



LOW-DENSITY
LDSD
SUPERSONIC DECELERATION

1
00:00:00,000 --> 00:00:07,710

>>> I'M KIM NEWTON FROM THE OFFICE OF COMMUNICATIONS AT NASA'S
HEAD QUARTERS I WOULD LIKE TO

2
00:00:07,710 --> 00:00:12,260

WELCOME EVERYBODY TO THE LOW
DENSITY SUPERSONIC DECELERATOR.

3
00:00:12,260 --> 00:00:18,489

LDSD.
I WOULD LIKE TO INTRODUCE OUR

4
00:00:18,489 --> 00:00:23,199

PANEL PARTICIPANTS.
TO MY LEFT, CAPTAIN BRUCE HAY.

5
00:00:23,199 --> 00:00:27,220

HE'S THE U.S. NAVY COMMANDING
OFFICER OF THE PACIFIC MISSILE

6
00:00:27,220 --> 00:00:30,119

RANGE FACILITY.
IN HAWAII.

7
00:00:30,119 --> 00:00:35,300

TO HIS LEFT.
STEVE JURCZYK, SPACE TECHNOLOGY

8
00:00:35,300 --> 00:00:42,330

MISSION DIRECTATE, NEXT TO HIM
IS IAN CLARK.

9
00:00:42,330 --> 00:00:52,780

HE'S THE PRINCIPAL INVESTIGATOR.
AND NEXT TO IAN IS DR. †MARK

10
00:00:52,780 --> 00:00:55,500

ADLER.
MARK IS THE PROGRAM MANAGER FOR

11
00:00:55,500 --> 00:00:58,390
THE LOW DENSITY SUPERSONIC
ACCELERATOR.

12
00:00:58,390 --> 00:01:02,610
ALSO AT NASA'S JET PROPULSION
LABORATORY IN PASADENA,

13
00:01:02,610 --> 00:01:05,539
CALIFORNIA.
HERE'S OPENING REMARKS FROM OUR

14
00:01:05,539 --> 00:01:08,890
PANEL MEMBERS THEN WE'LL TAKE
QUESTIONS FROM THE REPORTERS IN

15
00:01:08,890 --> 00:01:11,749
THE AUDIENCE.
NEXT WE'LL HAVE REPORTERS

16
00:01:11,749 --> 00:01:16,189
JOINING US ON THE TELEPHONE.
PLEASE ENTER STAR 1.

17
00:01:16,189 --> 00:01:25,060
WE'LL ALSO TAKE QUESTIONS FROM
OUR USTREAM FOLLOWERS.

18
00:01:25,060 --> 00:01:28,979
NOW I'LL TURN IT OVER TO CAP
CAPTAIN HAYS.

19
00:01:28,979 --> 00:01:36,109
>> GOOD MORNING.
WE'RE THRILLED TO BE SUPPORTING

20
00:01:36,109 --> 00:01:44,389
NASA AGAIN FOR THE LOW DENSITY
SUPERSONIC DECELERATOR.

21
00:01:44,389 --> 00:01:47,369
WE'RE LOOKING FORWARD TO HOSTING
THEM AGAIN NEXT YEAR.

22
00:01:47,369 --> 00:01:51,420
SO, YOU'RE NOT HERE TO SEE ME.
I'LL GLADLY TURN IT OVER TO THE

23
00:01:51,420 --> 00:01:53,540
PROFESSIONALS TO MY LEFT.
THANK YOU.

24
00:01:53,540 --> 00:01:56,479
>> GOOD MORNING.
OR GOOD AFTERNOON, EVERYONE,

25
00:01:56,479 --> 00:01:59,069
DEPENDING WHERE YOU ARE.
BEFORE I GET STARTED I WANT TO

26
00:01:59,069 --> 00:02:04,240
THANK CAPTAIN HAY AND HIS TEAM.
WE COULDN'T HAVE DONE LAST

27
00:02:04,240 --> 00:02:08,619
YEAR'S FLIGHT TEST AND COULDN'T
PULL OFF THE NEXT TEST WITHOUT

28
00:02:08,619 --> 00:02:12,160
HIS SUPPORT.
THANK YOU, CAPTAIN HAY.

29
00:02:12,160 --> 00:02:15,980
WE LEARNED A GREAT DEAL FROM
LAST YEAR'S FLIGHT TEST AND USED

30
00:02:15,980 --> 00:02:21,430
THAT KNOWLEDGE TO SHAPE THE
PERFORMANCE.

31
00:02:21,430 --> 00:02:24,200
SO, THIS YEAR I'M CAUTIOUSLY
OPTIMISTIC THAT WE'LL HAVE A

32
00:02:24,200 --> 00:02:27,990
FULLY SUCCESSFUL FLIGHT TEST.
EITHER WAY WE'LL GAIN A

33
00:02:27,990 --> 00:02:31,940
TREMENDOUS AMOUNT OF OFFICE.
BEFORE I TURN THING OVER TO IAN

34
00:02:31,940 --> 00:02:33,390
OR MARK I'LL GIVE YOU DETAILS OF
THE FLIGHT TEST.

35
00:02:33,390 --> 00:02:38,190
I'LL GIVE YOU A MOMENT HOW
IMPORTANT LIKE DEVELOPING AND

36
00:02:38,190 --> 00:02:41,290
TECHNOLOGY LIKE WE'RE DOING
SHEER TO NASA.

37
00:02:41,290 --> 00:02:45,980
IT DRIVES OUR EXPLORATION AND
JOURNEY TO MARS.

38
00:02:45,980 --> 00:02:51,870
WE DEVELOP NEW TECHNOLOGY,
EVENTUALLY FLY AND THEM PROVE

39
00:02:51,870 --> 00:02:56,140
THEM OUT.
TO ENABLE THE MISSION IN SCIENCE

40
00:02:56,140 --> 00:02:59,630
AND HUMAN EXPLORATION.
NASA SPACE TECHNOLOGY MISSION

41
00:02:59,630 --> 00:03:07,350
DIRECTORATE, DEVELOPING CRITICAL
CAPABLES NEEDED FOR THE FUTURE.

42
00:03:07,350 --> 00:03:13,540
COURT CURRENT CHALLENGE IS DEEP
EXPLORATION.

43
00:03:13,540 --> 00:03:17,670
IN FACT OVER THE NEXT 18 MONTHS
WE'LL BE LAUNCHING APPROXIMATELY

44
00:03:17,670 --> 00:03:20,970
SIX FLIGHT DEMONSTRATION
MISSIONS.

45
00:03:20,970 --> 00:03:25,050
RIGHT NOW, WE HAVE HAD THE
TECHNOLOGICAL LIMITS OF WHAT WE

46
00:03:25,050 --> 00:03:28,330
CAN LAND ON MARS IN TERMS OF
SIZE AND WEIGHT.

47
00:03:28,330 --> 00:03:34,590
WE LANDED ABOUT ONE METRIC TON.
THE CURIOSITY FOR MSL WAS ABOUT

48
00:03:34,590 --> 00:03:37,770
THE SIZE OF MINNEAPOLISNY COOPER
AND ONE METRIC TON OF 2,000200

49
00:03:37,770 --> 00:03:39,760
POUNDS.
THAT'S ABOUT ALL WE DID K DO

50
00:03:39,760 --> 00:03:41,370
WITH THE CURRENT TECHNOLOGY WE
USE.

51
00:03:41,370 --> 00:03:47,490
IT GOES BACK TO THE '60s AND
'70s.

