35,919
engineering counterparts have been

510
00:17:40,070 --> 00:17:38,240
performing but from the ops side of the

511
00:17:41,590 --> 00:17:40,080
house those procedures were really well

512
00:17:43,270 --> 00:17:41,600
potted so we're looking you know we were

513
00:17:45,110 --> 00:17:43,280

already postured very well the crew was

514
00:17:47,590 --> 00:17:45,120
able to start looking at those uh the

515
00:17:48,630 --> 00:17:47,600
day after we said that we might go eva

516
00:17:50,549 --> 00:17:48,640
so

517
00:17:53,350 --> 00:17:50,559
um i feel like we're at a very mature

518
00:17:55,350 --> 00:17:53,360
state in terms of being ready to go eva

519
00:17:57,029 --> 00:17:55,360
you know i looked around the room today

520
00:17:58,950 --> 00:17:57,039
and said what are people worried about

521
00:18:01,029 --> 00:17:58,960
and really um there was not much to be

522
00:18:02,549 --> 00:18:01,039
said so i think we're ready to go out

523
00:18:03,430 --> 00:18:02,559
the door on saturday

524
00:18:04,789 --> 00:18:03,440
and

525
00:18:05,510 --> 00:18:04,799
our team is

526
00:18:08,950 --> 00:18:05,520
as

527
00:18:10,630 --> 00:18:08,960
show-stopping issues to be working right

528
00:18:11,990 --> 00:18:10,640
now so

529
00:18:13,430 --> 00:18:12,000
so with that i'm going to hand it over

530
00:18:14,870 --> 00:18:13,440
allison

531
00:18:16,549 --> 00:18:14,880
all right thanks dina

532
00:18:18,710 --> 00:18:16,559
okay so to briefly mention a little bit

533
00:18:20,470 --> 00:18:18,720
about the water mitigation uh steps that

534
00:18:22,710 --> 00:18:20,480
that dina talked about we have made some

535
00:18:24,390 --> 00:18:22,720
modifications to the suit so in addition

536
00:18:26,950 --> 00:18:24,400
to training that we have given to the

537
00:18:28,789 --> 00:18:26,960
crew on how to respond in the event that

538
00:18:30,630 --> 00:18:28,799

they have water in the helmet again we

539
00:18:31,830 --> 00:18:30,640
have upgraded two pieces of hardware

540
00:18:33,830 --> 00:18:31,840
that we are going to be installing in

541
00:18:36,150 --> 00:18:33,840
the suits so this right here is a helmet

542
00:18:38,150 --> 00:18:36,160
absorption pad and this is basically

543
00:18:40,150 --> 00:18:38,160
it's it's a modified absorbent pad that

544
00:18:42,150 --> 00:18:40,160
is designed to be installed on the back

545
00:18:43,750 --> 00:18:42,160
of the crew member's helmet and so this

546
00:18:45,430 --> 00:18:43,760
is our first line of defense that if

547
00:18:46,789 --> 00:18:45,440
water were to enter the helmet again

548
00:18:48,549 --> 00:18:46,799
even though we don't expect it if water

549
00:18:50,630 --> 00:18:48,559
were to enter the helmet again this is

550
00:18:53,110 --> 00:18:50,640
designed to hold anywhere between 600

551
00:18:55,029 --> 00:18:53,120
and 800 milliliters of water

552
00:18:56,470 --> 00:18:55,039
we have included nominal checks in our

553
00:18:58,630 --> 00:18:56,480
procedure where we normally have the

554
00:19:00,070 --> 00:18:58,640
crew inspect their gloves to make sure

555
00:19:02,230 --> 00:19:00,080
they don't have any damage in the gloves

556
00:19:03,909 --> 00:19:02,240
we've now also added steps for them to

557
00:19:06,390 --> 00:19:03,919
check the helmet absorption pad or the

558
00:19:08,070 --> 00:19:06,400
hap to verify it's not squishy that's

559
00:19:10,230 --> 00:19:08,080
the technical term that we're using to

560
00:19:12,230 --> 00:19:10,240
define whether we think uh water has

561
00:19:14,070 --> 00:19:12,240
entered the helmet so

562
00:19:15,270 --> 00:19:14,080
typically we've we've done some testing

563
00:19:17,430 --> 00:19:15,280

quite a bit of testing on the ground

564
00:19:18,950 --> 00:19:17,440
with astronauts to verify when you lean

565
00:19:20,710 --> 00:19:18,960
back when can you first sense

566
00:19:23,190 --> 00:19:20,720
squishiness and that's roughly around

567
00:19:24,630 --> 00:19:23,200
the 200 milliliter mark so if we have

568
00:19:25,990 --> 00:19:24,640
anywhere close to 200 milliliters of

569
00:19:27,510 --> 00:19:26,000
water in this suit that's definitely

570
00:19:29,190 --> 00:19:27,520
much more than we ever expect to be in

571
00:19:31,190 --> 00:19:29,200
the suit so as soon as the crew member

572
00:19:33,430 --> 00:19:31,200
senses squishiness in his hat that's a

573
00:19:35,350 --> 00:19:33,440
sign that there is a problem in the emu

574
00:19:37,270 --> 00:19:35,360
and it's it's time to come inside so

575
00:19:39,110 --> 00:19:37,280
they do have that response and a new we

576
00:19:41,510 --> 00:19:39,120
created a new emergency cuff checklist

577
00:19:43,190 --> 00:19:41,520
page for the water in the emu so as soon

578
00:19:45,510 --> 00:19:43,200
as they either see water in their helmet

579
00:19:47,669 --> 00:19:45,520
or sense water in the hat it's time to

580
00:19:49,669 --> 00:19:47,679
to start terminating the eva

581
00:19:52,789 --> 00:19:49,679
the other piece of mitigation hardware

582
00:19:54,789 --> 00:19:52,799
that we put into the suit is the snorkel

583
00:19:57,110 --> 00:19:54,799
so this is a modified piece of hardware

584
00:19:58,950 --> 00:19:57,120
it's a water line vent tube which is a

585
00:20:01,270 --> 00:19:58,960
component inside the emu that we had the

586
00:20:03,430 --> 00:20:01,280
crew fabricate these on orbit so they

587
00:20:05,029 --> 00:20:03,440
basically cut apart

588
00:20:07,190 --> 00:20:05,039

the plastic tubing on this waterline

589
00:20:09,190 --> 00:20:07,200
vent tube and then attach hook velcro on

590
00:20:11,909 --> 00:20:09,200
one side and pile velcro on the other

591
00:20:14,149 --> 00:20:11,919
and the idea is that this snorkel is now

592
00:20:16,070 --> 00:20:14,159
installed inside the suit with the crew

593
00:20:17,669 --> 00:20:16,080
member between his between his water

594
00:20:19,430 --> 00:20:17,679
restraint bag and the front side of his

595
00:20:21,190 --> 00:20:19,440
suit so this is your

596
00:20:22,710 --> 00:20:21,200
this is your your last resort that if

597
00:20:24,149 --> 00:20:22,720
water is encroaching your face is

598
00:20:26,149 --> 00:20:24,159
similar to happen with luke on the last

599
00:20:28,549 --> 00:20:26,159
eva that the crew member can lean down

600
00:20:30,870 --> 00:20:28,559
and use this to breathe uh to receive

601
00:20:32,870 --> 00:20:30,880
you know fresh oxygen down near his

602
00:20:34,230 --> 00:20:32,880
midsection so those are the two two

603
00:20:36,230 --> 00:20:34,240
pieces of hardware we had the crew

604
00:20:38,310 --> 00:20:36,240
fabricate two of these snorkels a couple

605
00:20:40,789 --> 00:20:38,320
days ago and these helmet absorption

606
00:20:42,470 --> 00:20:40,799
pads we were fortunate enough to launch

607
00:20:44,710 --> 00:20:42,480
quite a few we have 24 on board we were

608
00:20:46,310 --> 00:20:44,720
able to launch those on the last soyuz

609
00:20:48,070 --> 00:20:46,320
as well as on the orbital demo mission

610
00:20:50,149 --> 00:20:48,080
so we're in good shape as far as that

611
00:20:51,990 --> 00:20:50,159
goes um so with that we can go ahead and

612
00:20:53,990 --> 00:20:52,000
start talking about the details of the

613
00:20:55,350 --> 00:20:54,000

space walks so if we can show the first

614
00:20:57,110 --> 00:20:55,360
graphic

615
00:20:59,190 --> 00:20:57,120
so there are space walking crew members

616
00:21:01,190 --> 00:20:59,200
we have rick mastracchio he comes to us

617
00:21:03,510 --> 00:21:01,200
with six space walks under his belt so

618
00:21:05,669 --> 00:21:03,520
he's a very experienced space walker he

619
00:21:07,990 --> 00:21:05,679
will serve the ev-1 or lead spacewalk

620
00:21:10,390 --> 00:21:08,000
officer or lead spacewalker role for

621
00:21:11,669 --> 00:21:10,400
eva's one and two

622
00:21:13,750 --> 00:21:11,679
and on the right side you see mike

623
00:21:15,510 --> 00:21:13,760
hopkins he is a rookie spacewalker but

624
00:21:17,669 --> 00:21:15,520
very excited to go out the door he will

625
00:21:19,830 --> 00:21:17,679
be the ev2 for eva's one and two and

626
00:21:21,510 --> 00:21:19,840
then he'll take the lead ev1 role on

627
00:21:23,029 --> 00:21:21,520
eva3

628
00:21:24,710 --> 00:21:23,039
so then on the inside

629
00:21:26,630 --> 00:21:24,720
go to the next graphic on the inside

630
00:21:29,029 --> 00:21:26,640
we'll have koichi wakata who was flying

631
00:21:31,190 --> 00:21:29,039
the ssrms or the space station robotic

632
00:21:33,590 --> 00:21:31,200
arm he will be as you'll see in the

633
00:21:35,350 --> 00:21:33,600
video one of the crew members spends a

634
00:21:37,510 --> 00:21:35,360
large majority of all three of the evas

635
00:21:39,750 --> 00:21:37,520
on the arm so koichi will be tied into

636
00:21:42,789 --> 00:21:39,760
this and he'll be flying the arm

637
00:21:44,230 --> 00:21:42,799
so the next graphic

638
00:21:46,230 --> 00:21:44,240

shows the overviews of the three

639
00:21:48,230 --> 00:21:46,240
spacewalks so broad strokes what we plan

640
00:21:51,110 --> 00:21:48,240
on doing on the first the first

641
00:21:52,710 --> 00:21:51,120
spacewalk is focused on de-integrating

642
00:21:54,630 --> 00:21:52,720
the failed pump module so that that

643
00:21:56,710 --> 00:21:54,640
includes demating the fluid quick

644
00:21:59,350 --> 00:21:56,720
disconnects installing a pump module

645
00:22:01,270 --> 00:21:59,360
jumper box which allows us to have fluid

646
00:22:02,870 --> 00:22:01,280
flow between the rest of the tcs the

647
00:22:04,950 --> 00:22:02,880
thermal control system with the

648
00:22:06,230 --> 00:22:04,960
accumulators in the system

649
00:22:08,230 --> 00:22:06,240
and then demating the electrical

650
00:22:09,909 --> 00:22:08,240
connectors on that failed pump module

651
00:22:11,510 --> 00:22:09,919
and then we also spend a little bit of

652
00:22:13,190 --> 00:22:11,520
time working on the spare pump module

653
00:22:15,830 --> 00:22:13,200
which includes releasing some

654
00:22:17,430 --> 00:22:15,840
multi-layer insulation on the second eva

655
00:22:19,350 --> 00:22:17,440
we're focused on removing the failed

656
00:22:21,510 --> 00:22:19,360
pump module from the truss and then

657
00:22:23,350 --> 00:22:21,520
temporarily stowing it on the poa or the

658
00:22:25,669 --> 00:22:23,360
payload oru accommodation tempstow

659
00:22:27,909 --> 00:22:25,679
location and then we work at the end of

660
00:22:31,029 --> 00:22:27,919
the eva on releasing the spare pump

661
00:22:32,789 --> 00:22:31,039
module uh from the esp3 carrier on the

662
00:22:34,630 --> 00:22:32,799
outboard side of s3

663
00:22:36,470 --> 00:22:34,640

and then we fly that over to the s1

664
00:22:38,230 --> 00:22:36,480
