
NASA
EPISODE FOUR:
BEFORE THE ROCKET

1
00:00:00,367 --> 00:00:01,401
>> YOU KNOW, WE'RE EXCITED

2
00:00:01,401 --> 00:00:02,335
TO SEE WHAT KIND OF DATA

3
00:00:02,335 --> 00:00:03,503
THAT WE COLLECT FROM

4
00:00:03,503 --> 00:00:04,771
THIS FIRST PROJECT.

5
00:00:04,771 --> 00:00:05,772
ANY SORT OF DATA THAT WE GET

6
00:00:05,772 --> 00:00:06,673
IS GOING TO BE BRAND NEW

7
00:00:06,673 --> 00:00:07,741
INFORMATION FOR US.

8
00:00:07,741 --> 00:00:09,776
AND FOR--

9
00:00:09,776 --> 00:00:12,312
[LAUGHTER]

10
00:00:15,248 --> 00:00:26,693
[MUSIC]

11
00:00:26,693 --> 00:00:31,197
>> THREE, TWO, ONE, AND ZERO.

12
00:00:31,197 --> 00:00:32,332
AND LIFTOFF OF

13
00:00:32,332 --> 00:00:33,767

THE FALCON 9 ROCKET

14
00:00:33,767 --> 00:00:35,068
AND THE DRAGON SPACECRAFT,

15
00:00:35,068 --> 00:00:36,269
PACKED WITH SCIENCE AND SUPPLIES

16
00:00:36,269 --> 00:00:37,504
FOR THE INTERNATIONAL

17
00:00:37,504 --> 00:00:38,471
SPACE STATION.

18
00:00:38,471 --> 00:00:39,506
HUMANITY'S HOME IN

19
00:00:39,506 --> 00:00:41,207
LOW EARTH ORBIT.

20
00:00:41,207 --> 00:00:42,542
>> SO WE WERE ORIGINALLY

21
00:00:42,542 --> 00:00:44,878
SCHEDULED TO BE ON SPACE-X 14.

22
00:00:44,878 --> 00:00:46,880
BUT ABOUT A WEEK BEFORE LAUNCH,

23
00:00:46,880 --> 00:00:48,982
UM, OUR PROJECT GOT CANCELED

24
00:00:48,982 --> 00:00:49,883
FROM THAT LAUNCH

25
00:00:49,883 --> 00:00:50,784
BECAUSE OF SOME ISSUES WITH

26
00:00:50,784 --> 00:00:52,819
THE CONTROLLED ENVIRONMENT.

27
00:00:52,819 --> 00:00:53,887
>> SCIENCE AND SPACE

28
00:00:53,887 --> 00:00:55,054
CAN BE COMPLEX.

29
00:00:55,054 --> 00:00:56,456
AND NO MATTER HOW METICULOUSLY

30
00:00:56,456 --> 00:00:58,291
THINGS ARE PLANNED AND EXECUTED,

31
00:00:58,291 --> 00:00:59,626
SOMETIMES THOSE COMPLEXITIES

32
00:00:59,626 --> 00:01:00,527
GET IN THE WAY OF

33
00:01:00,527 --> 00:01:01,694
LAUNCHING ON TIME.

34
00:01:01,694 --> 00:01:02,762
WHEN EQUIPMENT USED TO

35
00:01:02,762 --> 00:01:03,830
HOUSE THE EXPERIMENT

36
00:01:03,830 --> 00:01:04,898
DIDN'T LOOK PERFECT FOR

37
00:01:04,898 --> 00:01:06,332
A FINAL PRE-FLIGHT TEST,

38
00:01:06,332 --> 00:01:07,767

THERE WAS NO CHOICE BUT TO

39
00:01:07,767 --> 00:01:09,102
PUSH IT TO A LATER FLIGHT,

40
00:01:09,102 --> 00:01:11,137
TO ENSURE MISSION SUCCESS.

41
00:01:11,137 --> 00:01:12,138
AS A FIRST-TIME INVESTIGATOR,

42
00:01:12,138 --> 00:01:14,174
THAT WAS, UM--

43
00:01:14,174 --> 00:01:15,942
IT WASN'T DEVASTATING.