52
00:03:47,490 --> 00:03:52,910
THIS NEW TECHNOLOGY IS REQUIRED
TO LAND FIVE METRIC TONS FOR

53
00:03:52,910 --> 00:03:55,990
HUMAN MISSIONS.
MAYBE 30 AND BEYOND METRIC TONS

54
00:03:55,990 --> 00:03:59,060
TO THE SURFACE.
>> THE PARACHUTE WE'RE USING CAN

55
00:03:59,060 --> 00:04:02,970
IMPROVE PERFORMANCE BY 100 TO
200%.

56
00:04:02,970 --> 00:04:06,010
THAT'S CRITICAL.
NOT ONLY FOR FUTURE ENHANCED

57
00:04:06,010 --> 00:04:11,319
ROBOTIC MISSIONS BUT FUTURE
EXPLORATION OF MARS.

58
00:04:11,319 --> 00:04:14,600
AS I MENTIONED EARLIER.
THEY LAUNCHED SIX TECHNOLOGY

59
00:04:14,600 --> 00:04:17,060
DEMONSTRATIONS.
SOME ARE DEEP SPACE ATOMIC

60
00:04:17,060 --> 00:04:20,870
CLOCKS.
AND GREEN PROPELLING FUSION

61
00:04:20,870 --> 00:04:25,820
MISSION WHICH WILL SLEPT HIM
HIGH PERFORMANCE NONTOXIC PROPEL

62
00:04:25,820 --> 00:04:34,370
ANDS.
SO, SINCE THE FORMATION OF THE

63
00:04:34,370 --> 00:04:43,200
NATIONAL ADVISORY SYSTEM OR
NACA.

64
00:04:43,200 --> 00:04:47,020
AS WAS THE CASE WITH THE EARLY
PIONEERS OF FLIGHT.

65
00:04:47,020 --> 00:04:49,650
THERE'S NO GUARANTEE THAT THESE
TERMSES WILL BE COMPLETED

66
00:04:49,650 --> 00:04:52,010
SUCCESSFULLY.
THAT'S WHY WE GO AND FLY.

67
00:04:52,010 --> 00:04:55,980
ON TOP OF THEM, WE'LL LEARN A
GREAT DEAL FROM THE TESTS AND

68
00:04:55,980 --> 00:04:59,330
GAIN A LOT OF KNOWLEDGE THAT
WILL SHAPE FUTURE TESTS AND

69
00:04:59,330 --> 00:05:04,370
FUTURE SYSTEMS TO LAND LARGER
PAYLOADS ON THE SURFACE OF MARS.

70
00:05:04,370 --> 00:05:07,730
THAT COULD BE READY FOR USING
THIS TECHNOLOGY IN FUTURE

71
00:05:07,730 --> 00:05:12,980
LANDING MARS MISSIONS AS EARLY
AS 2020 AND COULD BE ESPECIALLY

72
00:05:12,980 --> 00:05:18,150
BENEFICIAL FOR MISSIONS LIKE
MARS RETURNS.

73
00:05:18,150 --> 00:05:23,750
NASAS SPACE TECHNOLOGY IS
AMAKING PROGRESS AND ADDRESSING

74
00:05:23,750 --> 00:05:29,470
MANY CHALLENGES FOR ACHIEVING
AFFORDABLE SPACE EXPLORATION.

75
00:05:29,470 --> 00:05:33,820
TECHNOLOGY DRIVES EXPLORATION IN
THE JOURNEY TO MARS AND DEVELOP

76
00:05:33,820 --> 00:05:36,360
TECHNOLOGY THAT ENABLES FUTURE
EXPLORATION OF THE SOLAR SYSTEM

77
00:05:36,360 --> 00:05:40,790
AND BEYOND THAT.
WE'RE LOOKING FORWARD TO FLYING

78
00:05:40,790 --> 00:05:43,650
THIS WEEK.
CROSS OUR FINGERS THAT THE

79
00:05:43,650 --> 00:05:54,550
WEATHER COOPERATES AND NOW OVER
TO DR.†CLARK TO GIVE YOU AM BACK

80
00:05:54,550 --> 00:06:02,389
CROWD.
>> TO GIVE YOU SOME BACK DROWN.

81
00:06:02,389 --> 00:06:07,090
THEY RELIED ON TECHNOLOGY LIKE
USING STARS FOR NAVIGATION AND

82
00:06:07,090 --> 00:06:08,820
WIND TO CARRY THEM ACROSS THE
OCEAN.

83
00:06:08,820 --> 00:06:12,650
TODAY WE CAST OUR EYES FROM THIS
PLACE OF RED SAND TO ANOTHER,

84
00:06:12,650 --> 00:06:15,740
PLANET MARS.
WE RELY ON TECHNOLOGY.

85
00:06:15,740 --> 00:06:21,639
OUR SPACECRAFT USES STARS.
WE STILL RELY ON WIND NOT TO

86
00:06:21,639 --> 00:06:25,960
CARRY US ACROSS SPACE BUT TO
SLOW US DOWN WHEN WE ARRIVE IN

87
00:06:25,960 --> 00:06:28,160
MARS.
OUR SPACECRAFT GOING 10,000

88
00:06:28,160 --> 00:06:33,150
MILES AN HOUR AND THE ONCOMING
WIND AND DRIVING DEVICES THAT

89
00:06:33,150 --> 00:06:37,419
HELP PRODUCE DRAG TO SLOW IT
DOWN TO SAFELY LAND ON THE

90
00:06:37,419 --> 00:06:40,889
SURFACE OF MARS.
A FEW YEARS AGO WE LANDED THE

91
00:06:40,889 --> 00:06:44,680
CURIOSITY ROVER.
THIS IS THE LAST SEVEN MISSIONS

92
00:06:44,680 --> 00:06:47,169
TO MARS.
EVEN BEFORE WE LANDED CURIOSITY,

93
00:06:47,169 --> 00:06:51,800
WE REALIZED THE TECHNOLOGIES WE
HAD TO LAND ROBOTIC MISSIONS TO

94
00:06:51,800 --> 00:06:57,040
MARS WERE SATURATED.
AS WE THOUGHT OF THE MORE

95
00:06:57,040 --> 00:07:00,600
EXCITING AND BOLD MISSIONS TO
MARS WE STARTED TO REALIZE WE

96
00:07:00,600 --> 00:07:04,010
DIDN'T HAVE THE TECHNOLOGIES IN
PLACE TO LAND THEM AND WE HAD TO

97
00:07:04,010 --> 00:07:06,979
START TODAY TO START DEVELOPING
THOSE TECHNOLOGIES.

98
00:07:06,979 --> 00:07:11,050
THINGS LIKE INFLATABLE DRAG
DEVICES THAT WE CAN INFLATE AND

99
00:07:11,050 --> 00:07:13,720
NEW SUPERSONIC PARACHUTE 100
FEET IN DIAMETER.

100
00:07:13,720 --> 00:07:19,030
THOSE ARE WHAT LDSD USED.
FOR THOSE MISSIONS.

101
00:07:19,030 --> 00:07:23,449
THEY ALLOW MORE MASS TO THE
SURFACE OF MARS AND ALLOW MORE

102
00:07:23,449 --> 00:07:27,660
SURFACE ITSELF TO REGIONS THAT
WE HAVEN'T HAD AVAILABLE TO US

103
00:07:27,660 --> 00:07:29,900
IN THE PAST.
FOR EXAMPLE, IF WE GO TO THE

104
00:07:29,900 --> 00:07:35,400
FIRST IMAGE, THE COLOR SPOTS
DENOTE AREAS WHERE WE CAN LAND

105
00:07:35,400 --> 00:07:37,340
SOMETHING LIKE THE CURIOSITY
ROVER.