location and install that into the trust

665
00:22:39,669 --> 00:22:38,240
and we plan on hooking up only the bolts

666
00:22:40,549 --> 00:22:39,679
and the electrical connectors on this

667
00:22:44,549 --> 00:22:40,559
eva

668
00:22:46,390 --> 00:22:44,559
will complete that spare pump module

669
00:22:49,510 --> 00:22:46,400
installation which includes mating the

670
00:22:51,270 --> 00:22:49,520
the four fluid lines and then relocating

671
00:22:54,630 --> 00:22:51,280
the failed pump module from its tempsto

672
00:22:57,270 --> 00:22:54,640
location out to the esp the esp3

673
00:22:58,950 --> 00:22:57,280
location where the failed came from

674
00:23:01,110 --> 00:22:58,960
so with that we can go ahead and get

675
00:23:04,149 --> 00:23:01,120
started with the videos and we'll talk

676
00:23:05,430 --> 00:23:04,159
through the tasks

677
00:23:07,270 --> 00:23:05,440
so if we could start the videos all

678
00:23:09,029 --> 00:23:07,280
right so on the first first spacewalk

679
00:23:10,950 --> 00:23:09,039
the crew members egress the joint

680
00:23:14,149 --> 00:23:10,960
airlock and they make their way up to

681
00:23:15,830 --> 00:23:14,159
the center of the s-1 truss

682
00:23:17,669 --> 00:23:15,840
mike hopkins mike will be uh the free

683
00:23:19,590 --> 00:23:17,679
float crew member rick will ingress the

684
00:23:20,549 --> 00:23:19,600
arm koichi will fly him up to the work

685
00:23:22,549 --> 00:23:20,559
site

686
00:23:25,029 --> 00:23:22,559
and then the two crew members will spend

687
00:23:27,110 --> 00:23:25,039
some time demating those four

688
00:23:29,029 --> 00:23:27,120

fluid quick disconnects which are

689
00:23:30,549 --> 00:23:29,039
illuminated there

690
00:23:32,390 --> 00:23:30,559
so a quick overview of the interfaces on

691
00:23:33,909 --> 00:23:32,400
the pump module you have four fluid

692
00:23:35,590 --> 00:23:33,919
quick disconnects three of them are one

693
00:23:38,149 --> 00:23:35,600
and a half inch size one is a quarter

694
00:23:39,669 --> 00:23:38,159
size you have five electrical connectors

695
00:23:41,669 --> 00:23:39,679
and then you also have four fasteners

696
00:23:43,830 --> 00:23:41,679
which are 5 8 inch fasteners which are

697
00:23:46,070 --> 00:23:43,840
what the primary fasteners that hold the

698
00:23:47,350 --> 00:23:46,080
pump module into the truss so here we

699
00:23:49,190 --> 00:23:47,360
are fortunate enough on the partial

700
00:23:51,350 --> 00:23:49,200
gravity simulator to have doug wheelock

701
00:23:52,870 --> 00:23:51,360
and tracy caldwell dyson help us create

702
00:23:54,789 --> 00:23:52,880
a training video about lessons they

703
00:23:56,149 --> 00:23:54,799
learned during the last pump module r r

704
00:23:57,590 --> 00:23:56,159
so we were able to film this training

705
00:23:59,269 --> 00:23:57,600
video just a few days ago and we got

706
00:24:01,110 --> 00:23:59,279
that uplink to the crew so they are able

707
00:24:02,470 --> 00:24:01,120
to learn of any gotchas

708
00:24:04,630 --> 00:24:02,480
once those four fluid lines are

709
00:24:06,470 --> 00:24:04,640
disconnected they'll then work to

710
00:24:07,990 --> 00:24:06,480
install the half inch and the one and a

711
00:24:10,070 --> 00:24:08,000
half inch fluid lines to this pump

712
00:24:12,310 --> 00:24:10,080
module jumper box as i mentioned this is

713
00:24:14,310 --> 00:24:12,320

what allows ammonia to flow another the

714
00:24:15,590 --> 00:24:14,320
pump module's out allows monia to have

715
00:24:16,950 --> 00:24:15,600
access to the

716
00:24:19,190 --> 00:24:16,960
accumulators and the nitrogen and

717
00:24:21,110 --> 00:24:19,200
ammonia tanks to prevent liquid lock

718
00:24:22,149 --> 00:24:21,120
so that's what we spend most of eva 1

719
00:24:24,390 --> 00:24:22,159
doing

720
00:24:25,830 --> 00:24:24,400
on eva 2 the focus is getting the failed

721
00:24:27,269 --> 00:24:25,840
pump module out of the trust and the new

722
00:24:29,190 --> 00:24:27,279
one in the trust so there you can see

723
00:24:30,870 --> 00:24:29,200
the loop a pump module on the s1 truss

724
00:24:32,470 --> 00:24:30,880
on the right side and as mike mentioned

725
00:24:35,430 --> 00:24:32,480
we have three spares we're shooting for

726
00:24:36,950 --> 00:24:35,440
the esp3 spare pump module to install in

727
00:24:38,710 --> 00:24:36,960
its new home

728
00:24:40,710 --> 00:24:38,720
right outside the airlock mike will pick

729
00:24:42,549 --> 00:24:40,720
up the adjustable grapple bar from the

730
00:24:43,990 --> 00:24:42,559
esp2 carrier

731
00:24:45,430 --> 00:24:44,000
he will then translate up to the truss

732
00:24:47,190 --> 00:24:45,440
and rick will be on the arm and they'll

733
00:24:48,789 --> 00:24:47,200
work to release the four fasteners that

734
00:24:50,230 --> 00:24:48,799
are holding the pump module on the truss

735
00:24:52,630 --> 00:24:50,240
then they'll slowly slide the pump

736
00:24:54,310 --> 00:24:52,640
module out of the truss about halfway

737
00:24:56,549 --> 00:24:54,320
giving them access to the install

738
00:24:58,149 --> 00:24:56,559

location for the adjustable grapple bar

739
00:25:00,710 --> 00:24:58,159
and it's this grapple bar that allows

740
00:25:02,870 --> 00:25:00,720
the pump module to be temporarily stowed

741
00:25:04,870 --> 00:25:02,880
between evas

742
00:25:07,110 --> 00:25:04,880
so once the pump module is free of the

743
00:25:08,950 --> 00:25:07,120
trust they'll give koichi the go to

744
00:25:10,789 --> 00:25:08,960
relocate the arm

745
00:25:12,789 --> 00:25:10,799
and rick over to the poa or the

746
00:25:14,870 --> 00:25:12,799
temporary stow location

747
00:25:16,789 --> 00:25:14,880
for this pump module mike said this is

748
00:25:18,470 --> 00:25:16,799
our desire is to keep this pump module

749
00:25:19,750 --> 00:25:18,480
as a viable spare so that we can perform

750
00:25:21,350 --> 00:25:19,760
additional maintenance on it in the

751
00:25:23,350 --> 00:25:21,360
future

752
00:25:25,430 --> 00:25:23,360
so once they have the spare pump module

753
00:25:27,190 --> 00:25:25,440
stowed on the poa

754
00:25:29,190 --> 00:25:27,200
they'll then work to translate over to

755
00:25:30,310 --> 00:25:29,200
esp3 where the new pump module is

756
00:25:32,950 --> 00:25:30,320
located

757
00:25:35,669 --> 00:25:32,960
they'll release that from the carrier

758
00:25:37,830 --> 00:25:35,679
and then fly back over to the truss to

759
00:25:40,549 --> 00:25:37,840
install that new pump module in the same

760
00:25:41,750 --> 00:25:40,559
location where we removed the failed

761
00:25:43,350 --> 00:25:41,760
as you can see there's quite a bit of

762
00:25:45,029 --> 00:25:43,360
our maneuvers throughout all of these

763
00:25:47,669 --> 00:25:45,039

evas so i'm sure koichi will be getting

764
00:25:51,590 --> 00:25:49,430
so they'll work together to slowly guide

765
00:25:52,789 --> 00:25:51,600
the pump module into the truss

766
00:25:54,549 --> 00:25:52,799
and then they'll attach the four

767
00:25:56,549 --> 00:25:54,559
fasteners that hold it in place and then

768
00:25:58,230 --> 00:25:56,559
mate the electrical connectors which

769
00:26:00,310 --> 00:25:58,240
will give us good insight into seeing if

770
00:26:20,549 --> 00:26:00,320
we have a viable spare in this pump

771
00:26:24,789 --> 00:26:22,630
helmet video and as well as cameras on

772
00:26:26,789 --> 00:26:24,799
the arm so the third spacewalk is

773
00:26:28,710 --> 00:26:26,799
focused on getting the fluid lines

774
00:26:30,630 --> 00:26:28,720
hooked up to the pump module those four

775
00:26:32,710 --> 00:26:30,640
fluid lines hooked up to the pump module

776
00:26:34,630 --> 00:26:32,720
and then working on relocating the

777
00:26:37,269 --> 00:26:34,640
failed pump module from its temporary

778
00:26:40,230 --> 00:26:37,279
stowage location over to the esp3

779
00:26:42,310 --> 00:26:40,240
location where we retrieved the spare

780
00:26:43,909 --> 00:26:42,320
on eva 3 we'll be swapping rolls so mike

781
00:26:45,350 --> 00:26:43,919
will actually be the crew member in the

782
00:26:47,590 --> 00:26:45,360
arm this time and rick will be the free

783
00:26:49,590 --> 00:26:47,600
float crew member as koichi is flying

784
00:26:52,070 --> 00:26:49,600
mike over with the failed pump module

785
00:26:54,630 --> 00:26:52,080
rick will spend some time at the s1 pump

786
00:26:55,669 --> 00:26:54,640
module install location verifying that

787
00:26:57,029 --> 00:26:55,679
he has

788
00:27:00,390 --> 00:26:57,039

everything buttoned up and that we've

789
00:27:03,510 --> 00:27:00,400
cleared the mt translation corridor

790
00:27:04,830 --> 00:27:03,520
once they're at the esp3 worksite

791
00:27:07,909 --> 00:27:04,840
mic will

792
00:27:09,750 --> 00:27:07,919
slowly commands to koichi to bring him

793
00:27:11,110 --> 00:27:09,760
into the work site

794
00:27:12,870 --> 00:27:11,120
then they will the two crew members will

795
00:27:14,310 --> 00:27:12,880
work together to release the adjustable

796
00:27:15,990 --> 00:27:14,320
grapple bar

797
00:27:18,630 --> 00:27:16,000
and then they will work on rotating the

798
00:27:20,950 --> 00:27:18,640
pump module 180 degrees to allow them to

799
00:27:23,350 --> 00:27:20,960
install it into the rails

800
00:27:24,870 --> 00:27:23,360
on the esp3 worksite once they install

801
00:27:26,549 --> 00:27:24,880
it they'll attach the four fasteners

802
00:27:28,310 --> 00:27:26,559
that hold it in place make some

803
00:27:30,310 --> 00:27:28,320
electrical connectors to provide heater

804
00:27:32,310 --> 00:27:30,320
power to this failed unit and then

805
00:27:35,029 --> 00:27:32,320
install some multi-layer insulation over

806
00:27:36,950 --> 00:27:35,039
it to protect it michael then worked to

807
00:27:39,669 --> 00:27:36,960
retrieve the adjustable grapple bar from

808
00:27:41,830 --> 00:27:39,679
a temp stow location

809
00:27:44,789 --> 00:27:41,840
and koichi will then begin maneuvering

810
00:27:46,950 --> 00:27:44,799
him from the outboard location on s3 all

811
00:27:48,389 --> 00:27:46,960
the way back to the esp-2 carrier on the

812
00:27:49,909 --> 00:27:48,399
airlock

813
00:27:52,070 --> 00:27:49,919

during this time rick will be cleaning

814
00:27:53,590 --> 00:27:52,080
up the work site which includes

815
00:27:54,950 --> 00:27:53,600
packing up the tool bags that they

816
00:27:57,110 --> 00:27:54,960
brought out with them and then heading

817
00:27:58,549 --> 00:27:57,120
back towards the airlock once at the

818
00:28:00,389 --> 00:27:58,559
esp2

819
00:28:02,149 --> 00:28:00,399
location

820
00:28:04,149 --> 00:28:02,159
mike will install the adjustable grapple

821
00:28:05,830 --> 00:28:04,159
bar onto the fhrc or the flex hose