44
00:01:15,942 --> 00:01:17,143
IT WAS JUST SAD THAT WE WEREN'T

45
00:01:17,143 --> 00:01:18,244
GONNA BE ABLE TO LAUNCH

46
00:01:18,244 --> 00:01:19,679
'CAUSE IT-- UP TO THAT POINT,

47
00:01:19,679 --> 00:01:20,713
IT HAD TAKEN US ABOUT

48
00:01:20,713 --> 00:01:22,015
TWO YEARS TO GET THERE.

49
00:01:22,015 --> 00:01:22,982
ULTIMATELY, IT GAVE US

50
00:01:22,982 --> 00:01:23,983
ABOUT SIX MONTHS MORE TIME

51
00:01:23,983 --> 00:01:25,218
TO REEVALUATE THAT

52
00:01:25,218 --> 00:01:26,319
CONTROLLED SYSTEM

53
00:01:26,319 --> 00:01:27,954
AND DO SOME MORE GROUNDWORK

54
00:01:27,954 --> 00:01:30,023
TO PREPARE FOR THE LAUNCH

55
00:01:30,023 --> 00:01:31,424
IN DECEMBER OF 2018

56
00:01:31,424 --> 00:01:33,493
ON SPACE-X 16.

57
00:01:33,493 --> 00:01:34,627
>> AFTER THE SETBACK OF BEING

58
00:01:34,627 --> 00:01:36,162
MOVED TO A LATER LAUNCH,

59
00:01:36,162 --> 00:01:37,797
OUR TEAM OF SCIENTISTS

60
00:01:37,797 --> 00:01:39,399
NOW HAS ONLY DAYS LEFT

61
00:01:39,399 --> 00:01:40,567
BEFORE THEIR EXPERIMENT

62
00:01:40,567 --> 00:01:41,668
WILL BE LOADED INTO

63
00:01:41,668 --> 00:01:43,236

A SPACE-X DRAGON CAPSULE

64
00:01:43,236 --> 00:01:44,370
THAT WILL CARRY IT TO THE

65
00:01:44,370 --> 00:01:46,005
INTERNATIONAL SPACE STATION.

66
00:01:46,005 --> 00:01:47,440
ELAINE AND PARASTOO,

67
00:01:47,440 --> 00:01:48,575
THE COFOUNDERS OF

68
00:01:48,575 --> 00:01:50,310
A BIOMEDICAL START-UP, ARE AT

69
00:01:50,310 --> 00:01:51,978
NASA'S KENNEDY SPACE CENTER,

70
00:01:51,978 --> 00:01:53,346
READYING THEIR RESEARCH

71
00:01:53,346 --> 00:01:54,948
FOR MICROGRAVITY.

72
00:01:54,948 --> 00:01:56,015
>> SINCE THIS IS

73
00:01:56,015 --> 00:01:56,983
OUR FIRST PROJECT THAT'S

74
00:01:56,983 --> 00:01:58,051
LAUNCHING TO STATION,

75
00:01:58,051 --> 00:01:59,052
THIS IS ALSO OUR FIRST TIME

76
00:01:59,052 --> 00:02:00,086
WORKING AT THE

77
00:02:00,086 --> 00:02:00,987
KENNEDY SPACE CENTER.

78
00:02:00,987 --> 00:02:02,055
SO IT'S BEEN AN EXCITING

79
00:02:02,055 --> 00:02:03,289
MOMENT TO, YOU KNOW,

80
00:02:03,289 --> 00:02:04,424
NOT JUST SEE THE VISITOR CENTER

81
00:02:04,424 --> 00:02:05,558
AND GO LOOK AT

82
00:02:05,558 --> 00:02:06,726
THE TOURISTY THINGS,

83
00:02:06,726 --> 00:02:08,628
BUT ALSO GET TO GET PAST

84
00:02:08,628 --> 00:02:10,163
THE SECURITY GATE AND INTO

85
00:02:10,163 --> 00:02:12,265
THE ACTUAL LABORATORIES.