106
00:07:37,340 --> 00:07:41,860
EACH OF THOSE ARE PLACES AND
LOCATIONS WE LANDED PREVIOUS

107
00:07:41,860 --> 00:07:44,460
MISSIONS.
ALL REGIONS SHADED IN BLACK ARE

108
00:07:44,460 --> 00:07:48,520
ELEVATIONS THAT ARE TOO HIGH.
THERE'S NOT ENOUGH ATMOSPHERE TO

109
00:07:48,520 --> 00:07:52,009
SLOW US DOWN TO TRY TO LAND SOME
HIGHER ELEVATIONS.

110
00:07:52,009 --> 00:07:55,150
WITH THE TECHNOLOGY LDSD IS
DEVELOPING.

111

00:07:55,150 --> 00:07:58,759

SOMETHING LIKE THE CURIOSITY
ROVER, WE OPEN UP THE SURFACE OF

112

00:07:58,759 --> 00:08:02,330

MARS.
WE EXPOSE LARGE REGIONS OF

113

00:08:02,330 --> 00:08:05,509

NORTHERN HEMISPHERE, WHEN WE
START THINKING ABOUT THE NEXT

114

00:08:05,509 --> 00:08:08,210

GENERATIONS OF MISSIONS WE KNOW
THOSE ARE EVEN MORE MASSIVE.

115

00:08:08,210 --> 00:08:12,870

WE F WE GO TO THE NEXT SLIDE.
WE TRY TO RELY ON TECHNOLOGY WE

116

00:08:12,870 --> 00:08:16,169

HAD TO LAND THOSE MISSIONS
THAT'S TWO, THREE TIMES HEAVIER

117

00:08:16,169 --> 00:08:20,229

THAN THE CURIOSITY ROVER.
THE OTHER HOLOGRAPH SHOWS WHERE

118

00:08:20,229 --> 00:08:23,820

YOU DO THAT.
THERE'S A LARGE REGION.

119

00:08:23,820 --> 00:08:26,919

PURPLE IF YOU SWING AND HOLD A
MAGNIFYING CLASS GLASS UP TO THE

120

00:08:26,919 --> 00:08:33,329

TELEVISION YOU CAN SEE THE BUT
WITH THE PARACHUTES WE CAN OPEN

121
00:08:33,329 --> 00:08:42,830
UP AT LEAST HALF OF MARS.
WITH THESE PAYLOADS AND WE START

122
00:08:42,830 --> 00:08:45,610
TO OPEN UP REGIONS OF MARS FOR
HUMAN PRECURSOR MISSIONS AS

123
00:08:45,610 --> 00:08:48,930
WELL.
LAST YEAR WE CAME HERE AND GOT

124
00:08:48,930 --> 00:08:55,480
TO CONDUCT A SUCCESSFUL TEST
JUST TO TEST THESE TECHNOLOGIES.

125
00:08:55,480 --> 00:08:57,410
I HAVE DATA FROM THAT THAT I CAN
SHOW.

126
00:08:57,410 --> 00:09:01,980
AFTER WE CUE THE FIRST VIDEO.
SO WE HAVE THIS VEHICLE.

127
00:09:01,980 --> 00:09:06,350
AND MARK'S GOING TO TALK ABOUT
HOW WE CONDUCT THE TEST.

128
00:09:06,350 --> 00:09:08,480
TAKE FOR GRANTED WE ARE GOING
FOUR TIMES THE SPEED OF SOUND

129
00:09:08,480 --> 00:09:12,370
AND WE HAVE OUR INFLATABLE DRIVE
DEVICE.

130
00:09:12,370 --> 00:09:16,310
WE DID THIS AHEAD OF SCHEDULE.
LAST YEAR WAS A SHAKE-OUT TEST.

131

00:09:16,310 --> 00:09:20,330

WE HAVE DATA AA YEAR AHEAD OF
SCHEDULE.

132

00:09:20,330 --> 00:09:23,950

WE SAW IT INFLATE PHENOMENALLY.
UNIFORMITY, VERY LITTLE

133

00:09:23,950 --> 00:09:28,440

DISTURBANCE.
AND A TON OF AERODYNAMIC DATA

134

00:09:28,440 --> 00:09:31,649

AND SAW IT PERFORM BETTER THAN
EXPECTED.

135

00:09:31,649 --> 00:09:35,420

CUE THE NEXT VIDEO.
WE HAVE EARLY TEST OF ANOTHER

136

00:09:35,420 --> 00:09:38,440

DEVICE WE HAD TO DEVELOP JUST TO
DEPLOY OUR LARGE SUPERSONIC

137

00:09:38,440 --> 00:09:41,730

PARACHUTE.
GO AHEAD AND PRESS PLAY.

138

00:09:41,730 --> 00:09:44,350

HERE WE'RE GOING 2.8 TIMES THE
SHOOT OF SOUND.

139

00:09:44,350 --> 00:09:48,839

WE SHOOT OUT THE BACK OF THE
VEHICLE A LARGE BALLOON

140

00:09:48,839 --> 00:09:53,950

PARACHUTE DEVICE AND TRY TO TAKE
A 100 FOOT PARACHUTE AND DEFLATE

141

00:09:53,950 --> 00:09:57,620

IT IN 2,000-MILE-AN-HOUR WIND
AND SEE WHAT HAPPENS.

142

00:09:57,620 --> 00:10:02,510

THE DATA TREASURE DROVE HAS BEEN
TREMENDOUS.

143

00:10:02,510 --> 00:10:04,740

BETTER QUALITY AND BETTER
QUANTITY THAN ANYTHING WE'VE

144

00:10:04,740 --> 00:10:06,550

HAD.
WE'VE BEEN USING SUPERSONIC

145

00:10:06,550 --> 00:10:10,890

PARACHUTES FOR OVER 40 YEARS AND
OUR UNDERSTANDING STEMS FROM A

146

00:10:10,890 --> 00:10:14,320

FEW TESTS CONDUCTED IN THE 1960s
AND '70s.

147

00:10:14,320 --> 00:10:18,640

THE DATA EXCITES IN A FEW
TECHNICAL REPORTS AND GRAINY 16

148

00:10:18,640 --> 00:10:20,860

MILLIMETER VIDEOS.
WE DIGITIZED THOSE.

149

00:10:20,860 --> 00:10:24,140

I WATCHED EACH ONE OF THOME
HUNDREDS OF TIME AND TRIED TO

150

00:10:24,140 --> 00:10:27,279

GLEAN MORE INFORMATION ABOUT THE
NATURE OF THESE DEVICES, HOW

151

00:10:27,279 --> 00:10:29,820

THEY INFLATE, OPERATE AND
BEHAVE.

152

00:10:29,820 --> 00:10:33,640

WE HAVE IMAGES, IF WE CUE THIS
RIGHT HERE.

153

00:10:33,640 --> 00:10:37,180

THESE ARE IMAGES FROM 1960s AND
EARLY 197.

154

00:10:37,180 --> 00:10:42,899

GENERALLY WE SEE IT INFLATE.
IF I COMPARE THAT TO THE DATA

155

00:10:42,899 --> 00:10:46,870

SET WE HAD LAST YEAR, JUST THE
QUALITY OF THE IMAGE, GO TO THE

156

00:10:46,870 --> 00:10:50,820

NEXT IMAGE, PLEASE, WE SAW
THINGS THAT WE'VE NEVER SEEN OR

157

00:10:50,820 --> 00:11:02,120

IMAGINED EXISTED BEFORE.
WE SAW A MUCH MORE DYNAMIC†--

158

00:11:02,120 --> 00:11:19,260

>> YOU SEE
WHERE THEY INTERFACED
WITH THE PARACHUTE.

159

00:11:19,260 --> 00:11:24,180

WHERE THE FAB SEAMS WERE AND WE
COULD START TO SEE THINGS IN THE

160

00:11:24,180 --> 00:11:26,370

NATURE OF THE INFLATION THAT WE
HAD NEVER KNOWN BEFORE.