822
00:28:07,990 --> 00:28:05,840
rotary coupler which is its temp stow

823
00:28:09,669 --> 00:28:08,000
location once complete with that he will

824
00:28:11,590 --> 00:28:09,679
work on egressing the arm and removing

825
00:28:13,110 --> 00:28:11,600
the foot restraint and then the two crew

826
00:28:15,269 --> 00:28:13,120
members will head inside and that will

827
00:28:17,510 --> 00:28:15,279
complete the eva

828
00:28:18,710 --> 00:28:17,520
and josh i think that's all i have okay

829
00:28:19,750 --> 00:28:18,720
let's take some questions we'll start

830
00:28:22,710 --> 00:28:19,760
here in houston then we'll go to the

831
00:28:24,389 --> 00:28:22,720
phone lines i'll start with mark crowe

832
00:28:25,909 --> 00:28:24,399
thanks uh this is probably a minor

833
00:28:28,470 --> 00:28:25,919
question in the whole picture but could

834
00:28:31,590 --> 00:28:28,480
you just talk about the uh the beta data

835
00:28:36,230 --> 00:28:31,600
angle and how that's influencing the the

836
00:28:41,990 --> 00:28:39,669
there is both uh both evas and and

837
00:28:44,470 --> 00:28:42,000
birthing operations uh have constraints

838
00:28:47,190 --> 00:28:44,480

that make it difficult to do in fact we

839
00:28:50,389 --> 00:28:47,200
we avoid uh birthing all together above

840
00:28:52,310 --> 00:28:50,399
60 degrees beta

841
00:28:54,070 --> 00:28:52,320
the constraint's really 65 the ground

842
00:28:55,430 --> 00:28:54,080
group is 60 but we're headed to a pretty

843
00:28:56,950 --> 00:28:55,440
high beta

844
00:28:58,389 --> 00:28:56,960
and you can get yourself into conditions

845
00:28:59,909 --> 00:28:58,399
where you didn't make it the first day

846
00:29:02,870 --> 00:28:59,919
and then suddenly you're you're deep

847
00:29:04,070 --> 00:29:02,880
into beta high baited territory so

848
00:29:05,830 --> 00:29:04,080
we try to

849
00:29:07,510 --> 00:29:05,840
avoid birthings around a high beta

850
00:29:09,110 --> 00:29:07,520
period dockings or birthing around high

851
00:29:10,950 --> 00:29:09,120
debated periods

852
00:29:12,230 --> 00:29:10,960
we looked at doing the eda during high

853
00:29:14,230 --> 00:29:12,240
beta there's a lot of challenges

854
00:29:16,870 --> 00:29:14,240
associated with that both for cooling

855
00:29:19,029 --> 00:29:16,880
the iss and meeting the needs for the

856
00:29:21,190 --> 00:29:19,039
the emu crew itself

857
00:29:23,350 --> 00:29:21,200
and while we could probably work it out

858
00:29:25,909 --> 00:29:23,360
and make it happen given the short time

859
00:29:28,789 --> 00:29:25,919
we have we we'd prefer to stay on this

860
00:29:31,190 --> 00:29:28,799
side of the beta cutout

861
00:29:33,830 --> 00:29:31,200
i'm sorry uh mark caro for aviation week

862
00:29:35,029 --> 00:29:33,840
could you just frame that period as you

863
00:29:38,549 --> 00:29:35,039

as you said

864
00:29:41,269 --> 00:29:38,559
we go above 60 on december 30th and i

865
00:29:44,870 --> 00:29:41,279
believe we come below on the 9th of

866
00:29:45,750 --> 00:29:44,880
january it's about like that

867
00:29:46,549 --> 00:29:45,760
okay

868
00:29:51,830 --> 00:29:46,559
jim

869
00:29:53,430 --> 00:29:51,840
looking at the cause root cause work

870
00:29:55,430 --> 00:29:53,440
still going on

871
00:29:57,350 --> 00:29:55,440
are you looking at any kind of root

872
00:29:59,269 --> 00:29:57,360
cause such as the airlock heat exchanger

873
00:30:00,870 --> 00:29:59,279
that would be an issue of contaminating

874
00:30:01,750 --> 00:30:00,880
the other suits as well as this in other

875
00:30:03,510 --> 00:30:01,760
words

876
00:30:05,830 --> 00:30:03,520
if the other suits are contaminated the

877
00:30:07,190 --> 00:30:05,840
same way as lucas was

878
00:30:08,950 --> 00:30:07,200
could you tell

879
00:30:11,110 --> 00:30:08,960
by inspecting on orbit

880
00:30:13,909 --> 00:30:11,120
and are you

881
00:30:15,909 --> 00:30:13,919
what are you doing to

882
00:30:17,510 --> 00:30:15,919
lower that possibility

883
00:30:18,230 --> 00:30:17,520
so um

884
00:30:19,669 --> 00:30:18,240
the

885
00:30:20,950 --> 00:30:19,679
airlock heat exchanger of course is one

886
00:30:21,909 --> 00:30:20,960
of the components that we'd be looking

887
00:30:22,710 --> 00:30:21,919
at

888
00:30:25,029 --> 00:30:22,720

and

889
00:30:26,870 --> 00:30:25,039
what basically i'll just say as i

890
00:30:29,269 --> 00:30:26,880
mentioned the water chemistry has

891
00:30:31,110 --> 00:30:29,279
been very complicated and in fact you

892
00:30:32,549 --> 00:30:31,120
know whole days have been spent with a

893
00:30:35,269 --> 00:30:32,559
lot of water chemists trying to figure

894
00:30:36,710 --> 00:30:35,279
this out so we have not yet said it's

895
00:30:38,230 --> 00:30:36,720
something that for sure would be fleet

896
00:30:40,549 --> 00:30:38,240
wide and in fact it could be something

897
00:30:42,070 --> 00:30:40,559
that's a one-off um but

898
00:30:44,149 --> 00:30:42,080
we've looked at everything from

899
00:30:45,990 --> 00:30:44,159
constituents that are inside the suits

900
00:30:47,990 --> 00:30:46,000
to the airlock and we have found

901
00:30:49,590 --> 00:30:48,000
different types of components that might

902
00:30:50,950 --> 00:30:49,600
lead us well it could be an air-like

903
00:30:51,909 --> 00:30:50,960
heat exchanger thing or maybe it

904
00:30:53,510 --> 00:30:51,919
wouldn't

905
00:30:55,750 --> 00:30:53,520
but in terms of

906
00:30:56,870 --> 00:30:55,760
what our scrubbing and you know taking a

907
00:30:58,310 --> 00:30:56,880
look at all the different filters and

908
00:31:00,789 --> 00:30:58,320
everything that we've done we think that

909
00:31:02,470 --> 00:31:00,799
we're taking out two clean suits to the

910
00:31:05,750 --> 00:31:02,480
best of our knowledge not that we

911
00:31:07,110 --> 00:31:05,760
wouldn't um you know we can't rule out

912
00:31:08,630 --> 00:31:07,120
until we've just determined the root

913
00:31:09,990 --> 00:31:08,640

cause uh

914
00:31:11,190 --> 00:31:10,000
that that's you know we can't rule out

915
00:31:12,950 --> 00:31:11,200
that we would have water and helmet

916
00:31:14,310 --> 00:31:12,960
again um but that's what the ops

917
00:31:16,549 --> 00:31:14,320
mitigations are for and what the new

918
00:31:18,310 --> 00:31:16,559
hardware is for um but we're still

919
00:31:20,310 --> 00:31:18,320
really working on what the root cause is

920
00:31:23,909 --> 00:31:20,320
so i'll i just say that that's kind of

921
00:31:26,950 --> 00:31:25,110
are there any

922
00:31:28,710 --> 00:31:26,960
are the issues of potential water flow

923
00:31:30,230 --> 00:31:28,720
in the helmet constraining you for

924
00:31:33,430 --> 00:31:30,240
example for a crewmen on the end of the

925
00:31:34,389 --> 00:31:33,440
ssrms you have how you change your ssrms

926
00:31:36,470 --> 00:31:34,399
truman

927
00:31:38,389 --> 00:31:36,480
procedures because of any concerns about

928
00:31:41,509 --> 00:31:38,399
getting back yeah i'll answer that

929
00:31:44,310 --> 00:31:41,519
particular one i think um so we have had

930
00:31:46,389 --> 00:31:44,320
very so originally when this all

931
00:31:47,990 --> 00:31:46,399
broke post aba 23 we did look

932
00:31:49,590 --> 00:31:48,000
generically at what it would take to get

933
00:31:50,950 --> 00:31:49,600
somebody who's on the arm if he had

934
00:31:52,789 --> 00:31:50,960
water and helmet

935
00:31:54,549 --> 00:31:52,799
even if he's carrying a large

936
00:31:56,549 --> 00:31:54,559
pump module for example

937
00:31:58,549 --> 00:31:56,559
and um you know the other crew member

938
00:32:01,190 --> 00:31:58,559

can come and assist and help to tie down

939
00:32:03,029 --> 00:32:01,200
the pump module or if for example let's

940
00:32:05,430 --> 00:32:03,039
say that the unaffected crew member is

941
00:32:06,310 --> 00:32:05,440
on the arm then the other person you

942
00:32:07,990 --> 00:32:06,320
know

943
00:32:09,590 --> 00:32:08,000
on the trust if he needs assistance then

944
00:32:11,669 --> 00:32:09,600
we would tie down tie all that down but

945
00:32:14,389 --> 00:32:11,679
we did a very specific analysis for this

946
00:32:16,310 --> 00:32:14,399
particular eva and we also looked very

947
00:32:18,710 --> 00:32:16,320
carefully at the arm trajectories to

948
00:32:20,230 --> 00:32:18,720
make sure that we had good trajectories

949
00:32:21,750 --> 00:32:20,240
that would allow us to get back to the

950
00:32:23,509 --> 00:32:21,760
airlock as soon as possible should we

951
00:32:26,149 --> 00:32:23,519
need to and we even did a neutral

952
00:32:27,750 --> 00:32:26,159
buoyancy laboratory um you know we did

953
00:32:29,190 --> 00:32:27,760
some neutral buoyancy laboratory work to

954
00:32:31,110 --> 00:32:29,200
make sure that we could be as efficient

955
00:32:33,190 --> 00:32:31,120
as possible in terms of our tie-down

956
00:32:34,549 --> 00:32:33,200
should we have this eventuality but

957
00:32:36,310 --> 00:32:34,559
that's all just part of saying you know

958
00:32:37,590 --> 00:32:36,320
hey we've looked at this from a safety

959
00:32:39,669 --> 00:32:37,600
perspective

960
00:32:40,830 --> 00:32:39,679
and we have all the mitigations in place

961
00:32:44,870 --> 00:32:40,840
for

962
00:32:46,710 --> 00:32:44,880
that okay gina i have two questions um

963
00:32:48,310 --> 00:32:46,720

mike what have you learned about this

964
00:32:50,149 --> 00:32:48,320
you've got a phrase about this just

965
00:32:51,830 --> 00:32:50,159
another day of learning how to operate a

966
00:32:54,230 --> 00:32:51,840
space station what have you learned from

967
00:32:55,909 --> 00:32:54,240
this event

968
00:32:58,230 --> 00:32:55,919
okay so you talk about the suit or the

969
00:32:59,909 --> 00:32:58,240
ball the pump

970
00:33:03,430 --> 00:32:59,919
uh well

971
00:33:05,190 --> 00:33:03,440
uh you know from uh this is this is part

972
00:33:07,269 --> 00:33:05,200
of um

973
00:33:08,950 --> 00:33:07,279
how things happen in space and what can

974
00:33:11,350 --> 00:33:08,960
possibly uh

975
00:33:12,789 --> 00:33:11,360
fail in in which way and so

976
00:33:15,190 --> 00:33:12,799
what we have learned we've been

977
00:33:17,590 --> 00:33:15,200
operating for 15 years on iss right and

978
00:33:21,269 --> 00:33:19,509
when we first started space station the

979
00:33:23,750 --> 00:33:21,279
philosophy was you had a failure you

980
00:33:25,750 --> 00:33:23,760
changed out an oru and you you sent it

981
00:33:27,430 --> 00:33:25,760
home and you forgot about it right you

982
00:33:28,950 --> 00:33:27,440
let the team operate the way you need to

983
00:33:31,669 --> 00:33:28,960
on orbit

984
00:33:33,190 --> 00:33:31,679
logistics is not a consistent system