86
00:02:12,265 --> 00:02:13,500
>> WHILE SOME EXPERIMENTS ARE

87
00:02:13,500 --> 00:02:14,868
LOADED INTO DRAGON IN THE WEEKS

88
00:02:14,868 --> 00:02:16,236

LEADING UP TO LAUNCH,

89
00:02:16,236 --> 00:02:17,504
OTHERS HAVE MORE

90
00:02:17,504 --> 00:02:19,105
TIME-SENSITIVE COMPONENTS.

91
00:02:19,105 --> 00:02:20,440
THESE REQUIRE PRECISE

92
00:02:20,440 --> 00:02:21,674
PREPARATION AND LOADING

93
00:02:21,674 --> 00:02:23,543
IN THE DAYS BEFORE LIFTOFF.

94
00:02:23,543 --> 00:02:25,144
FOR THOSE SCIENTISTS,

95
00:02:25,144 --> 00:02:26,379
LABORATORIES AT THE KENNEDY

96
00:02:26,379 --> 00:02:27,614
SPACE CENTER THAT ARE

97
00:02:27,614 --> 00:02:29,048
A PART OF THE SPACE STATION

98
00:02:29,048 --> 00:02:31,851
PROCESSING FACILITY, OR SSPF,

99
00:02:31,851 --> 00:02:33,820
BECOME A HOME AWAY FROM HOME.

100
00:02:33,820 --> 00:02:35,221
HERE, THEY CAN CARRY OUT

101
00:02:35,221 --> 00:02:36,689
THE CRITICAL LAST STEPS OF

102
00:02:36,689 --> 00:02:38,124
PREPARING THEIR EXPERIMENTS

103
00:02:38,124 --> 00:02:39,259
FOR DELIVERY TO

104
00:02:39,259 --> 00:02:40,393
THE SPACE STATION.

105
00:02:40,393 --> 00:02:42,095
>> SO WE GOT HERE ON A THURSDAY,

106
00:02:42,095 --> 00:02:44,130
AND IT'S CURRENTLY SUNDAY.

107
00:02:44,130 --> 00:02:45,198
PUT IN A BIG DAY YESTERDAY,

108
00:02:45,198 --> 00:02:46,332
FILLING UP THESE WELLS

109
00:02:46,332 --> 00:02:47,634
WITH GEL SOLUTION,

110
00:02:47,634 --> 00:02:49,135
AND GETTING READY FOR HAND-OVER

111
00:02:49,135 --> 00:02:51,571
AT 7:30 A.M. ON MONDAY,

112
00:02:51,571 --> 00:02:52,805
AHEAD OF LAUNCH

113
00:02:52,805 --> 00:02:54,941

ON TUESDAY AFTERNOON.

114
00:02:54,941 --> 00:02:55,942
>> ONCE YOU ARRIVE HERE,

115
00:02:55,942 --> 00:02:57,410
YOU KIND OF GET INTO

116
00:02:57,410 --> 00:02:58,511
THIS OTHER TIME.

117
00:02:58,511 --> 00:02:59,445
IT'S THIS WEIRD, LIKE,

118
00:02:59,445 --> 00:03:00,547
LITTLE TIME BUBBLE WHERE

119
00:03:00,547 --> 00:03:01,848
EVERYTHING IS NOW L-BASED,

120
00:03:01,848 --> 00:03:03,016
AND 'L' BEING LAUNCH.

121
00:03:03,016 --> 00:03:04,918
AND IT'S L MINUS 72.

122
00:03:04,918 --> 00:03:06,252
L MINUS 48.

123
00:03:06,252 --> 00:03:07,587
L MINUS 24.

124
00:03:07,587 --> 00:03:08,922
AND IT'S JUST BUILDING UP

125
00:03:08,922 --> 00:03:10,557
TO THE ACTUAL LAUNCH TIME.

126
00:03:10,557 --> 00:03:11,591
>> WITH THOSE PRECIOUS

127
00:03:11,591 --> 00:03:12,559
REMAINING HOURS,

128
00:03:12,559 --> 00:03:13,593
THE TEAM IS PREPPING THEIR

129
00:03:13,593 --> 00:03:15,795
MICROPLATES FOR MICROGRAVITY.