161

00:11:26,370 --> 00:11:30,500
WHEN SHE SHOWED VIDEOS FOLKS
WORKING ON PARACHUTES IN 40

162

00:11:30,500 --> 00:11:33,839
YEARS THEY THOUGHT THIS WAS THE
WORST PARACHUTE INFLATION WE'VE

163

00:11:33,839 --> 00:11:36,330
EVER SEEN.
THEN WE STARTED WATCHING OLD

164

00:11:36,330 --> 00:11:38,779
VIDEOS AND GOING BACK AND SEE
THOSE.

165

00:11:38,779 --> 00:11:42,720
WE STARTED TO REALIZE THEY
EXISTED PREVIOUSLY.

166

00:11:42,720 --> 00:11:45,860
WE DEPARTMENT HAVE THIS DATA SET
AVAILABLE TO US.

167

00:11:45,860 --> 00:12:00,430
THIS UNDERSTANDING.
SO, WE STARTED LEARNING

168

00:12:00,430 --> 00:12:27,330
A LOT.
>> HOW

169

00:12:27,330 --> 00:12:33,350
WE DESIGN THE PARACHUTE
BUT THE PARACHUTE IS NEW.

170

00:12:33,350 --> 00:12:37,440
THEY HAVE MORE CURVATURE THAT
HELPS REDUCE THE STRESSES EARLY

171

00:12:37,440 --> 00:12:39,820

ON.

WE'VE HADDED A LOT MORE

172

00:12:39,820 --> 00:12:43,279

STRUCTURAL HIGH STRENGTH
MATERIAL IN THE CROWN OF THE

173

00:12:43,279 --> 00:12:45,050

PARACHUTE AND THROUGHOUT THE
PARACHUTE TO MAKE IT MORE PRO

174

00:12:45,050 --> 00:12:47,529

BUST TO A LOT OF DYNAMICS WE'VE
SEEN DURING THE INFLATION

175

00:12:47,529 --> 00:12:50,170

PROCESS.

WE HAVE A LOT OF DAMAGED

176

00:12:50,170 --> 00:12:52,200

CAPABILITY WHICH IF PART OF THE
FABRIC BEGINS TO TEAR.

177

00:12:52,200 --> 00:12:56,310

IT PRESENT PROPAGATE THROUGH THE
PARACHUTE.

178

00:12:56,310 --> 00:13:01,540

IT'S A MUCH STRONGER PARACHUTE
THAT WE THINK WILL PROVIDE A

179

00:13:01,540 --> 00:13:04,930

DATA SET FOR US AND HOPEFULLY
PERFORM WELL FOR US UNDER THESE

180

00:13:04,930 --> 00:13:07,130

CONDITIONS.

TO DESCRIBE HOW WE GET

181

00:13:07,130 --> 00:13:09,330

TECHNOLOGIES TO THE CONDITIONS
I'LL PASS IT TO MARK.

182

00:13:09,330 --> 00:13:17,779

>> GO TO THE NEXT SLIDE.

>> GOING ADVANCE TO THE SLIDE

183

00:13:17,779 --> 00:13:20,700

SHOWING THE SIDE AND THE
PARACHUTE.

184

00:13:20,700 --> 00:13:23,339

>> SO, THIS SHOWS THE TWO
TECHNOLOGIES THAT WE'LL BE

185

00:13:23,339 --> 00:13:25,209

TESTING.

AS IAN SAID WE HAD A SHAKEOUT

186

00:13:25,209 --> 00:13:27,860

FLIGHT LAST YEAR.

WE TESTED OUR VEHICLE TO MAKE

187

00:13:27,860 --> 00:13:29,550

SURE WE COULD GET THE

TECHNOLOGIES TO THE RIGHT

188

00:13:29,550 --> 00:13:33,040

CONDITION.

WE'RE ABLE TO TEST THE

189

00:13:33,040 --> 00:13:34,740

DONUT-LOOKING THING IAN IS

STANDING IN THE MIDDLE OF.

190

00:13:34,740 --> 00:13:40,269

YOU SEE HIS OUTSTRETCHED ARMS.

IT'S ABOUT 20 FEET IN DIAMETER.

191

00:13:40,269 --> 00:13:45,310

WE WERE ABLE TO TEST IT LAST
YEAR.

192

00:13:45,310 --> 00:13:50,430

WE HAVE THAT FOR USE AT MARS.
THAT'S THE FIRST STAGE WE NEED

193

00:13:50,430 --> 00:13:52,730

TO SLOW DOWN THE HEAVY STAGES OF
MARS.

194

00:13:52,730 --> 00:13:55,680

THE SECOND IS PARACHUTE.
NOT TO THE SAME SCALE.

195

00:13:55,680 --> 00:13:58,899

IT'S 100 FEET IN DIAMETER.
LAID OUT ON THE GROUND.

196

00:13:58,899 --> 00:14:02,230

YOU SEE THE 15-FOOT TEST
VEHICLE.

197

00:14:02,230 --> 00:14:05,230

THAT TECHNOLOGY WE DEVELOPED
THIS YEAR.

198

00:14:05,230 --> 00:14:09,120

LAST YEAR WE WERE ABLE TO SEE
THINGS ABOUT THE PARACHUTE THAT

199

00:14:09,120 --> 00:14:11,980

DIDN'T BEHAVE.
WE SAW IT GET DESTROYED IN THE

200

00:14:11,980 --> 00:14:14,769

TEST.
NOW DEVELOPED A MORE STRONGER

201

00:14:14,769 --> 00:14:18,769

PARACHUTE WE'LL TEST THIS TIME.
LET ME GO ON TO THE NEXT SLIDE

202

00:14:18,769 --> 00:14:22,329

TO SHOW YOU HOW WE TESTED IT ON
THE GROUND BEFORE WE FLY IT THIS

203

00:14:22,329 --> 00:14:26,170

WEEK IN THE UPPER ATMOSPHERE.
THIS IS IN THE NAVAL AIR WEAPON

204

00:14:26,170 --> 00:14:28,220

S STATION IN CHINA BEACH,
CALIFORNIA.

205

00:14:28,220 --> 00:14:36,160

WE
CARRY THE PARACHUTE ON A
HELICOPTER, DROP IT OUT OF THE

206

00:14:36,160 --> 00:14:38,950

HELICOPTER, THE PARACHUTE
INFLATES AS YOU SEE THERE.

207

00:14:38,950 --> 00:14:41,779

ONCE A LARGE BULLET GOES INTO
THAT FUNNEL.

208

00:14:41,779 --> 00:14:44,950

YOU SEE IT COMING DOWN.
AS SOON AS THAT LATCHES IN THE

209

00:14:44,950 --> 00:14:46,490

ROCKETS FIRE.
ROCKETS PULL ON THAT ROPE

210

00:14:46,490 --> 00:14:50,339

THROUGH A PULLEY, PULLING IT

STRAIGHT DOWN WITH OVER 100,000

211

00:14:50,339 --> 00:14:53,779

POUNDS OF FORCE.

THIS WAS TO SURVIVE 80,000

212

00:14:53,779 --> 00:14:55,720

POUNDS AND SURVIVED TO 120,000

POUNDS.

213

00:14:55,720 --> 00:15:00,100

WE'VE SHOWN IT HAS THE STRENGTH

IT NEEDS TO SURVIVE IN THE FULL

214

00:15:00,100 --> 00:15:03,010

OPEN CONFIGURATION.