985
00:33:35,669 --> 00:33:33,200
that's always there for you and crew

986
00:33:36,950 --> 00:33:35,679
time is very constrained

987
00:33:39,269 --> 00:33:36,960
and so

988
00:33:40,470 --> 00:33:39,279

over the years we've changed our mindset

989
00:33:42,389 --> 00:33:40,480
when you have a failure you try to

990
00:33:43,669 --> 00:33:42,399
understand the failure and instead of

991
00:33:45,269 --> 00:33:43,679
the first thing you do is try to just

992
00:33:47,029 --> 00:33:45,279
change it out because it takes crew time

993
00:33:48,789 --> 00:33:47,039
and it's waste to spare you say can i

994
00:33:50,310 --> 00:33:48,799
figure out how to work around it so this

995
00:33:52,789 --> 00:33:50,320
is we've learned a lot with this

996
00:33:54,630 --> 00:33:52,799
particular system we never imagined that

997
00:33:56,389 --> 00:33:54,640
we could figure out how to how to

998
00:33:57,830 --> 00:33:56,399
control a loop without a flow control

999
00:33:59,750 --> 00:33:57,840
valve if you look at the data the thing

1000
00:34:01,830 --> 00:33:59,760
is moving all the time

1001
00:34:03,990 --> 00:34:01,840
the isolation valve was made to be

1002
00:34:05,830 --> 00:34:04,000
opened and closed

1003
00:34:08,230 --> 00:34:05,840
very seldom

1004
00:34:09,669 --> 00:34:08,240
and so you the design wasn't such that

1005
00:34:10,869 --> 00:34:09,679
you'd sit here and move it in little

1006
00:34:13,349 --> 00:34:10,879
increments

1007
00:34:15,430 --> 00:34:13,359
to try to find the sweet spot and so

1008
00:34:17,430 --> 00:34:15,440
um in this particular case i tell you i

1009
00:34:19,270 --> 00:34:17,440
think we've learned a lot about

1010
00:34:21,430 --> 00:34:19,280
how to manage a system we hadn't ever

1011
00:34:23,669 --> 00:34:21,440
intended to manage this way

1012
00:34:26,149 --> 00:34:23,679
if i'd had a lot more days before the

1013
00:34:27,510 --> 00:34:26,159

orbital guys flew i'm starting to get

1014
00:34:28,550 --> 00:34:27,520
the sense we probably could figure out

1015
00:34:29,829 --> 00:34:28,560
how to operate this thing for an

1016
00:34:30,710 --> 00:34:29,839
extended period of time that's why i

1017
00:34:35,190 --> 00:34:30,720
can't

1018
00:34:35,909 --> 00:34:35,200
but i'm kind of getting that that sense

1019
00:34:38,629 --> 00:34:35,919
so

1020
00:34:40,310 --> 00:34:38,639
um this is one of just many failures we

1021
00:34:42,310 --> 00:34:40,320
have a lot of different

1022
00:34:43,430 --> 00:34:42,320
types of little failures and we

1023
00:34:46,069 --> 00:34:43,440
we learn

1024
00:34:47,589 --> 00:34:46,079
what our options are and um and we

1025
00:34:49,430 --> 00:34:47,599
wouldn't have imagined this as being an

1026
00:34:50,869 --> 00:34:49,440
option when we when we've talked about

1027
00:34:52,550 --> 00:34:50,879
flow control valve barriers we'd just

1028
00:34:54,069 --> 00:34:52,560
assume that eventually you've got to

1029
00:34:56,149 --> 00:34:54,079
change it out just like a punk failure

1030
00:34:57,349 --> 00:34:56,159
but then it happens and you go wow

1031
00:34:59,190 --> 00:34:57,359
changing a pump out tomorrow is going to

1032
00:35:01,109 --> 00:34:59,200
be really hard in this case we had the

1033
00:35:02,790 --> 00:35:01,119
suit anomaly we still haven't completely

1034
00:35:04,390 --> 00:35:02,800
sorted out in our heads so we would just

1035
00:35:06,069 --> 00:35:04,400
assume not rush off to change it up we

1036
00:35:07,430 --> 00:35:06,079
could help it

1037
00:35:09,349 --> 00:35:07,440
and so it kind of

1038
00:35:11,349 --> 00:35:09,359

kind of gave us the impetus to look even

1039
00:35:12,950 --> 00:35:11,359
further so

1040
00:35:15,030 --> 00:35:12,960
you know it's just another another

1041
00:35:17,990 --> 00:35:15,040
opportunity for us to figure out how to

1042
00:35:18,790 --> 00:35:18,000
how to operate this vehicle and and

1043
00:35:21,109 --> 00:35:18,800
not

1044
00:35:23,670 --> 00:35:21,119
the way it was originally intended

1045
00:35:25,910 --> 00:35:23,680
uh but certainly in a safe manner

1046
00:35:29,270 --> 00:35:25,920
perhaps preserve spares and in the

1047
00:35:33,349 --> 00:35:30,950
allison i look at the parts you've got

1048
00:35:34,950 --> 00:35:33,359
there those parts you had on the space

1049
00:35:37,750 --> 00:35:34,960
station or were you what were the

1050
00:35:39,030 --> 00:35:37,760
constraints for you and your team trying

1051
00:35:41,109 --> 00:35:39,040
to figure out how to come up with those

1052
00:35:43,190 --> 00:35:41,119
workarounds and those solutions right so

1053
00:35:45,430 --> 00:35:43,200
that so the snorkel as i mentioned this

1054
00:35:46,790 --> 00:35:45,440
is actually a

1055
00:35:48,470 --> 00:35:46,800
part that we can change out on the

1056
00:35:50,310 --> 00:35:48,480
spacesuit it's part of a waterline vent

1057
00:35:52,630 --> 00:35:50,320
tube assembly which is actually what

1058
00:35:54,870 --> 00:35:52,640
runs from the backpack of the suit and

1059
00:35:55,990 --> 00:35:54,880
it's what hooks up to the liquid cooling

1060
00:35:57,589 --> 00:35:56,000
and ventilation garment that the crew

1061
00:35:59,750 --> 00:35:57,599
members wear so normally these tubes

1062
00:36:01,510 --> 00:35:59,760
will be passing water that's providing

1063
00:36:03,589 --> 00:36:01,520

cooling around the crew member's body so

1064
00:36:06,069 --> 00:36:03,599
some smart engineers on the ground were

1065
00:36:07,829 --> 00:36:06,079
able to uh figure out hey this looks

1066
00:36:09,750 --> 00:36:07,839
it's a similar diameter to a snorkel

1067
00:36:11,670 --> 00:36:09,760
that you have for scuba diving so what

1068
00:36:14,069 --> 00:36:11,680
if we're able to each waterline vent

1069
00:36:15,829 --> 00:36:14,079
tube assembly has two of these tubes so

1070
00:36:17,589 --> 00:36:15,839
by just sacrificing one of our our

1071
00:36:19,270 --> 00:36:17,599
spares on board they were able to come

1072
00:36:21,190 --> 00:36:19,280
up with a way to

1073
00:36:22,390 --> 00:36:21,200
just snip off the ends and then file it

1074
00:36:24,470 --> 00:36:22,400
so that it's not rough in the crew

1075
00:36:25,990 --> 00:36:24,480
member's mouth and then apply velcro we

1076
00:36:27,829 --> 00:36:26,000
already have velcro inside the suit

1077
00:36:29,109 --> 00:36:27,839
which is what holds the drink bag up to

1078
00:36:31,190 --> 00:36:29,119
the front part of the suit so they were

1079
00:36:33,349 --> 00:36:31,200
able to come up with this ingenious idea

1080
00:36:35,670 --> 00:36:33,359
to to hold it in place as far as the

1081
00:36:38,150 --> 00:36:35,680
helmet absorption pad goes we looked at

1082
00:36:40,870 --> 00:36:38,160
ways of modifying a potentially onboard

1083
00:36:42,550 --> 00:36:40,880
modifying the maximum absorbency garment

1084
00:36:44,230 --> 00:36:42,560
that the crew members wear but that

1085
00:36:46,310 --> 00:36:44,240
created quite a bit of fod it was kind

1086
00:36:47,750 --> 00:36:46,320
of a mess to cut this apart

1087
00:36:49,829 --> 00:36:47,760
so we were fortunate enough to be able

1088
00:36:51,349 --> 00:36:49,839

to to quickly turn these around and

1089
00:36:53,030 --> 00:36:51,359
fabricate units that we were able to

1090
00:36:54,470 --> 00:36:53,040
launch as i mentioned on the orbital

1091
00:36:55,829 --> 00:36:54,480
demo mission as well as on the soyuz

1092
00:36:58,550 --> 00:36:55,839
mission so thankfully we already had

1093
00:36:59,990 --> 00:36:58,560
these on board but but both of these you

1094
00:37:03,589 --> 00:37:00,000
know the invention of these came out of

1095
00:37:04,870 --> 00:37:03,599
the issues that we had on eva23

1096
00:37:05,910 --> 00:37:04,880
all right robert

1097
00:37:09,510 --> 00:37:05,920
hi robert perelman with

1098
00:37:11,990 --> 00:37:09,520
collectivebase.com um or allison uh with

1099
00:37:14,550 --> 00:37:12,000
regards to the number of ebas

1100
00:37:16,310 --> 00:37:14,560
where do you see the potential hold ups

1101
00:37:18,069 --> 00:37:16,320
or where do you see the potential

1102
00:37:19,270 --> 00:37:18,079
ability to get ahead so that you might

1103
00:37:22,390 --> 00:37:19,280
have just

1104
00:37:25,750 --> 00:37:22,400
you might just need two epa's

1105
00:37:27,829 --> 00:37:25,760
all right so so the way let me let me uh

1106
00:37:29,829 --> 00:37:27,839
ruffle through my papers here

1107
00:37:31,910 --> 00:37:29,839
so the way the timelines are laid out uh

1108
00:37:33,829 --> 00:37:31,920
to currently show us in three evas is

1109
00:37:35,589 --> 00:37:33,839
based on the difficulties that we had

1110
00:37:37,030 --> 00:37:35,599
with the fluid quick disconnects during

1111
00:37:38,790 --> 00:37:37,040
the previous time that we changed out

1112
00:37:40,630 --> 00:37:38,800
this pump so we have become a lot

1113
00:37:42,710 --> 00:37:40,640

smarter on how to operate these cuties

1114
00:37:44,710 --> 00:37:42,720
especially in off nominal situations so

1115
00:37:46,550 --> 00:37:44,720
in the event you know fingers crossed

1116
00:37:48,310 --> 00:37:46,560
these cuties go very smoothly and we're

1117
00:37:49,829 --> 00:37:48,320
able with no issue to close and demate

1118
00:37:52,069 --> 00:37:49,839
these qd's and we have enough

1119
00:37:54,630 --> 00:37:52,079
consumables at the end of our eva it

1120
00:37:56,230 --> 00:37:54,640
allows us to pull the removal of the

1121
00:37:59,030 --> 00:37:56,240
failed pump module and the temp still on

1122
00:38:00,870 --> 00:37:59,040
the poa up to the first dva so then that

1123
00:38:03,829 --> 00:38:00,880
puts us in great posture to on the

1124
00:38:06,150 --> 00:38:03,839
second eva be able to just go fly over

1125
00:38:07,990 --> 00:38:06,160
grab the spare from esp3 install it in

1126
00:38:09,910 --> 00:38:08,000
the truss hook up the fluid lines

1127
00:38:12,550 --> 00:38:09,920
integrate that into the system and then

1128
00:38:14,390 --> 00:38:12,560
button up the work site within two evas

1129
00:38:17,030 --> 00:38:14,400
that den then does leave the failed pump

1130
00:38:19,430 --> 00:38:17,040
module on the poa on the temporary stow

1131
00:38:21,109 --> 00:38:19,440
location until a future eva but keep in

1132
00:38:23,430 --> 00:38:21,119
mind that we did have uh during the

1133
00:38:25,190 --> 00:38:23,440
previous evas on in 2010 we did leave

1134
00:38:26,630 --> 00:38:25,200
the failed pump module on the poa for i

1135
00:38:28,550 --> 00:38:26,640
think it was about six months before we

1136
00:38:30,470 --> 00:38:28,560
relocated it so we still have plenty of

1137
00:38:32,150 --> 00:38:30,480
time to keep that as a viable spare if

1138
00:38:35,030 --> 00:38:32,160

it were to remain on the poa instead of

1139