130
00:03:15,795 --> 00:03:17,163
MICROPLATES ARE ALSO

131
00:03:17,163 --> 00:03:18,565
USED IN LABS ON EARTH,

132
00:03:18,565 --> 00:03:19,799
BUT THESE WERE SPECIALLY

133
00:03:19,799 --> 00:03:21,968
DESIGNED TO BE SELF-CONTAINED.

134
00:03:21,968 --> 00:03:23,202
>> MY ROLE ON THE PROJECT

135
00:03:23,202 --> 00:03:24,237
WAS TO DESIGN THE ACTUAL

136
00:03:24,237 --> 00:03:25,738
MICROPLATE THEMSELVES.

137
00:03:25,738 --> 00:03:27,240
THE CHALLENGE ON ORBIT, THOUGH,

138
00:03:27,240 --> 00:03:29,309

IS THAT, UH, GENERALLY,

139
00:03:29,309 --> 00:03:30,476
FLUID EXPERIMENTS HAVE TO BE

140
00:03:30,476 --> 00:03:31,978
CONDUCTED IN THE GLOVEBOX,

141
00:03:31,978 --> 00:03:33,346
AND THE GLOVEBOX IS-IS

142
00:03:33,346 --> 00:03:34,714
VERY TIME-LIMITED.

143
00:03:34,714 --> 00:03:36,316
UH, IT'S VERY CREW INTENSIVE.

144
00:03:36,316 --> 00:03:37,483
SO WE'VE DESIGNED THIS

145
00:03:37,483 --> 00:03:38,918
SELF-CONTAINED MICROPLATE

146
00:03:38,918 --> 00:03:40,019
THAT, UH, CAN BE OPERATED

147
00:03:40,019 --> 00:03:41,254
OUTSIDE OF THE GLOVEBOX.

148
00:03:41,254 --> 00:03:42,388
IT HAS ALL OF THE CONTAINMENT

149
00:03:42,388 --> 00:03:44,157
TO KEEP THE FLUIDS INSIDE.

150
00:03:44,157 --> 00:03:46,526
>> SO WE HAVE LOADED THESE WELLS

151
00:03:46,526 --> 00:03:48,828
WITH [INDISTINCT].

152
00:03:48,828 --> 00:03:50,463
AND WE WANTED--

153
00:03:50,463 --> 00:03:51,898
WE WANT TO ACTUALLY LOOK AT

154
00:03:51,898 --> 00:03:53,933
THE EFFECT OF MICROGRAVITY

155
00:03:53,933 --> 00:03:55,969
AND HOW THE RELEASE OF THE DRUG

156
00:03:55,969 --> 00:03:57,937
IS AFFECTED WHEN WE SEND IT

157
00:03:57,937 --> 00:03:59,439
TO THE SPACE STATION.

158
00:03:59,439 --> 00:04:01,174
SO THE CONCERN THAT WE HAVE

159
00:04:01,174 --> 00:04:03,242
IS THAT IF WE HAVE BUBBLES

160
00:04:03,242 --> 00:04:04,978
THAT ARE IN THE WELLS,

161
00:04:04,978 --> 00:04:07,580
IT MAY BE DIFFICULT FOR

162
00:04:07,580 --> 00:04:09,015
THE PLATE READER TO BE ABLE TO

163
00:04:09,015 --> 00:04:11,351

READ THE AMOUNT CORRECTLY.

164
00:04:11,351 --> 00:04:12,652
SO WE ARE BEING VERY CAREFUL

165
00:04:12,652 --> 00:04:14,153
WITH HOW WE ARE

166
00:04:14,153 --> 00:04:16,322
LOADING THE WATERS.

167
00:04:16,322 --> 00:04:17,557
>> SO WHAT'S LEFT TO DO TODAY,

168
00:04:17,557 --> 00:04:18,992
ONCE PARASTOO HERE FINISHES

169
00:04:18,992 --> 00:04:20,493
FILLING THE MICROPLATES,

170
00:04:20,493 --> 00:04:21,961
I'M GONNA TAKE OVER

171
00:04:21,961 --> 00:04:23,696
AND SEAL THEM UP COMPLETELY.