WE'LL TEST IN THE UPPER

215

00:15:03,010 --> 00:15:06,760

ATMOSPHERE OVER HAWAII WHERE WE

CAN SIMULATE THE THIN AIR OF

216

00:15:06,760 --> 00:15:09,880

MARS WITH THE THIN AIR OF THE

STRATOSPHERE ABOVE OUR SPEEDS,

217

00:15:09,880 --> 00:15:13,990

THAT DO THAT TO SEE HOW IT

BEHAVES NOT JUST IN THE FULLY

218

00:15:13,990 --> 00:15:19,959

OPEN BUT AS IT INFLATES.

NOW WE'LL SEE HOW IT INFLATES IN

219

00:15:19,959 --> 00:15:22,470

THE SUPERSONIC FLOW IN THE TEST

WE'LL SEE THIS WEEK OR NEXT.

220

00:15:22,470 --> 00:15:27,910

THE NEXT ONE IS ADD VANED

TECHNOLOGY WE'RE DEVELOPING MORE

221

00:15:27,910 --> 00:15:32,139

OVER THE NEXT SEVEN MONTHS.
THIS IS ANOTHER SIAD.

222

00:15:32,139 --> 00:15:36,029

THIS IS 26 FEET IN DIAMETER.
IT'S MUCH LARGER BUT NOT MUCH

223

00:15:36,029 --> 00:15:37,769

HEAVIER.
IT'S MUCH MORE ADVANCED.

224

00:15:37,769 --> 00:15:40,510

MORE EFFICIENT.
THIS SHOWS A ROCKET TEST AT THE

225

00:15:40,510 --> 00:15:43,279

SAME FACILITY AT CHINA LAKE.
IN SLOW MOTION WHERE WE DEPLOY

226

00:15:43,279 --> 00:15:49,800

THE SIAD AT 250 MILES AN HOUR TO
SIMULATE THE LOAD.

227

00:15:49,800 --> 00:15:52,649

THERE IT IS AT FULL SPEED GOING
OVER THE CAMERA WHICH GETS

228

00:15:52,649 --> 00:15:57,350

KNOCKED OVER BY THE ROCKET SLED.
SO, THAT WAS ACTUALLY A VERY

229

00:15:57,350 --> 00:15:58,970

SUCCESSFUL TEST THAT WE SHOWED
FOR THE FIRST TIME.

230

00:15:58,970 --> 00:16:02,610

WE BUILD THIS VERY LARGE SIDING

AND IT INFLATES DOWN THE TRACK.

231

00:16:02,610 --> 00:16:06,579

WE'RE HOPING TO TEST THAT
SUPERSONICALLY IN THE FUTURE.

232

00:16:06,579 --> 00:16:10,380

SO, NEXT SLIDE.
WE HAVE NOW THIS MODEL HERE.

233

00:16:10,380 --> 00:16:12,800

SO I'LL EXPLAIN TO YOU A LITTLE
ABOUT THE TEST VEHICLE AND HOW

234

00:16:12,800 --> 00:16:16,760

WE FLY IT.
WE'LL SHOW YOU WHAT THE OVERALL

235

00:16:16,760 --> 00:16:19,579

PROFILE IS OF THE FLIGHT.
ONCE WE GET IT UP THERE.

236

00:16:19,579 --> 00:16:24,139

WE USE A SOLID ROCKET MOTOR.
IT'S VERY POWERFUL THAT

237

00:16:24,139 --> 00:16:28,730

ACCELERATES IT FROM ZERO TO MACH
4 IN OVER A MINUTE.

238

00:16:28,730 --> 00:16:31,279

IT'S FLYING THROUGH THE NAIR
THIS DIRECTION.

239

00:16:31,279 --> 00:16:34,529

WE CALL THIS A FLYING SAUCER.
IT DOESN'T SPIN AROUND, IT FLIES

240

00:16:34,529 --> 00:16:39,529

INTO THE WIND DIRECTLY.

THIS BLUNT END PROVIDES A LOT OF

241

00:16:39,529 --> 00:16:41,260

DRAG TO SLOW DOWN THE VEHICLE OF
MARS.

242

00:16:41,260 --> 00:16:43,290

IT'S A SHAPE LIKE THE MARS
VEHICLE.

243

00:16:43,290 --> 00:16:47,459

IT'S THE SAME SIZE SO WE CAN
PRESENT THE SAME ENVIRONMENT TO

244

00:16:47,459 --> 00:16:51,480

OUR DEVICES AS WE SEE AT MARS.
TO GET THE AIR.

245

00:16:51,480 --> 00:16:53,930

WE HAVE A HIGH ATMOSPHERE UP TO
180,000 FEET.

246

00:16:53,930 --> 00:16:59,269

THEN GO UP TO MACH 4.
THIS GETS SPUN UP.

247

00:16:59,269 --> 00:17:02,050

ACCELERATES MACH 4 AND FROM
THERE, WE EXPLORE THE SIDE

248

00:17:02,050 --> 00:17:07,600

TACKED TIGHTLY TO THE VEHICLE.
IT INFLATES IN A FEW TENTHS OF A

249

00:17:07,600 --> 00:17:10,650

SECOND AND MAKES A DONUT AROUND
THE VEHICLE 20 FEET IN DIAMETER

250

00:17:10,650 --> 00:17:17,839

TO SLOW IT DOWN AT MACH 3.

THEN DEPLOY THE BALLOON THAT'S

251

00:17:17,839 --> 00:17:20,760

BEING USED TO PULL OUT THE
PARACHUTE AT MACH 2.9.

252

00:17:20,760 --> 00:17:22,839

ONCE THAT SLOWS DOWN TO MACH
2.35.

253

00:17:22,839 --> 00:17:28,150

IT PULLS OUT OF THE PACK AND
IT'S FULLY EXPOSED TO THE FLOW.

254

00:17:28,150 --> 00:17:34,000

AT THAT POINT IT PULLS UP AND
YOU OBSERVE THE MISSION.

255

00:17:34,000 --> 00:17:39,620

YOU THEN OBSERVE THE VIDEO.
THESE ARE THE CAMERAS LOOKING

256

00:17:39,620 --> 00:17:42,750

STRAIGHT UP AT THE PARACHUTE.
WE HAVE HIGH RESOLUTION, HIGH

257

00:17:42,750 --> 00:17:47,470

SPEED CAMERA, COLOR STEREO
CAMERAS.

258

00:17:47,470 --> 00:17:49,890

AND LOOK AT THOSE DETAILED
IMAGES AND LEARN WHAT HAPPENED

259

00:17:49,890 --> 00:17:52,650

IN THAT PARACHUTE INFLATION
EVENT THROUGH SUPERSONIC FLIGHT

260

00:17:52,650 --> 00:17:55,510

AND SUB SONIC FLIGHT.

WE MEASURED TRAJECTORY

261

00:17:55,510 --> 00:17:58,320

ACCURATELY SO WE KNOW HOW THE
DIVISIONS ARE SLOWING THE

262

00:17:58,320 --> 00:18:03,340

SYSTEM.

WE THEN RESPECT THE AERODYNAMICS

263

00:18:03,340 --> 00:18:06,740

OF THESE DEVICES WHICH ALLOWS
FUTURE MISSIONS TO USE ALL OF

264

00:18:06,740 --> 00:18:09,549

THAT DATA AND SIMULATE HOW THESE
DEVICES WORK AT MARS SO THEY

265

00:18:09,549 --> 00:18:12,720

HAVE GREAT CONFIDENCE THESE
THINGS WORK WHEN THEY WANT TO

266

00:18:12,720 --> 00:18:15,299

PUT EXTENSIVE MISSIONS ON THE
PARACHUTES.

267

00:18:15,299 --> 00:18:19,169

LET ME PUT UP THE NEXT SLIDE AND
SO YOU WHAT THE MISSION LOOKS

268

00:18:19,169 --> 00:18:25,919

LIKE OUT OF KAUAI.