00:38:36,550 --> 00:38:35,040
being relocated to the carrier on esp3

1140
00:38:40,230 --> 00:38:36,560
so those are the potential ways to get

1141
00:38:43,190 --> 00:38:41,430
from mike

1142
00:38:45,270 --> 00:38:43,200
you mentioned that this pump is going to

1143
00:38:47,349 --> 00:38:45,280
be potentially repaired but if that

1144
00:38:49,190 --> 00:38:47,359
wasn't the case or you couldn't do that

1145
00:38:51,270 --> 00:38:49,200
do you still have the ability to launch

1146
00:38:53,349 --> 00:38:51,280
a new pump module do you have bundles on

1147
00:38:54,950 --> 00:38:53,359
the ground leading you know the one that

1148
00:38:56,550 --> 00:38:54,960
failed actually we're repairing and

1149
00:38:58,710 --> 00:38:56,560
we're and we're going to have to do

1150
00:39:00,790 --> 00:38:58,720
another build of pumps just to

1151
00:39:02,470 --> 00:39:00,800
just for the life of iss in general over

1152
00:39:05,109 --> 00:39:02,480
time you eventually have to build a new

1153
00:39:07,430 --> 00:39:05,119
set of pumps but uh yeah the the cargo

1154
00:39:09,910 --> 00:39:07,440
capabilities we have today can carry

1155
00:39:11,190 --> 00:39:09,920
every oru we have in the fleet we can

1156
00:39:13,670 --> 00:39:11,200
take to orbit

1157
00:39:16,470 --> 00:39:13,680
there are a couple of spares we hadn't

1158
00:39:18,950 --> 00:39:16,480
had not intended to build or didn't

1159
00:39:20,069 --> 00:39:18,960
think we would need one was the solar

1160
00:39:22,470 --> 00:39:20,079
array

1161
00:39:24,790 --> 00:39:22,480
and the other is the big

1162
00:39:26,950 --> 00:39:24,800
the big radiators

1163
00:39:28,790 --> 00:39:26,960

if we if we had to spare either those

1164
00:39:30,710 --> 00:39:28,800
two we'd have to figure out another

1165
00:39:32,230 --> 00:39:30,720
another path than th than the existing

1166
00:39:34,550 --> 00:39:32,240
systems we use today

1167
00:39:36,230 --> 00:39:34,560
but other than that all the orus we we

1168
00:39:38,950 --> 00:39:36,240
have and expect to change out on orbit

1169
00:39:40,630 --> 00:39:38,960
we can carry to orbit

1170
00:39:41,990 --> 00:39:40,640
okay let's go to the phone lines let's

1171
00:39:46,230 --> 00:39:42,000
start with elizabeth howell with

1172
00:39:49,990 --> 00:39:47,750
hello can you provide some more

1173
00:39:54,470 --> 00:39:50,000
specifics on which systems have been

1174
00:39:57,990 --> 00:39:56,069
did you catch that which systems have

1175
00:39:58,870 --> 00:39:58,000
been affected by the this pump issue

1176
00:39:59,990 --> 00:39:58,880
yeah

1177
00:40:02,069 --> 00:40:00,000
uh

1178
00:40:04,069 --> 00:40:02,079
well i'll just say um

1179
00:40:05,510 --> 00:40:04,079
you know one of our um

1180
00:40:09,750 --> 00:40:05,520
the the main issue is that we can't

1181
00:40:12,069 --> 00:40:09,760
really uh integrate the node two um

1182
00:40:14,470 --> 00:40:12,079
heat exchanger and it affects the

1183
00:40:16,870 --> 00:40:14,480
systems in node two columbus and the gym

1184
00:40:19,990 --> 00:40:16,880
right now and that's where we do a lot

1185
00:40:21,829 --> 00:40:20,000
of our science is in those modules so

1186
00:40:23,750 --> 00:40:21,839
it's really affecting our ability to do

1187
00:40:25,349 --> 00:40:23,760
science and then

1188
00:40:27,349 --> 00:40:25,359

additionally um

1189
00:40:29,589 --> 00:40:27,359
there are other systems are dependent

1190
00:40:32,069 --> 00:40:29,599
solely on loop bravo so that opens us up

1191
00:40:33,990 --> 00:40:32,079
to kind of a window of failures that

1192
00:40:35,349 --> 00:40:34,000
would not be um that would not be good

1193
00:40:37,589 --> 00:40:35,359
basically we were in a loss of

1194
00:40:39,349 --> 00:40:37,599
redundancy situation for the others in

1195
00:40:40,710 --> 00:40:39,359
terms of the external systems like i

1196
00:40:43,190 --> 00:40:40,720
said we're in a better posture than in

1197
00:40:45,910 --> 00:40:43,200
2010 because we have a lot of boxes

1198
00:40:48,710 --> 00:40:45,920
externally that um are continuing to be

1199
00:40:50,150 --> 00:40:48,720
cooled so we're we're not in as bad a

1200
00:40:52,710 --> 00:40:50,160
situation in terms of our critical

1201
00:40:56,309 --> 00:40:52,720
systems being down right now so really

1202
00:40:59,670 --> 00:40:56,319
i'd say mostly our impacts are to um

1203
00:41:01,030 --> 00:40:59,680
to the uh payloads and uh the fact that

1204
00:41:02,390 --> 00:41:01,040
we might have had an issue flying

1205
00:41:04,390 --> 00:41:02,400
orbital which we would have had to

1206
00:41:06,069 --> 00:41:04,400
jumper around and that kind of thing

1207
00:41:08,150 --> 00:41:06,079
for the most part we're operating uh

1208
00:41:09,510 --> 00:41:08,160
nominally from a crew perspective minus

1209
00:41:11,829 --> 00:41:09,520
the payloads which is of course our

1210
00:41:15,750 --> 00:41:11,839
primary mission so that it is a big

1211
00:41:15,760 --> 00:41:21,589
okay let's go to miriamkramerspace.com

1212
00:41:25,589 --> 00:41:23,829
hi thanks for taking my question um yeah

1213
00:41:28,230 --> 00:41:25,599

i have a kind of a similar question to

1214
00:41:29,349 --> 00:41:28,240
elizabeth um i'm actually wondering if

1215
00:41:31,430 --> 00:41:29,359
any

1216
00:41:34,390 --> 00:41:31,440
potential science has been lost because

1217
00:41:35,430 --> 00:41:34,400
of this or if there's still time to

1218
00:41:37,750 --> 00:41:35,440
um

1219
00:41:39,829 --> 00:41:37,760
bounce back from it so to have any

1220
00:41:42,790 --> 00:41:39,839
experiments been lost and and will there

1221
00:41:45,190 --> 00:41:42,800
be potentially make up for it thanks

1222
00:41:47,910 --> 00:41:45,200
uh today no we haven't lost any research

1223
00:41:49,910 --> 00:41:47,920
we've had to manage what research we do

1224
00:41:53,190 --> 00:41:49,920
based on what dina was saying

1225
00:41:55,829 --> 00:41:53,200
we have had some periods of having the

1226
00:41:57,670 --> 00:41:55,839
the freeze the freezer we call the melfi

1227
00:41:59,510 --> 00:41:57,680
that keeps our existing samples cold

1228
00:42:01,190 --> 00:41:59,520
we've had to have it off

1229
00:42:02,390 --> 00:42:01,200
for extended periods of time which it's

1230
00:42:04,230 --> 00:42:02,400
built to do

1231
00:42:06,790 --> 00:42:04,240
it's built to go

1232
00:42:08,470 --> 00:42:06,800
about eight hours without the

1233
00:42:09,990 --> 00:42:08,480
without any power and still keep the

1234
00:42:12,230 --> 00:42:10,000
components at the temperature they need

1235
00:42:13,589 --> 00:42:12,240
to be kept at of course on the flip side

1236
00:42:15,109 --> 00:42:13,599
then when you turn it back on you've got

1237
00:42:17,109 --> 00:42:15,119
to run it for about twice as much time

1238
00:42:19,030 --> 00:42:17,119

to regain that capability to to get it

1239
00:42:20,870 --> 00:42:19,040
back up to temperature

1240
00:42:22,230 --> 00:42:20,880
so the team's been managing that because

1241
00:42:23,910 --> 00:42:22,240
that's one of the components we've had

1242
00:42:24,630 --> 00:42:23,920
to power on and off based on where we

1243
00:42:25,990 --> 00:42:24,640
were

1244
00:42:26,870 --> 00:42:26,000
and trying to manage the flow a little

1245
00:42:29,670 --> 00:42:26,880
bit

1246
00:42:32,150 --> 00:42:29,680
largely though at the melfi's been on

1247
00:42:33,910 --> 00:42:32,160
in the last little while and

1248
00:42:35,589 --> 00:42:33,920
the teams have done a good job of

1249
00:42:39,349 --> 00:42:35,599
protecting that research but we have not

1250
00:42:40,710 --> 00:42:39,359
lost any research as a result of this

1251
00:42:45,190 --> 00:42:40,720
all right peter with christian science

1252
00:42:48,950 --> 00:42:47,510
peter you there

1253
00:42:51,270 --> 00:42:48,960
okay let's go to jeff linfield with

1254
00:42:52,790 --> 00:42:51,280
national public radio

1255
00:42:54,950 --> 00:42:52,800
hi there um

1256
00:42:56,550 --> 00:42:54,960
so i was wondering if you lost the other

1257
00:42:59,190 --> 00:42:56,560
cooling loop would you be forced to

1258
00:43:00,870 --> 00:42:59,200
abandon the station and also if there

1259
00:43:02,470 --> 00:43:00,880
was a leak how quickly could you get the

1260
00:43:06,069 --> 00:43:02,480
astronauts back inside a leak in the

1261
00:43:09,910 --> 00:43:07,349
go ahead

1262
00:43:11,109 --> 00:43:09,920
so um

1263
00:43:12,470 --> 00:43:11,119

the

1264
00:43:14,309 --> 00:43:12,480
what we have been trying to protect for

1265
00:43:15,829 --> 00:43:14,319
is next first fed next worst phase is

1266
00:43:17,990 --> 00:43:15,839
the loss of that pump i would tell you

1267
00:43:20,150 --> 00:43:18,000
that given uh how we can manage the pump

1268
00:43:22,390 --> 00:43:20,160
today that uh

1269
00:43:24,790 --> 00:43:22,400
we would uh we would be in pretty good

1270
00:43:26,870 --> 00:43:24,800
shape if we lost pump b today

1271
00:43:28,550 --> 00:43:26,880
uh if you're down already down a

1272
00:43:30,470 --> 00:43:28,560
complete cooling system and you lose the

1273
00:43:32,470 --> 00:43:30,480
other cooling system then we run into

1274
00:43:34,630 --> 00:43:32,480
quite a few challenges

1275
00:43:36,550 --> 00:43:34,640
we have to rely largely on the russian

1276
00:43:37,910 --> 00:43:36,560
segment and we'd be in a pretty big

1277
00:43:40,390 --> 00:43:37,920
hurry to try to

1278
00:43:42,550 --> 00:43:40,400
get outside and repair it and so that

1279
00:43:44,790 --> 00:43:42,560
would that would challenge us if we had

1280
00:43:48,309 --> 00:43:44,800
both loops down we've always known that

1281
00:43:50,230 --> 00:43:48,319
was a a big concern and so um we try not

1282
00:43:52,230 --> 00:43:50,240
to leave ourselves in that posture very

1283
00:43:53,910 --> 00:43:52,240
long it's part of the reasons why we've

1284
00:43:55,750 --> 00:43:53,920
been kind of balancing the risk of

1285
00:43:58,470 --> 00:43:55,760
trying to fly orbital

1286
00:44:00,390 --> 00:43:58,480
if we can limp along on the a side with

1287
00:44:02,950 --> 00:44:00,400
this way we're trying to manage it

1288
00:44:04,550 --> 00:44:02,960

and and success or at least the criteria

1289
00:44:07,430 --> 00:44:04,560
we're using to say we could limp along

1290
00:44:09,109 --> 00:44:07,440
was could you stand the the b side

1291
00:44:10,470 --> 00:44:09,119
failure with the way we can manage the a

1292
00:44:13,030 --> 00:44:10,480
side today

1293
00:44:14,630 --> 00:44:13,040
um and so that was that was the question

1294
00:44:16,230 --> 00:44:14,640
we were trying to answer

1295
00:44:17,990 --> 00:44:16,240
uh yesterday afternoon we weren't

1296
00:44:19,510 --> 00:44:18,000
certain that was necessarily the case

1297
00:44:20,710 --> 00:44:19,520