172
00:04:23,696 --> 00:04:24,897
ONCE THAT'S DONE,

173
00:04:24,897 --> 00:04:26,299
WE'LL ADD ALL OF THE LABELS

174
00:04:26,299 --> 00:04:27,700
ON TO THE MICROPLATES

175
00:04:27,700 --> 00:04:29,369
AND PUT THEM IN

176
00:04:29,369 --> 00:04:32,372
A SELF-CONTAINED BOX THAT IS

177
00:04:32,372 --> 00:04:33,640
WHAT THEY'LL ACTUALLY TRAVEL

178
00:04:33,640 --> 00:04:37,877
TO THE SPACE STATION ON.

179
00:04:37,877 --> 00:04:39,012
>> THREE YEARS IN THE MAKING

180
00:04:39,012 --> 00:04:41,681
JUST TO GET IT RIGHT.

181
00:04:43,983 --> 00:04:44,784
ONCE WE DO THAT, WE'LL TURN IT

182
00:04:44,784 --> 00:04:45,852
OVER TO COLD STO.

183
00:04:45,852 --> 00:04:46,853
COLD STO WILL

184
00:04:46,853 --> 00:04:47,754
TAKE IT FROM THERE.

185
00:04:47,754 --> 00:04:48,821
AND, UH, THE NEXT TIME

186
00:04:48,821 --> 00:04:50,289
WE'LL SEE 'EM WILL BE ON ORBIT

187
00:04:50,289 --> 00:04:52,058
AND THE CREWS OPENING THEM UP.

188
00:04:52,058 --> 00:04:53,259

>> COLD STO,

189
00:04:53,259 --> 00:04:54,627
SHORT FOR COLD STOWAGE,

190
00:04:54,627 --> 00:04:55,995
IS THE TEAM RESPONSIBLE FOR

191
00:04:55,995 --> 00:04:57,363
MAKING SURE THAT THE RESEARCH

192
00:04:57,363 --> 00:04:59,032
STAYS AT THE RIGHT TEMPERATURE

193
00:04:59,032 --> 00:05:00,366
ON ITS JOURNEY FROM THE LAB

194
00:05:00,366 --> 00:05:02,702
ON EARTH TO THE LAB IN SPACE.

195
00:05:02,702 --> 00:05:04,037
THIS HAND-OFF IS ONE OF

196
00:05:04,037 --> 00:05:05,271
THE LAST STEPS BEFORE

197
00:05:05,271 --> 00:05:07,140
BEING LOADED ONTO THE ROCKET.

198
00:05:07,140 --> 00:05:08,574
THE COLD STOWAGE TEAM WILL TAKE

199
00:05:08,574 --> 00:05:10,276
ELAINE AND PARASTOO'S EXPERIMENT

200
00:05:10,276 --> 00:05:11,878
AND KEEP IT SAFE AND SOUND

201
00:05:11,878 --> 00:05:13,880
BEFORE IT'S LOADED FOR LAUNCH.

202
00:05:17,250 --> 00:05:18,451
>> WELL, IT'LL FEEL LIKE

203
00:05:18,451 --> 00:05:19,552
A RELIEF WHEN WE ACTUALLY

204
00:05:19,552 --> 00:05:21,988
SEE IT TAKE OFF.

205
00:05:21,988 --> 00:05:23,122
AND THEN IT WILL BE FINALLY--

206
00:05:23,122 --> 00:05:24,390
>> IT'S A HUGE STEP, THOUGH.

207
00:05:24,390 --> 00:05:25,491
>> YEAH.

208
00:05:25,491 --> 00:05:26,426
>> IT'S DONE.

209
00:05:26,426 --> 00:05:27,360
IT'S OUT OF OUR HANDS

210
00:05:27,360 --> 00:05:28,327
AT THIS POINT.

211
00:05:28,327 --> 00:05:29,195
>> YEAH.

212
00:05:29,195 --> 00:05:30,063
IT WILL BE OFFICIALLY

213
00:05:30,063 --> 00:05:31,130

OUT OF OUR HANDS WHEN

214
00:05:31,130 --> 00:05:32,398
IT LEAVES THE EARTH'S SURFACE.