WE LAUNCHED FROM THE PACE JUST A

269

00:18:25,919 --> 00:18:31,280

LITTLE NORTH OF HERE.
A LARGE HELIUM BALLOON.

270

00:18:31,280 --> 00:18:35,169

A STANDARD BALLOON LAUNCHED FOR

SCIENCE MISSIONS.

271

00:18:35,169 --> 00:18:38,240

THIS IS USED WHERE YOU PUT
TELESCOPES HIGH IN THE

272

00:18:38,240 --> 00:18:42,270

ATMOSPHERE TO LOOK AT SPACE.
WE'RE USING IT TO LAUNCH OUR

273

00:18:42,270 --> 00:18:45,700

TEST VEHICLE.
WE GET IT UP 120,000 FEET.

274

00:18:45,700 --> 00:18:50,150

MOST TO WHERE WE WANT TO BE.
ONCE WE GET UP TO ALTITUDE.

275

00:18:50,150 --> 00:18:55,770

WE DROP THE TEST VEHICLE, WITHIN
A FEW TENTHS OF A SECOND.

276

00:18:55,770 --> 00:18:57,890

WE THEN FIRE THE MAIN ROCKET
MOTOR TO ACCELERATOR IT.

277

00:18:57,890 --> 00:19:01,870

IN OVER 71 SECONDS IT EXCEL
RATES FROM ZERO TO MACH 4 AND

278

00:19:01,870 --> 00:19:08,010

IT'S GOING 80,000 FEET ABOVE THE
EARTH'S SURFACE.

279

00:19:08,010 --> 00:19:10,650

ONCE GOING MACH 4 AT 180,000
FEET.

280

00:19:10,650 --> 00:19:14,260

WE OBSERVE THE OPERATION AND

TEST THEM.

281

00:19:14,260 --> 00:19:17,220

IT'S GOING ROUGHLY HORIZONTALLY
TO GIVE US TIME AND CONDITION

282

00:19:17,220 --> 00:19:22,340

AND WE SLOW THE VEHICLE DOWN AND
EVENTUALLY THE VEHICLE ARCS OVER

283

00:19:22,340 --> 00:19:26,169

AND THAT SAME TEST PARACHUTE
LANDS THE VEHICLE IN THE WATER.

284

00:19:26,169 --> 00:19:30,049

IT LANDS IN THE OCEAN AND WE
SEND OUT TO GET IT.

285

00:19:30,049 --> 00:19:35,080

LET'S SHOW GOOGLE EARTH FROM
LAST YEAR.

286

00:19:35,080 --> 00:19:38,330

THIS IS THE BASE, THE LAUNCH
SITE THERE.

287

00:19:38,330 --> 00:19:44,160

SOUTH OF THE RUNWAY AT PMRS.
IT GO OVER THE ISLAND, IT

288

00:19:44,160 --> 00:19:47,780

DEPARTS OUT ACROSS THE OCEAN.
AS THE BLUE LINE CONTINUES WE

289

00:19:47,780 --> 00:19:52,330

ALLOW IT TO GET UP TO ALTITUDE.
WE HAD TO BAIT ABOUT TWO HOURS

290

00:19:52,330 --> 00:19:54,630

TO GET UP TO 120,000 FEET.

AT THE END OF THE BLUE, THE RED

291

00:19:54,630 --> 00:19:58,940

LINE WE DROP AND FIRE THE
VEHICLE AND GOES UP HIGH IN

292

00:19:58,940 --> 00:20:03,630

ALTITUDE TO 200,000 FEET.
IT THEN CONDUCTED THE TEST.

293

00:20:03,630 --> 00:20:05,690

ARCED OVER AND LANDED IN THE
OCEAN.

294

00:20:05,690 --> 00:20:08,250

NEXT SLIDE.
AFTER IT LANDED WE SENT OUT A

295

00:20:08,250 --> 00:20:09,950

RECOVERY BOAT.
THERE'S THE VEHICLE AFTER THE

296

00:20:09,950 --> 00:20:12,429

MISSION BEING PICKED UP OUT OF
THE WATER.

297

00:20:12,429 --> 00:20:16,929

WOO ALSO RECOVER THE PARACHUTE.
WE RECOVERED EVERYTHING.

298

00:20:16,929 --> 00:20:21,730

OUR DATA, HIGH SPEED VIDEO.
AROUND RECORDERS.

299

00:20:21,730 --> 00:20:24,820

TO GET THE VEHICLE OR AT LEAST
RECORDER, TO GET THAT DATA.

300

00:20:24,820 --> 00:20:27,309

IT WAS ALL SUCCESSFUL LAST YEAR

AND THAT'S WHAT WE'RE GOING TO

301

00:20:27,309 --> 00:20:30,580

DO THIS YEAR.

I WOULD LIKE TO THANK AGAIN

302

00:20:30,580 --> 00:20:33,710

CAPTAIN HAY.

THIS IS A UNIQUE FACILITY FOR US

303

00:20:33,710 --> 00:20:35,710

TO DO THIS TEST.

THERE'S REALLY NO OTHER PLACE IN

304

00:20:35,710 --> 00:20:37,960

THE WORLD WE CAN FIND WHERE WE

FOUND THE RIGHT CONDITIONS TO

305

00:20:37,960 --> 00:20:41,260

LAUNCH A BALLOON, HAVE IT GO OUT

AWAY FROM POPULATED AREAS.

306

00:20:41,260 --> 00:20:44,870

HAVE SUPPORT SERVICES, ALL OF

THE INSTRUMENTATION THAT CAPTAIN

307

00:20:44,870 --> 00:20:47,049

HAY MENTIONED.

TO PROVIDE THE MISSION AND GET

308

00:20:47,049 --> 00:20:51,419

OUR DATA BACK AND DO OPERATIONS.

I WANT TO SHOW A LITTLE BALLOON,

309

00:20:51,419 --> 00:20:54,510

IT'S SCALE OF THE BALLOON ABOUT

8 FEET IN DIAMETER.

310

00:20:54,510 --> 00:20:59,070

STANDING NEXT IS PETTY OFFICER

QUINLAN TO GIVE YOU SCALE.

311

00:20:59,070 --> 00:21:03,740

IT'S OVER 400 FEET IN DIAMETER.
OUR 14-FOOT TEST VEHICLE IS

312

00:21:03,740 --> 00:21:06,070

ABOUT THE SIZE OF A COFFEE CUP
LID.

313

00:21:06,070 --> 00:21:09,750

YOU CAN HOLD IT OUT NEXT TO THE
BALLOON.

314

00:21:09,750 --> 00:21:14,030

YOU CAN SEE HOW SMALL THAT IS
COMPARED TO THE BALLOON.

315

00:21:14,030 --> 00:21:17,390

IT'S A VERY, VERY LARGE BALLOON.
WILL SETTLE VERY NICELY INTO THE

316

00:21:17,390 --> 00:21:21,179

ROSE BOWL CARRIAGE THE VEHICLE
UP TO THE HIGH ALTITUDE.

317

00:21:21,179 --> 00:21:26,720

I WOULD LIKE TO THANK ALSO THE
COLUMBIA CENTER BALLOON FACILITY

318

00:21:26,720 --> 00:21:31,350

TO ALLOW OUR PEOPLE TO GET UP TO
ALTITUDE AND MAKE THIS

319

00:21:31,350 --> 00:21:35,429

COST-EFFECTIVE APPROACH TO TEST
THESE TECHNOLOGIES.

320

00:21:35,429 --> 00:21:40,340

FOR THAT I'LL TURN IT BACK OVER

TO KIM FOR QUESTION.

321

00:21:40,340 --> 00:21:43,230

>> NOW WE'LL TURN TO QUESTIONS.
FIRST TO REPORTERS IN THE

322

00:21:43,230 --> 00:21:46,020

AUDIENCE THEN REPORTERS ON THE
TELEPHONE.