today i tell you i'm still not certain

1298
00:44:22,390 --> 00:44:20,720
that's necessarily the case but i feel

1299
00:44:23,829 --> 00:44:22,400
better about our chances

1300
00:44:26,309 --> 00:44:23,839
if we have a problem and again remember

1301
00:44:28,069 --> 00:44:26,319
pump a is not completely down

1302
00:44:29,910 --> 00:44:28,079
pump a in fact the pump itself is

1303
00:44:32,069 --> 00:44:29,920
running fine and we're cooling all the

1304
00:44:33,589 --> 00:44:32,079
external oru's the last time we had a

1305
00:44:34,870 --> 00:44:33,599
pump failure and dina talked about this

1306
00:44:37,349 --> 00:44:34,880
you lost all the cooling to your

1307
00:44:39,270 --> 00:44:37,359
external orus those are major

1308
00:44:41,990 --> 00:44:39,280
power systems and power distribution

1309
00:44:45,430 --> 00:44:42,000
systems outside that that lost cooling

1310
00:44:47,349 --> 00:44:45,440
and so that has a dramatic impact uh and

1311
00:44:49,510 --> 00:44:47,359
and those components remain active and

1312
00:44:51,990 --> 00:44:49,520
so therefore we are supplying

1313
00:44:53,829 --> 00:44:52,000

power to to many of the the systems that

1314
00:44:56,390 --> 00:44:53,839
we had to manage last time so this is

1315
00:44:57,589 --> 00:44:56,400
not a complete loss of the a side to

1316
00:44:59,030 --> 00:44:57,599
begin with

1317
00:45:01,349 --> 00:44:59,040
because of the way we're learning to

1318
00:45:02,790 --> 00:45:01,359
manage it we have more confidence today

1319
00:45:04,069 --> 00:45:02,800
than we did yesterday and i suspect

1320
00:45:05,109 --> 00:45:04,079
tomorrow and the next day we'll gain

1321
00:45:06,710 --> 00:45:05,119
more

1322
00:45:08,790 --> 00:45:06,720
so i would tell you today if we lost the

1323
00:45:10,230 --> 00:45:08,800
b-side we would we would manage it

1324
00:45:12,309 --> 00:45:10,240
almost like you listened to us manage

1325
00:45:13,589 --> 00:45:12,319
the a-side today we'd

1326
00:45:15,750 --> 00:45:13,599
we would if you lost the whole pump

1327
00:45:17,589 --> 00:45:15,760
again you lose half the cooling to half

1328
00:45:19,430 --> 00:45:17,599
your power systems and so that would

1329
00:45:21,510 --> 00:45:19,440
have a more dramatic impact than you see

1330
00:45:23,349 --> 00:45:21,520
here today but it's something we can

1331
00:45:24,870 --> 00:45:23,359
manage in general

1332
00:45:26,550 --> 00:45:24,880
uh it doesn't do us a whole lot of good

1333
00:45:28,230 --> 00:45:26,560
to evacuate space station if we lose the

1334
00:45:30,230 --> 00:45:28,240
two coolant systems it does us a lot

1335
00:45:33,270 --> 00:45:30,240
more good to stay there and fix them

1336
00:45:37,030 --> 00:45:33,280
so we can get on with things

1337
00:45:51,510 --> 00:45:37,040
okay marshall with space policy online

1338
00:45:54,710 --> 00:45:52,550

anyway i'm wondering if you should

1339
00:45:56,950 --> 00:45:54,720
characterize this spacewalk as an

1340
00:45:59,910 --> 00:45:56,960
emergency and that's why you came up

1341
00:46:01,750 --> 00:45:59,920
with the absorbent pad and the snorkel

1342
00:46:03,030 --> 00:46:01,760
or are you working on those things

1343
00:46:05,510 --> 00:46:03,040
already

1344
00:46:07,589 --> 00:46:05,520
and is it going to be part of your space

1345
00:46:09,430 --> 00:46:07,599
walking plans from

1346
00:46:10,790 --> 00:46:09,440
now forward to always have those other

1347
00:46:12,950 --> 00:46:10,800
spaces

1348
00:46:13,990 --> 00:46:12,960
let me let can i answer that one you

1349
00:46:16,710 --> 00:46:14,000
guys

1350
00:46:19,109 --> 00:46:16,720
um the way i would answer that is uh we

1351
00:46:20,950 --> 00:46:19,119
we had this uh failure where we uh

1352
00:46:23,270 --> 00:46:20,960
flooded the the suit

1353
00:46:25,750 --> 00:46:23,280
um before that eva we believed we

1354
00:46:27,349 --> 00:46:25,760
believed that uh we actually wouldn't

1355
00:46:28,550 --> 00:46:27,359
have that failure mode what we believe

1356
00:46:30,790 --> 00:46:28,560
would happen

1357
00:46:32,790 --> 00:46:30,800
was the uh as we started to pass that

1358
00:46:35,190 --> 00:46:32,800
much water past the little impeller and

1359
00:46:37,349 --> 00:46:35,200
the fan a little fan and the fan pump

1360
00:46:39,829 --> 00:46:37,359
set we believe that it would stall the

1361
00:46:42,230 --> 00:46:39,839
fan uh the pump the the suit would shut

1362
00:46:44,150 --> 00:46:42,240
down and that was then began your 30

1363
00:46:45,750 --> 00:46:44,160

minute timer that you had with the with

1364
00:46:47,750 --> 00:46:45,760
the secondary oxygen pack the flow

1365
00:46:49,670 --> 00:46:47,760
oxygen and we would come back in so the

1366
00:46:51,349 --> 00:46:49,680
timing was always try to protect 30

1367
00:46:54,150 --> 00:46:51,359
minutes get inside and we believe that

1368
00:46:56,230 --> 00:46:54,160
you wouldn't necessarily flood the suit

1369
00:46:57,670 --> 00:46:56,240
we believed you would flood the the

1370
00:46:59,589 --> 00:46:57,680
system and eventually it would shut down

1371
00:47:01,190 --> 00:46:59,599
before you passed a lot of water what we

1372
00:47:03,270 --> 00:47:01,200
learned was

1373
00:47:05,190 --> 00:47:03,280
we can pass quite a bit of water uh for

1374
00:47:07,430 --> 00:47:05,200
an extended period of time and the suit

1375
00:47:10,309 --> 00:47:07,440
would keep running and so

1376
00:47:12,069 --> 00:47:10,319
uh we have reviewed not just the hazards

1377
00:47:14,230 --> 00:47:12,079
associated with this anomaly but all the

1378
00:47:15,829 --> 00:47:14,240
hazards for the suit

1379
00:47:17,190 --> 00:47:15,839
with an eye towards this and anything

1380
00:47:19,589 --> 00:47:17,200
we've learned over the years because the

1381
00:47:21,670 --> 00:47:19,599
suits are 35 years old we review the

1382
00:47:23,750 --> 00:47:21,680
hazards every so often as a matter of

1383
00:47:25,270 --> 00:47:23,760
course but when you get a new data point

1384
00:47:27,349 --> 00:47:25,280
then you look at it with the with the

1385
00:47:29,270 --> 00:47:27,359
different lens and we've done that with

1386
00:47:31,190 --> 00:47:29,280
all of our hazards so i would tell you

1387
00:47:34,150 --> 00:47:31,200
based on what we've learned

1388
00:47:35,510 --> 00:47:34,160

uh i would expect that for for

1389
00:47:38,549 --> 00:47:35,520
as long as we have this particular

1390
00:47:40,309 --> 00:47:38,559
design suit we'll we'll keep the the hap

1391
00:47:43,829 --> 00:47:40,319
and this the snorkel available to the

1392
00:47:45,750 --> 00:47:43,839
crew as a as an alternate means of

1393
00:47:47,990 --> 00:47:45,760
providing us additional margin against

1394
00:47:49,349 --> 00:47:48,000
the failure case where you have to come

1395
00:47:53,030 --> 00:47:49,359
back inside

1396
00:47:55,430 --> 00:47:53,040
um we've also done a number of tests in

1397
00:47:57,430 --> 00:47:55,440
particular one of our concerns going in

1398
00:47:59,190 --> 00:47:57,440
uh with that with the failure case we

1399
00:48:01,510 --> 00:47:59,200
dealt with was whether or not we always

1400
00:48:04,309 --> 00:48:01,520
had this vent where you can you can open

1401
00:48:05,670 --> 00:48:04,319
up and let vent and let the the air flow

1402
00:48:08,470 --> 00:48:05,680
through this little vent on the side of

1403
00:48:09,990 --> 00:48:08,480
the helmet to keep the flow across the

1404
00:48:11,670 --> 00:48:10,000
the crew's

1405
00:48:12,950 --> 00:48:11,680
head so you don't get stagnant air in

1406
00:48:15,109 --> 00:48:12,960
the helmet and eventually have these

1407
00:48:17,030 --> 00:48:15,119
kind of failures and we were worried

1408
00:48:18,150 --> 00:48:17,040
about opening it and flowing water if

1409
00:48:19,510 --> 00:48:18,160
there's water and helmet flowing the

1410
00:48:20,950 --> 00:48:19,520
water out the good news is you get the

1411
00:48:22,150 --> 00:48:20,960
water out the bad news is if you freeze

1412
00:48:23,910 --> 00:48:22,160
it and you can't close it again you

1413
00:48:25,109 --> 00:48:23,920

could be in a worse posture so we've

1414
00:48:26,710 --> 00:48:25,119
done a lot of testing improved to

1415
00:48:28,390 --> 00:48:26,720
ourselves we can't freeze it open and

1416
00:48:30,069 --> 00:48:28,400
it'll pass water

1417
00:48:32,390 --> 00:48:30,079
so we've done another number of other

1418
00:48:33,829 --> 00:48:32,400
tests and all of this is

1419
00:48:35,349 --> 00:48:33,839
data that we're putting that we've put

1420
00:48:38,069 --> 00:48:35,359
back into our hazards and we looked at

1421
00:48:40,549 --> 00:48:38,079
our hazards and made sure that we have

1422
00:48:43,109 --> 00:48:40,559
all the controls we need to protect

1423
00:48:44,710 --> 00:48:43,119
the crews and

1424
00:48:46,790 --> 00:48:44,720
and we still are at the point we think

1425
00:48:50,069 --> 00:48:46,800
you can protect a 30-minute case where

1426
00:48:51,910 --> 00:48:50,079
you have to be in within 30 minutes and

1427
00:48:53,430 --> 00:48:51,920
even with these new scenarios but part

1428
00:48:55,829 --> 00:48:53,440
of what gives us a little margin in the

1429
00:48:56,870 --> 00:48:55,839
system is this hap and the snorkel which

1430
00:48:59,510 --> 00:48:56,880
are

1431
00:49:02,950 --> 00:48:59,520
relatively simple to do and and so i

1432
00:49:04,710 --> 00:49:02,960
would suspect uh for the future as we

1433
00:49:06,710 --> 00:49:04,720
use emu's i would imagine we'll continue

1434
00:49:08,390 --> 00:49:06,720
to put these components in there to give

1435
00:49:10,390 --> 00:49:08,400
us margin even

1436
00:49:13,589 --> 00:49:10,400
as we mod the suit and feel better about

1437
00:49:15,190 --> 00:49:13,599
that particular anomaly

1438
00:49:16,390 --> 00:49:15,200

okay thanks marcia just a friendly uh

1439
00:49:17,589 --> 00:49:16,400
reminder to everybody on the phone lines

1440
00:49:19,030 --> 00:49:17,599
keep your phones on mutant tell a call

1441
00:49:20,549 --> 00:49:19,040
on you that sort of helps everybody out

1442
00:49:23,750 --> 00:49:20,559
let's go to stephen clark

1443
00:49:27,990 --> 00:49:25,510
hi thanks um

1444
00:49:29,349 --> 00:49:28,000
just a question on uh the delay of the

1445
00:49:30,549 --> 00:49:29,359
orbital flight

1446
00:49:33,270 --> 00:49:30,559
can you talk a little bit about the

1447
00:49:34,549 --> 00:49:33,280
impact of that to some of the payloads

1448
00:49:35,910 --> 00:49:34,559
inside the cygnus will you have to

1449
00:49:39,430 --> 00:49:35,920
replace any

1450
00:49:42,309 --> 00:49:39,440
experiment samples inside there and also

1451
00:49:46,069 --> 00:49:42,319
any expected downstream impacts to the

1452
00:49:48,710 --> 00:49:46,079
visiting vehicle manifest for 2014.