215
00:05:32,398 --> 00:05:33,700
SO, THAT-THAT'LL BE

216
00:05:33,700 --> 00:05:36,135
THE MOMENT THAT...

217
00:05:36,135 --> 00:05:39,205
WE ARE FINALLY, FINALLY DONE.

218
00:05:39,205 --> 00:05:40,206
UNTIL WE GET DATA.

219
00:05:40,206 --> 00:05:41,140
AND THEN WE GET TO PROCESS IT.

220
00:05:41,140 --> 00:05:42,809
>> I KNOW.

221
00:05:42,809 --> 00:05:43,976
THAT'S JUST THE BEGINNING,

222
00:05:43,976 --> 00:05:46,079
ACTUALLY.

223
00:05:47,413 --> 00:05:48,881
>> SO, WHAT'LL HAPPEN NOW IS,

224
00:05:48,881 --> 00:05:49,682
NOW THAT WE'VE HANDED 'EM OVER

225
00:05:49,682 --> 00:05:51,184
TO NASA, NASA WILL DELIVER.

226
00:05:51,184 --> 00:05:52,218
THEY'RE ON THEIR WAY RIGHT NOW,

227
00:05:52,218 --> 00:05:53,286
OUT TO DRAGON, TO BE LOADED.

228
00:05:53,286 --> 00:05:54,987
AND THE LAUNCH HOPEFULLY

229
00:05:54,987 --> 00:05:58,057
WILL HAPPEN TOMORROW AT 13:38.

230
00:05:58,057 --> 00:05:59,092
I'VE BEEN INVOLVED

231
00:05:59,092 --> 00:05:59,992
SINCE THE VERY BEGINNING,

232
00:05:59,992 --> 00:06:00,993
WHICH WAS APPROXIMATELY

233
00:06:00,993 --> 00:06:02,028
ABOUT THREE YEARS AGO.

234
00:06:02,028 --> 00:06:03,930
IT'S BEEN A LONG ROAD.

235
00:06:03,930 --> 00:06:05,131
BUT, UH, LIKE EVERYTHING

236
00:06:05,131 --> 00:06:06,299
THAT'S A LOT OF WORK,

237
00:06:06,299 --> 00:06:07,333
IT'S WORTH IT.

238
00:06:07,333 --> 00:06:09,268

AND, UH, WE'RE EXCITED TO HELP

239
00:06:09,268 --> 00:06:10,636
[INDISTINCT] GET SOME DATA

240
00:06:10,636 --> 00:06:12,004
FOR THIS PROJECT.

241
00:06:12,004 --> 00:06:13,039
>> OVERALL, WE'RE GONNA

242
00:06:13,039 --> 00:06:14,173
GET A LOT OF DATA FROM

243
00:06:14,173 --> 00:06:15,608
JUST THIS ONE PROJECT,

244
00:06:15,608 --> 00:06:16,776
AND THOSE TWO EXPERIMENTS

245
00:06:16,776 --> 00:06:17,643
ARE GONNA FORM A LOT OF

246
00:06:17,643 --> 00:06:19,378
DIFFERENT THINGS FOR US.

247
00:06:19,378 --> 00:06:22,682
[LAUGHING]

248
00:06:24,617 --> 00:06:26,486
ALL RIGHT.

249
00:06:27,854 --> 00:06:28,988
>> IT'S A LITTLE WINDY

250
00:06:28,988 --> 00:06:29,856
OUT HERE TODAY.

251
00:06:29,856 --> 00:06:31,057
IT'S A BEAUTIFUL DAY.

252
00:06:31,057 --> 00:06:32,024
IT'S A LITTLE WINDY.

253
00:06:32,024 --> 00:06:32,825
IT'S GOT ME CONCERNED.

254
00:06:32,825 --> 00:06:34,026
MY-MY LAUNCH INTUITION

255
00:06:34,026 --> 00:06:35,428
IS TINGLING A BIT.

256
00:06:35,428 --> 00:06:36,462
IT'S ALWAYS AN AWESOME