323

00:21:46,020 --> 00:21:49,570

IF YOU'RE ON THE TELEPHONE
PLEASE HIT STAR 1 TO GET INTO

324

00:21:49,570 --> 00:21:52,860

THE QUESTIONED CUE AND THEN
WE'LL GO TO SOCIAL MEDIA.

325

00:21:52,860 --> 00:21:55,270

FOR QUESTIONS IN THE AUDIENCE
RAISE YOUR HAND AND WE'LL GET A

326

00:21:55,270 --> 00:21:58,539

MIKE OVER TO YOU AND STATE YOUR
NAME AND MEDIA AFFILIATION.

327

00:21:58,539 --> 00:22:05,820

ANY HERE FROM REPORTERS.
RIGHT HERE IN THE FRONT.

328

00:22:05,820 --> 00:22:09,270

KEITH?
>> I'M CHUCK LASKER WITH SOCIAL

329

00:22:09,270 --> 00:22:13,679

KAUAI.
WITH ALL OF THIS TECHNOLOGY, IN

330

00:22:13,679 --> 00:22:19,440

YOUR OPINION, HOW SOON DO YOU

THINK WE'LL PUT HUMANS ON MARS?

331

00:22:19,440 --> 00:22:24,450

>> TO PUT HUMANS ON MARS IN THE
2030s.

332

00:22:24,450 --> 00:22:27,940

SO WE'RE DEVELOPING A SUITE OF
EDL TECHNOLOGIES TO LAND LARGER

333

00:22:27,940 --> 00:22:32,270

MASSES TO ACCESS MORE OF THE
PLANET, LIKE IAN SAID BUT WE

334

00:22:32,270 --> 00:22:34,289

NEED A WHOLE HOST OF OTHER
TECHNOLOGIES.

335

00:22:34,289 --> 00:22:38,940

WE NEED ADVANCED AND SPACE
TECHNOLOGIES, ENVIRONMENTAL AND

336

00:22:38,940 --> 00:22:43,030

LIFE SUPPORT SYSTEM TECHNOLOGIES
SO THEY CAN SURVIVE THE TRIP AND

337

00:22:43,030 --> 00:22:45,669

THEN WE NEED SYSTEMS ON THE
SURFACE OF MARS THAT CAN PRODUCE

338

00:22:45,669 --> 00:22:49,809

THINGS LIKE FUEL, OXYGEN, SO WE
CAN LIVE OFF THE LAND BECAUSE

339

00:22:49,809 --> 00:22:52,010

WE'RE NOT GOING TO BE ABLE TO
TAKE EVERYTHING WITH US.

340

00:22:52,010 --> 00:22:55,669

IT'S GOING TO TAKE A COUPLE

DECADES THAT DEVELOP THAT.

341

00:22:55,669 --> 00:23:00,460

EDL TECHNOLOGIES ARE CRITICAL TO
MAKE THAT HAPPEN AND LDSO IS A

342

00:23:00,460 --> 00:23:06,929

GREAT ADVANCEMENT IN EDL
TECHNOLOGY.

343

00:23:06,929 --> 00:23:09,960

>> NEXT WE HAVE A QUESTION FROM
OUR TELEPHONE BRIDGE.

344

00:23:09,960 --> 00:23:12,340

IRENE FROM REUTERS.
IRENE?

345

00:23:12,340 --> 00:23:15,049

>> THANKS, KIM.
I HAVE A COUPLE QUESTION.

346

00:23:15,049 --> 00:23:18,270

THE FIRST IS FOR MARK.
DID I HEAR YOU SAY CORRECTLY

347

00:23:18,270 --> 00:23:23,549

THAT THE DIAMETER OF THE SSIAD
FOR THIS FLIGHT WAS LARGER OR

348

00:23:23,549 --> 00:23:28,650

ARE YOU REFERRING TO THE GROUND
TEST I DID ON THE RAIL TRACK AND

349

00:23:28,650 --> 00:23:32,870

I HAVE ANOTHER QUESTION AS WELL.
>> THE FIRST, A 26-FOOT DIAMETER

350

00:23:32,870 --> 00:23:36,820

SITE IS NOT WHAT WE'RE FLYING

THIS YEAR.

351

00:23:36,820 --> 00:23:40,140

THE ONE WE'RE FLYING THIS YEAR
IS 20 FEET IN DIAMETER.

352

00:23:40,140 --> 00:23:42,500

WE NEED THAT TO PRESENT THE
RIGHT ENVIRONMENT FOR THE

353

00:23:42,500 --> 00:23:47,409

PARACHUTE TEST.

>> I GUESS ON THAT NOTE, I DON'T

354

00:23:47,409 --> 00:23:50,840

KNOW WHO IT WAS WHO REFERENCED
THAT WITH THE SUCCESSFUL

355

00:23:50,840 --> 00:23:53,970

DEPLOYMENT OF THE SIAD LAST
YEAR, THAT THIS IS NOW FLIGHT

356

00:23:53,970 --> 00:24:01,010

QUALIFIED FOR MARS AND SOMEONE
ELSE SAID THAT THE†-- WITH THE

357

00:24:01,010 --> 00:24:05,789

PARACHUTE TEST, COULD BE READY
TO BE TESTED ON MARS AS EARLY AS

358

00:24:05,789 --> 00:24:10,270

MARS 2020 ROVER, AND I JUST
WANTED TO KNOW, I MEAN,

359

00:24:10,270 --> 00:24:15,840

OBVIOUSLY YOU DON'T NEED THE
EXTRA MASS ON THAT PAYLOAD, BUT

360

00:24:15,840 --> 00:24:19,789

WOULD†-- IS NASA ACTUALLY

CONSIDER USING EITHER OF THESE

361

00:24:19,789 --> 00:24:24,240
SYSTEMS ON THE MARS 2020 ROVER
DELIVERY?

362

00:24:24,240 --> 00:24:26,250
>> RIGHT.
AT THAT TIME, THE MARS 2020

363

00:24:26,250 --> 00:24:27,860
MISSION DESIGN DOESN'T REQUIRE
THE NEW TECHNOLOGY.

364

00:24:27,860 --> 00:24:30,289
IT WAS DESIGNED EXACTLY IN THAT
WAY.

365

00:24:30,289 --> 00:24:32,820
THEY DIDN'T KNOW AND STILL DON'T
KNOW, WHETHER OR NOT THEY'LL

366

00:24:32,820 --> 00:24:34,309
SUCCEED IN TECHNOLOGY
DEVELOPMENT AND THEY HAVE TO

367

00:24:34,309 --> 00:24:38,919
PROCEED WITH DESIGN OF THE
SYSTEMS WE HAVE TO WAIT TO SEE

368

00:24:38,919 --> 00:24:40,570
IF THERE'S SOME REASON THEY
MIGHT CONSIDER IT.

369

00:24:40,570 --> 00:24:45,299
BUT RIGHT NOW IT'S NOT THE PLAN
TO USE OR REQUIRE THESE

370

00:24:45,299 --> 00:24:47,740
TECHNOLOGIES.

NEXT OPPORTUNITY WE EXPECT WILL

371

00:24:47,740 --> 00:24:49,990

BE FOR COMPONENTS FOR MARS'
SAMPLE RETURN.

372

00:24:49,990 --> 00:24:53,830

2020 IS THE BEGINNING.
2020 WE'LL COLLECT SAMPLES TO

373

00:24:53,830 --> 00:24:57,419

RETURN TO EARTH AND DO THAT WE
HAVE TO PUT ROCKETS DOWN TO

374

00:24:57,419 --> 00:25:01,289

LAUNCH INTO ORBIT.
THOSE ARE VERY LARGE AND COULD

375

00:25:01,289 --> 00:25:08,090

REQUIRE SIAD TO GET THAT DOWN TO
THE GROUND AND OTHER THINGS.