1453
00:49:51,190 --> 00:49:48,720
um i wouldn't expect a big impact to the

1454
00:49:53,030 --> 00:49:51,200
downstream manifest the orbital guys

1455
00:49:56,309 --> 00:49:53,040
might have a little slip in their next

1456
00:49:58,230 --> 00:49:56,319
flight but it wouldn't be significant

1457
00:50:00,950 --> 00:49:58,240
unless something else happens it would

1458
00:50:05,510 --> 00:50:00,960
be significant we do have some

1459
00:50:06,549 --> 00:50:05,520
late load items uh we have some

1460
00:50:08,630 --> 00:50:06,559
freezer

1461
00:50:11,430 --> 00:50:08,640
blocks that we use to keep things cold

1462
00:50:13,270 --> 00:50:11,440
so they don't stay frozen forever

1463
00:50:15,829 --> 00:50:13,280

so we'll we'll take those out and

1464
00:50:17,750 --> 00:50:15,839
re-freeze them and and then

1465
00:50:19,270 --> 00:50:17,760
store the items that are in those

1466
00:50:21,589 --> 00:50:19,280
containers until ready to go fly and

1467
00:50:23,109 --> 00:50:21,599
then we'll we'll pack them back up and

1468
00:50:25,349 --> 00:50:23,119
send them on their way also

1469
00:50:27,270 --> 00:50:25,359
interestingly enough we have ants on

1470
00:50:29,190 --> 00:50:27,280
board and

1471
00:50:31,109 --> 00:50:29,200
and while most of us try to kill ants

1472
00:50:35,109 --> 00:50:31,119
we're trying to keep these alive

1473
00:50:37,030 --> 00:50:35,119
and uh and so we will it's a ant habitat

1474
00:50:39,430 --> 00:50:37,040
it lasts for about 10 days so we'll roll

1475
00:50:42,710 --> 00:50:39,440
back and as i understand it we feed the

1476
00:50:43,990 --> 00:50:42,720
ants and we'll we'll take care of them

1477
00:50:45,510 --> 00:50:44,000
until we're ready to pack them up and

1478
00:50:47,270 --> 00:50:45,520
then the 10-day clock will start again

1479
00:50:49,349 --> 00:50:47,280
we'll late load and and

1480
00:50:51,109 --> 00:50:49,359
i think it's 12-day clock actually so

1481
00:50:53,750 --> 00:50:51,119
we'll go back into our normal flow so we

1482
00:50:55,829 --> 00:50:53,760
didn't lose any research we did have

1483
00:50:57,589 --> 00:50:55,839
we had confirmed with orbital at that

1484
00:50:58,870 --> 00:50:57,599
point that we could go all the way to

1485
00:51:00,230 --> 00:50:58,880
the end of the window and protect all

1486
00:51:01,750 --> 00:51:00,240
the research but now that we're not

1487
00:51:02,950 --> 00:51:01,760
launching we'll back up we can get back

1488
00:51:05,030 --> 00:51:02,960

to the items

1489
00:51:08,549 --> 00:51:05,040
uh and then we'll uh we'll keep them

1490
00:51:11,190 --> 00:51:08,559
conditioned until we're ready to fly

1491
00:51:13,349 --> 00:51:11,200
okay irene with reuters

1492
00:51:16,150 --> 00:51:13,359
thanks very much um i have

1493
00:51:17,270 --> 00:51:16,160
three quick questions the first is the

1494
00:51:22,710 --> 00:51:17,280
amf

1495
00:51:25,990 --> 00:51:24,470
you want me to elaborate

1496
00:51:27,829 --> 00:51:26,000
i'm sorry we can't hear you either

1497
00:51:30,790 --> 00:51:27,839
whoever is speaking russian is not on

1498
00:51:33,109 --> 00:51:30,800
mute and uh we can't hear your responses

1499
00:51:34,150 --> 00:51:33,119
yes ams is still operating at some point

1500
00:51:35,990 --> 00:51:34,160
we had

1501
00:51:37,589 --> 00:51:36,000
as we get to the high beta we have to

1502
00:51:38,950 --> 00:51:37,599
maneuver the uh

1503
00:51:43,030 --> 00:51:38,960
uh

1504
00:51:45,270 --> 00:51:43,040
radiators the one of the central system

1505
00:51:47,349 --> 00:51:45,280
radiators to give them a little bit of

1506
00:51:48,870 --> 00:51:47,359
protection from the sun that was going

1507
00:51:51,270 --> 00:51:48,880
to be a concern when we were trying to

1508
00:51:53,109 --> 00:51:51,280
manage this loop but assuming that we

1509
00:51:54,630 --> 00:51:53,119
get the the eva done then we'll be able

1510
00:51:56,309 --> 00:51:54,640
to protect them like we normally do but

1511
00:51:57,670 --> 00:51:56,319
they're operating today unless there's

1512
00:51:59,829 --> 00:51:57,680
been a failure in the last hour or two i

1513
00:52:02,150 --> 00:51:59,839

hadn't heard about it

1514
00:52:04,549 --> 00:52:02,160
the other question i think dina did you

1515
00:52:08,230 --> 00:52:04,559
say that mike was going to be wearing uh

1516
00:52:10,309 --> 00:52:08,240
luca's suit and uh for allison

1517
00:52:11,430 --> 00:52:10,319
uh when were those charcoals that are

1518
00:52:14,230 --> 00:52:11,440
going to be used when were those

1519
00:52:16,390 --> 00:52:14,240
fabricated please thanks

1520
00:52:18,549 --> 00:52:16,400
okay so um

1521
00:52:20,470 --> 00:52:18,559
yes mike hopkins will be wearing luca's

1522
00:52:23,349 --> 00:52:20,480
old soup but it will have a brand new

1523
00:52:24,710 --> 00:52:23,359
fresh fan pump separator um additionally

1524
00:52:26,069 --> 00:52:24,720
there are some other components that we

1525
00:52:28,309 --> 00:52:26,079
changed out on it

1526
00:52:30,710 --> 00:52:28,319
mostly just from a sizing perspective

1527
00:52:33,109 --> 00:52:30,720
and because we were low on oxygen on the

1528
00:52:35,750 --> 00:52:33,119
secondary oxygen pack so we did do some

1529
00:52:38,470 --> 00:52:35,760
other um change outs but notably would

1530
00:52:40,150 --> 00:52:38,480
be the fan pump separator and all the

1531
00:52:41,750 --> 00:52:40,160
water lines contained within that unit

1532
00:52:42,950 --> 00:52:41,760
so

1533
00:52:44,790 --> 00:52:42,960
you know we like i said we've done a

1534
00:52:46,549 --> 00:52:44,800
thorough return to service examination

1535
00:52:47,750 --> 00:52:46,559
of everything that happened on ebay 23

1536
00:52:49,430 --> 00:52:47,760
and then considering that we changed

1537
00:52:51,510 --> 00:52:49,440
something out on orbit

1538
00:52:53,750 --> 00:52:51,520

we feel confident that the suit is a

1539
00:52:54,549 --> 00:52:53,760
very clean suit and ready to go

1540
00:52:56,230 --> 00:52:54,559
and then

1541
00:52:58,390 --> 00:52:56,240
the other one was the snorkel right and

1542
00:53:00,390 --> 00:52:58,400
the crew fabricated the snorkels on

1543
00:53:04,950 --> 00:53:00,400
board on on sunday prior to their

1544
00:53:12,829 --> 00:53:06,470
i'm sorry i missed that they were

1545
00:53:16,150 --> 00:53:14,710
thanks you have another do you have

1546
00:53:17,990 --> 00:53:16,160
another question

1547
00:53:19,910 --> 00:53:18,000
um i i do actually have this wasn't part

1548
00:53:22,470 --> 00:53:19,920
of it but if there is a problem with the

1549
00:53:24,790 --> 00:53:22,480
suits is it is there another backup plan

1550
00:53:27,430 --> 00:53:24,800
is it possible for the astronauts to use

1551
00:53:30,630 --> 00:53:27,440
the the so-called um the russian suits

1552
00:53:31,829 --> 00:53:30,640
or what would be the options if there's

1553
00:53:34,150 --> 00:53:31,839
continuing

1554
00:53:35,990 --> 00:53:34,160
issues with the uh with the leaks and

1555
00:53:39,349 --> 00:53:36,000
the helmets

1556
00:53:44,390 --> 00:53:42,069
i'll say i would be surprised if we have

1557
00:53:46,630 --> 00:53:44,400
a problem with

1558
00:53:50,069 --> 00:53:46,640
with suits once we change out the

1559
00:53:52,710 --> 00:53:50,079
fan pump set what we are learning is is

1560
00:53:55,190 --> 00:53:52,720
is this problem is caused by

1561
00:53:57,510 --> 00:53:55,200
flowing

1562
00:53:58,790 --> 00:53:57,520
water that has a high silica content

1563
00:54:01,589 --> 00:53:58,800

through a

1564
00:54:03,270 --> 00:54:01,599
um centrifuge device which is the fan

1565
00:54:05,430 --> 00:54:03,280
pump step turns out to be and then you

1566
00:54:07,349 --> 00:54:05,440
create particulate

1567
00:54:10,630 --> 00:54:07,359
we think it occurs over

1568
00:54:12,790 --> 00:54:10,640
a number of exposures

1569
00:54:15,670 --> 00:54:12,800
we've looked at

1570
00:54:17,910 --> 00:54:15,680
our filters and the only saturated

1571
00:54:20,390 --> 00:54:17,920
filter we found

1572
00:54:22,630 --> 00:54:20,400
we brought home in august of 2012. we

1573
00:54:26,790 --> 00:54:22,640
had exposed both

1574
00:54:31,190 --> 00:54:26,800
30 11 and 3005 to this um

1575
00:54:32,549 --> 00:54:31,200
uh this overly saturated uh filter we

1576
00:54:34,630 --> 00:54:32,559
there's actually two filters in the

1577
00:54:36,470 --> 00:54:34,640
system we brought home the downstream

1578
00:54:38,150 --> 00:54:36,480
particulate filter and in there we had

1579
00:54:40,789 --> 00:54:38,160
discovered based on what was in there

1580
00:54:42,870 --> 00:54:40,799
that the ion filter in front of it was

1581
00:54:44,390 --> 00:54:42,880
saturated unfortunately we didn't know

1582
00:54:47,270 --> 00:54:44,400
that at the time and so we continued to

1583
00:54:49,190 --> 00:54:47,280
use the ion filter both 3005 and 3011

1584
00:54:51,589 --> 00:54:49,200
were exposed to this we believe is

1585
00:54:53,990 --> 00:54:51,599
highly likely this is this is where the

1586
00:54:55,589 --> 00:54:54,000
contamination came from how it got

1587
00:54:57,190 --> 00:54:55,599
introduced is something we're still

1588
00:54:59,990 --> 00:54:57,200

trying to sort out

1589
00:55:02,309 --> 00:55:00,000
but we we believe with clean filters

1590
00:55:03,670 --> 00:55:02,319
it will the ion filter will trap the

1591
00:55:05,430 --> 00:55:03,680
silicate

1592
00:55:07,670 --> 00:55:05,440
as was mentioned

1593
00:55:09,750 --> 00:55:07,680
by i think dina mentioned it we had

1594
00:55:11,910 --> 00:55:09,760
found that there's an excess in this one

1595
00:55:13,030 --> 00:55:11,920
case there's an excessive amount

1596
00:55:15,030 --> 00:55:13,040
of

1597
00:55:17,510 --> 00:55:15,040
fluor chlorides and

1598
00:55:19,349 --> 00:55:17,520
sulfates which is not really important

1599
00:55:21,030 --> 00:55:19,359
other than if you know that what happens

1600
00:55:22,470 --> 00:55:21,040
in an ion filter when those show up is

1601
00:55:24,549 --> 00:55:22,480
they have an affinity towards the ion

1602
00:55:26,069 --> 00:55:24,559
filter and so they kick the silicates

1603
00:55:27,430 --> 00:55:26,079
off and when the silicates get kicked

1604
00:55:28,549 --> 00:55:27,440
off they get kicked off in large

1605
00:55:30,549 --> 00:55:28,559
quantities

1606
00:55:32,789 --> 00:55:30,559
go into the flow stream and then

1607
00:55:35,829 --> 00:55:32,799
once they get to a centrifuge type

1608
00:55:38,630 --> 00:55:35,839
device they nucleate inside the pump and

1609
00:55:40,150 --> 00:55:38,640
then you start plugging up holes so

1610
00:55:41,910 --> 00:55:40,160
we first of all we believe that the

1611
00:55:43,510 --> 00:55:41,920
lines we're using today are clean we've

1612
00:55:46,150 --> 00:55:43,520
put in new filters

1613
00:55:48,549 --> 00:55:46,160

and we think the filter system works

1614
00:55:50,230 --> 00:55:48,559
3015 you know had the failure it's

1615
00:55:51,670 --> 00:55:50,240
possible it might have played a role in

1616
00:55:55,109 --> 00:55:51,680
this at some point

1617
00:55:56,230 --> 00:55:55,119
um 3011 now has been completely all of

1618
00:55:58,150 --> 00:55:56,240
the components inside have been

1619
00:55:59,670 --> 00:55:58,160
completely changed out

1620
00:56:01,109 --> 00:55:59,680
um and

1621
00:56:02,630 --> 00:56:01,119
most importantly it's been the fan pump

1622
00:56:05,670 --> 00:56:02,640
set

1623
00:56:07,670 --> 00:56:05,680
so 3010 really wasn't exposed to this

1624
00:56:10,069 --> 00:56:07,680
particular line after

1625
00:56:12,630 --> 00:56:10,079
after we know it was saturated now it it

1626
00:56:14,470 --> 00:56:12,640
was exposed once to this line

1627
00:56:17,030 --> 00:56:14,480
before we knew it was saturated but it

1628
00:56:18,950 --> 00:56:17,040
was early on and so we feel pretty good

1629
00:56:20,470 --> 00:56:18,960
about 30 10.

1630
00:56:22,470 --> 00:56:20,480
so i said all that to say as we go

1631
00:56:24,870 --> 00:56:22,480
outside and we flood a suit if it's 30

1632
00:56:27,030 --> 00:56:24,880
11 we'll all be shocked

1633
00:56:28,549 --> 00:56:27,040
but if we do flood a suit then then what

1634
00:56:33,030 --> 00:56:28,559
we'll do is we'll go back inside and

1635
00:56:34,789 --> 00:56:33,040
we'll look at the data if it's 30 10

1636
00:56:36,230 --> 00:56:34,799
then what we'll do is and we still plan

1637
00:56:38,230 --> 00:56:36,240
to do this we just got to get them on

1638
00:56:39,990 --> 00:56:38,240

orbit and one of them is on orb one it's

1639
00:56:41,030 --> 00:56:40,000
the reason why we were trying to fly orb

1640
00:56:44,470 --> 00:56:41,040
one first

1641
00:56:45,670 --> 00:56:44,480
uh is to fly a clean fan pump set so

1642
00:56:47,990 --> 00:56:45,680
we've got

1643
00:56:50,549 --> 00:56:48,000
what we believe to be be a clean one in

1644
00:56:53,510 --> 00:56:50,559
3011. we've got a one that we know is

1645
00:56:55,430 --> 00:56:53,520
clean it's on orb one and we'll fly

1646
00:56:57,349 --> 00:56:55,440
as we sort our way through this of this

1647
00:56:59,109 --> 00:56:57,359
anomaly we intend to fly

1648
00:57:00,549 --> 00:56:59,119
at least one more if not two more fan

1649
00:57:01,990 --> 00:57:00,559
pump steps to make sure we know the

1650
00:57:03,829 --> 00:57:02,000
condition of the pan pump steps in the

1651
00:57:05,910 --> 00:57:03,839
suit and when you do that then at least

1652
00:57:07,589 --> 00:57:05,920
for this particular failure note mode

1653
00:57:09,589 --> 00:57:07,599
even if we don't know root cause quite

1654
00:57:10,630 --> 00:57:09,599
yet we think we have a number of evas in

1655
00:57:12,230 --> 00:57:10,640
these suits

1656
00:57:13,670 --> 00:57:12,240
and i would tell you that given what the

1657
00:57:15,190 --> 00:57:13,680
team is learning on how to manage this

1658
00:57:16,950 --> 00:57:15,200
pump i think we've

1659
00:57:18,870 --> 00:57:16,960
we will probably be able to buy our time

1660
00:57:21,270 --> 00:57:18,880
sells time if we have a province ebay

1661
00:57:23,829 --> 00:57:21,280
we'll probably back out and then we'll

1662
00:57:26,390 --> 00:57:23,839
talk about what plan b is if we can get

1663
00:57:27,750 --> 00:57:26,400

a second fan pump step on orb one we

1664
00:57:29,670 --> 00:57:27,760
might try to do that and get it late

1665
00:57:31,910 --> 00:57:29,680
loaded and and then fly orb one and then

1666
00:57:34,390 --> 00:57:31,920
go back outside and do the ebas but if

1667
00:57:37,190 --> 00:57:34,400
we can if we can prevent having to do

1668
00:57:38,309 --> 00:57:37,200
that having to manage this loop in this

1669
00:57:40,069 --> 00:57:38,319
um

1670
00:57:42,150 --> 00:57:40,079
in this degraded state we'd prefer to do

1671
00:57:45,030 --> 00:57:42,160
that

1672
00:57:46,870 --> 00:57:45,040
thanks so much for my short questions

1673
00:57:51,109 --> 00:57:46,880
all right thanks irene uh let's go to

1674
00:57:53,990 --> 00:57:52,829
uh

1675
00:57:55,430 --> 00:57:54,000
hello this is

1676
00:57:58,069 --> 00:57:55,440
ivan from uh

1677
00:58:00,630 --> 00:57:58,079
task news agency of russia uh i wanted

1678
00:58:02,789 --> 00:58:00,640
to ask you how the recent

1679
00:58:04,549 --> 00:58:02,799
malfunction affected the russian segment

1680
00:58:06,630 --> 00:58:04,559
of the station by far

1681
00:58:10,230 --> 00:58:06,640
and if the first coming

1682
00:58:12,870 --> 00:58:10,240
eva will not be successful how exactly

1683
00:58:15,270 --> 00:58:12,880
will that affect russian figment and

1684
00:58:17,109 --> 00:58:15,280
russian cosmonauts

1685
00:58:18,710 --> 00:58:17,119
let's see on the russian segment we do

1686
00:58:20,789 --> 00:58:18,720
provide power

1687
00:58:22,950 --> 00:58:20,799
to the russian segment

1688
00:58:24,470 --> 00:58:22,960

but again this failure mode on this pump

1689
00:58:27,270 --> 00:58:24,480
we're actually

1690
00:58:29,190 --> 00:58:27,280
where we're reducing cooling is inside

1691
00:58:31,589 --> 00:58:29,200
the space station not outside the out

1692
00:58:34,549 --> 00:58:31,599
the exterior components

1693
00:58:36,630 --> 00:58:34,559
the mbsu's which provide

1694
00:58:37,670 --> 00:58:36,640
power distribution and also our source

1695
00:58:39,270 --> 00:58:37,680
of power

1696
00:58:40,950 --> 00:58:39,280
over to the russian segment are are

1697
00:58:42,630 --> 00:58:40,960
working and so today

1698
00:58:43,990 --> 00:58:42,640
we are managing the power and we're

1699
00:58:45,430 --> 00:58:44,000
trying to

1700
00:58:47,109 --> 00:58:45,440
minimize

1701
00:58:49,190 --> 00:58:47,119
all of our loads throughout the station

1702
00:58:50,789 --> 00:58:49,200
but we've we continue to provide the

1703
00:58:52,309 --> 00:58:50,799
power that the russian segment needs to

1704
00:58:54,069 --> 00:58:52,319
operate so

1705
00:58:54,789 --> 00:58:54,079
from that respect

1706
00:58:58,710 --> 00:58:54,799
i

1707
00:59:02,069 --> 00:58:58,720
segment

1708
00:59:04,309 --> 00:59:02,079
colleagues at all i will say that

1709
00:59:06,630 --> 00:59:04,319
there's a russian segment eda planned

1710
00:59:08,710 --> 00:59:06,640
for the 27th of december

1711
00:59:10,150 --> 00:59:08,720
uh our russian colleagues were kind

1712
00:59:11,750 --> 00:59:10,160
enough to move it to the right so we

1713
00:59:13,589 --> 00:59:11,760

could fly the orbital mission of course

1714
00:59:14,950 --> 00:59:13,599
then this anomaly occurred

1715
00:59:17,829 --> 00:59:14,960
uh it is our

1716
00:59:20,710 --> 00:59:17,839
our plan to try to get this all this

1717
00:59:23,270 --> 00:59:20,720
work done before the russian segment eva

1718
00:59:25,030 --> 00:59:23,280
um so we don't impact that particular

1719
00:59:26,230 --> 00:59:25,040
eba that's the only thing i know of

1720
00:59:27,670 --> 00:59:26,240
really that's

1721
00:59:29,589 --> 00:59:27,680
something we're having to to watch

1722
00:59:31,270 --> 00:59:29,599
closely

1723
00:59:34,390 --> 00:59:31,280
okay thank you let's go to james dean

1724
00:59:38,789 --> 00:59:36,710
all right thanks um so mr stephanie i

1725
00:59:40,789 --> 00:59:38,799
know you you think that

1726
00:59:42,309 --> 00:59:40,799
you'll be able to use this pump module

1727
00:59:43,589 --> 00:59:42,319
again down the road with with some

1728
00:59:44,870 --> 00:59:43,599
modification

1729
00:59:46,390 --> 00:59:44,880
uh so i just wondered if you could kind

1730
00:59:48,069 --> 00:59:46,400
of recap

1731
00:59:51,030 --> 00:59:48,079
where this event where you think it's

1732
00:59:53,030 --> 00:59:51,040
left to you um in terms of or in terms

1733
00:59:54,789 --> 00:59:53,040
of how long you expected things to last

1734
00:59:55,510 --> 00:59:54,799
and average failure rates and all that

1735
01:00:02,309 --> 00:59:55,520
as

1736
01:00:03,829 --> 01:00:02,319
thought you would be at this point uh do

1737
01:00:05,829 --> 01:00:03,839
you really think it's

1738
01:00:07,349 --> 01:00:05,839

no impact if if this

1739
01:00:09,430 --> 01:00:07,359
module can be

1740
01:00:10,950 --> 01:00:09,440
you know recovered later or kind of what

1741
01:00:12,950 --> 01:00:10,960
where does this uh

1742
01:00:14,870 --> 01:00:12,960
leave you as you as you map out you know

1743
01:00:16,470 --> 01:00:14,880
the years to come and the spares

1744
01:00:19,190 --> 01:00:16,480
available

1745
01:00:21,109 --> 01:00:19,200
uh james that's a great question and

1746
01:00:22,710 --> 01:00:21,119
so i'll try to answer it as succinctly

1747
01:00:25,670 --> 01:00:22,720
as i can

1748
01:00:27,990 --> 01:00:25,680
every year we reassess our logistics

1749
01:00:29,109 --> 01:00:28,000
plan we we look at all the failures that

1750
01:00:30,950 --> 01:00:29,119
occurred

1751
01:00:32,710 --> 01:00:30,960
uh we look at this

1752
01:00:34,549 --> 01:00:32,720
the statistics associated with those

1753
01:00:35,670 --> 01:00:34,559
failures and past failures and the

1754
01:00:37,829 --> 01:00:35,680
design

1755
01:00:40,789 --> 01:00:37,839
of the unit

1756
01:00:43,510 --> 01:00:40,799
and we try to forecast how many spares

1757
01:00:46,710 --> 01:00:43,520
we need uh at least

1758
01:00:47,829 --> 01:00:46,720
up through uh 2020.

1759
01:00:49,829 --> 01:00:47,839
and so

1760
01:00:52,870 --> 01:00:49,839
uh

1761
01:00:54,549 --> 01:00:52,880
when we do that analysis for the next

1762
01:00:56,230 --> 01:00:54,559
year which starts

1763
01:00:58,150 --> 01:00:56,240

i think the beginning of the year so i

1764
01:01:00,789 --> 01:00:58,160
think we begin that process about early

1765
01:01:03,670 --> 01:01:00,799
february when we do the next run we're

1766
01:01:06,309 --> 01:01:03,680
going to flow in this failure

1767
01:01:07,510 --> 01:01:06,319
and and we'll see what it spits out at

1768
01:01:09,270 --> 01:01:07,520
the other end

1769
01:01:15,349 --> 01:01:09,280
what is

1770
01:01:17,430 --> 01:01:15,359
uh that today we have enough spares in

1771
01:01:19,109 --> 01:01:17,440
what we plan to build to get us to 2020

1772
01:01:22,150 --> 01:01:19,119
at least to 2020

1773
01:01:25,190 --> 01:01:22,160
um and protecting this pump

1774
01:01:27,670 --> 01:01:25,200
uh means if we can if we can

1775
01:01:29,109 --> 01:01:27,680
find a way to fix this pumper or add

1776
01:01:31,510 --> 01:01:29,119
something to the front of this pump to

1777
01:01:33,030 --> 01:01:31,520
let us regain its capability then

1778
01:01:35,270 --> 01:01:33,040
essentially we still have all the spares

1779
01:01:37,190 --> 01:01:35,280
we thought we needed before this failure

1780
01:01:39,349 --> 01:01:37,200
occurred and you have to remember your

1781
01:01:41,430 --> 01:01:39,359
your analysis assumes failure so we have

1782
01:01:43,430 --> 01:01:41,440
to go back and look at this failure and

1783
01:01:45,270 --> 01:01:43,440
see on average whether it fits in in the

1784
01:01:46,789 --> 01:01:45,280
trade space and see if it affects how

1785
01:01:48,150 --> 01:01:46,799
many spares we think we need we haven't

1786
01:01:49,829 --> 01:01:48,160
done that yet

1787
01:01:51,510 --> 01:01:49,839
but we will

1788
01:01:53,109 --> 01:01:51,520

and it won't be just this thing we're

1789
01:01:55,029 --> 01:01:53,119
talking about you know we have a certain

1790
01:01:57,430 --> 01:01:55,039
amount of money we protect to to build

1791
01:01:59,430 --> 01:01:57,440
the spares we need and so some things

1792
01:02:01,109 --> 01:01:59,440
didn't fail that we thought were and so

1793
01:02:03,270 --> 01:02:01,119
that'll make our position better in

1794
01:02:04,870 --> 01:02:03,280
those components some things failed that

1795
01:02:06,549 --> 01:02:04,880
we didn't expect

1796
01:02:08,630 --> 01:02:06,559
and those make things a little worse and

1797
01:02:10,710 --> 01:02:08,640
some things did about what we expected

1798
01:02:12,069 --> 01:02:10,720
and so in the end we'll look to

1799
01:02:13,910 --> 01:02:12,079
you know kind of balance things out we

1800
01:02:15,510 --> 01:02:13,920
do that we do that every year and we

1801
01:02:17,510 --> 01:02:15,520
haven't run it in this particular case

1802
01:02:21,109 --> 01:02:17,520
it's a fairly complicated

1803
01:02:23,750 --> 01:02:21,119
uh analysis process we go through um

1804
01:02:26,710 --> 01:02:23,760
with these orus and it and it it learns

1805
01:02:28,470 --> 01:02:26,720
from each year that you operate um so it

1806
01:02:30,789 --> 01:02:28,480
takes us quite a bit of time to run the

1807
01:02:32,870 --> 01:02:30,799
system for for uh

1808
01:02:34,950 --> 01:02:32,880
run the analysis for all the systems but

1809
01:02:36,549 --> 01:02:34,960
that's future work i wouldn't expect a

1810
01:02:38,950 --> 01:02:36,559
dramatic change

1811
01:02:40,789 --> 01:02:38,960
um but it but it it may have some impact

1812
01:02:43,109 --> 01:02:40,799
on the number of spares we think we need

1813
01:02:45,029 --> 01:02:43,119

by 2020.

1814
01:02:45,910 --> 01:02:45,039
okay thanks james follow us here in the

1815
01:02:47,430 --> 01:02:45,920
room

1816
01:02:48,630 --> 01:02:47,440
okay we're going to wrap it up we want

1817
01:02:51,589 --> 01:02:48,640
to remind you that the spacewalks are

1818
01:02:53,270 --> 01:02:51,599
coming up on the 21st 23rd and 25th they

1819
01:02:56,069 --> 01:02:53,280
begin about the same time every day our

1820
01:02:59,029 --> 01:02:56,079
nasa tv coverage will begin at 5 15 a.m

1821
01:03:00,470 --> 01:02:59,039
central time 6 15 a.m eastern time all

1822
01:03:02,069 --> 01:03:00,480
three of those days in the actual

1823
01:03:04,390 --> 01:03:02,079
spacewalks will officially begin about

1824
01:03:06,069 --> 01:03:04,400
an hour or so after we come on the air

1825
01:03:08,630 --> 01:03:06,079
for all the latest just log on to

1826
01:03:10,390 --> 01:03:08,640
nasa.gov station as we get ready to kick