376

00:25:08,090 --> 00:25:11,710

PROVIDING CARGO TO ASTRONAUTS ON
THE SURFACE.

377

00:25:11,710 --> 00:25:15,679

THESE PROVIDE THE FIRST STEPS
FOR TRYING TO GET TO THE POINT

378

00:25:15,679 --> 00:25:18,740

WE CAN ACTUALLY HAVE A JOURNEY
TO MARS WITH HUMANS.

379

00:25:18,740 --> 00:25:22,870

>> THANK YOU, MARK.
NEXT WE HAVE ALLEN BOYLE WITH

380

00:25:22,870 --> 00:25:29,269

MSNBC NEWS.

>> CAN YOU HEAR ME?

381

00:25:29,269 --> 00:25:36,000

>> I MAY HAVE MISSED SOME OF THE PRESENTATION, BUT I WANTED TO

382

00:25:36,000 --> 00:25:38,710

JUST DOUBLE-CHECK ON THE WEATHER OUTLOOK.

383

00:25:38,710 --> 00:25:43,480

I KNOW LAST YEAR THERE WAS QUITE A DELAY BECAUSE OF THE WINDS.

384

00:25:43,480 --> 00:25:47,570

WHAT IS THE OUTLOOK AND WHAT'S THE WINDOW IN CASE YOU DO HAVE

385

00:25:47,570 --> 00:25:50,929

TO DELAY THE INITIAL ATTEMPT? THANK YOU.

386

00:25:50,929 --> 00:25:53,000

>> RIGHT. THE FACT IS, AS WE WERE

387

00:25:53,000 --> 00:25:55,510

REFERRING TO LAST YEAR, OUR FIRST TWO-WEEK LAUNCH PERIOD

388

00:25:55,510 --> 00:25:56,809

LIKE THIS YEAR'S TWO-WEEK LAUNCH PERIOD.

389

00:25:56,809 --> 00:25:58,940

WE NOT ABLE TO LAUNCH. WE HAD WIND CONDITIONS THAT

390

00:25:58,940 --> 00:26:00,880

PREVENTED LAUNCH.

WE DID NOT HAVE THE RIGHT

391

00:26:00,880 --> 00:26:07,559

TRAJECTORIES TO CARRY IT OFF OF
POPULATED AREAS TO MAKE IT SAFE.

392

00:26:07,559 --> 00:26:10,200

THIS YEAR AGAIN WE'LL LOOK AT
THESE FIRST TWO WEEKS FOR A

393

00:26:10,200 --> 00:26:13,280

POSSIBLE LAUNCH OPPORTUNITY.
RIGHT NOW THE OUTLOOK IS NOT

394

00:26:13,280 --> 00:26:15,159

LOOKING TOO BAD.
I'M HOPING BY THE END OF THE

395

00:26:15,159 --> 00:26:17,890

WEEK OR NEXT WEEK WE'LL HAVE A
GREAT OPPORTUNITY.

396

00:26:17,890 --> 00:26:20,510

TOMORROW IS NOT LOOKING GREAT
BUT WE WILL CONTINUE TO WATCH

397

00:26:20,510 --> 00:26:22,419

THE WEATHER.
IT CAN CHANGE.

398

00:26:22,419 --> 00:26:25,059

IF WE DON'T GET OFF IN THE FIRST
TWO WEEKS WE HAVE A BACK-UP

399

00:26:25,059 --> 00:26:29,909

PERIOD THAT WE CAN TRY TO GET
OFF WHERE THERE MIGHT BE BETTER

400

00:26:29,909 --> 00:26:31,460

CONDITIONS.

THAT'S WHAT WE DID LAST YEAR.

401

00:26:31,460 --> 00:26:33,159

WE DIDN'T GET OFF IN THE FIRST
LAUNCH PERIOD.

402

00:26:33,159 --> 00:26:36,100

A COUPLE WEEKS LATER WE CAME
BACK AND LAUNCHED THE NEXT DAY

403

00:26:36,100 --> 00:26:40,600

OF THE BACKUP OPPORTUNITY.
>> DO WE HAVE ANY MORE QUESTIONS

404

00:26:40,600 --> 00:26:43,669

HERE AT PMRS?
REPORTERS HERE?

405

00:26:43,669 --> 00:26:45,419

RAISE YOUR HAND IF YOU HAVE A
QUESTION.

406

00:26:45,419 --> 00:26:47,650

ANYBODY ELSE HERE?
OKAY.

407

00:26:47,650 --> 00:26:57,370

NOW WE'LL GO TO SOCIAL.
CAN WE GET A MIKE OVER HERE?

408

00:26:57,370 --> 00:27:06,049

I ACTUALLY HAVE A COUPLE.
QUESTION IS HOW WILL LDSD BE

409

00:27:06,049 --> 00:27:13,270

CONTROLLED?
>> IT'S NOT ACTUALLY CONTROLLED.

410

00:27:13,270 --> 00:27:15,640

WE USE PHYSICS TO CONTROL THE

VEHICLE.

411

00:27:15,640 --> 00:27:18,860

WE POINT IT IN THE DIRECTION WE
WANT THE VEHICLE TO TRAVEL AND

412

00:27:18,860 --> 00:27:27,110

WHEN YOU USE GYROSCOPIC ABILITY.
IT'S CONTROLLED BY THRUST,

413

00:27:27,110 --> 00:27:35,059

GRAVITY AND ANGULAR MOMENTUM.
>> WHY ARE AERODYNAMIC SURFACES

414

00:27:35,059 --> 00:27:42,169

SMOOTH RATHER THAN DIMPLED LIKE
A GOLF BALL?

415

00:27:42,169 --> 00:27:43,940

>> DEPEND WHAT YOU'RE TRYING TO
DO WITH CAN THE SURFACE.

416

00:27:43,940 --> 00:27:52,010

IN CASES LIKE DIMPLES LIKE A
GOLF BALL IS HAVE A GOLF BALL

417

00:27:52,010 --> 00:27:55,130

FLY IN A PARTICULAR WAY.
FOR OUR AERODYNAMIC SURFACES

418

00:27:55,130 --> 00:27:57,350

WE'RE FOCUSED ON TRYING TO
PRODUCE DRAG.

419

00:27:57,350 --> 00:28:03,110

WHICH HAVE LARGE BLUNT SURFACES
TO FACE THE WIND AND CREATE THAT

420

00:28:03,110 --> 00:28:06,299

DRAFT.

OR HAVE GIANT PARACHUTES WHERE

421

00:28:06,299 --> 00:28:12,429

YOU HAVE A GIANT BOWL THAT HELPS
TO SLOW DOWN THE DRAG THAT WAY.

422

00:28:12,429 --> 00:28:17,409

>> FROM FACEBOOK.

WHAT IS THE HEIGHT OF THE DRAG?

423

00:28:17,409 --> 00:28:22,799

>> IT'S 119 TO 120,000 FEET.

IT DROPS FOR THEIR 100 TO 200

424

00:28:22,799 --> 00:28:27,940

FEET AND ACCELERATES UPWARDS
FROM THERE, 18 TO TO 200,000

425

00:28:27,940 --> 00:28:32,360

FEET.

>> AND ONE MORE FROM USTREAM.

426

00:28:32,360 --> 00:28:37,970

>> WHAT ARE THE GE G-FORCES WHEN
IT 0 OPENS UP AT MACH 4.

427

00:28:37,970 --> 00:28:43,020

>> GENERALLY, WHEN WE INFLATE
LAST YEAR AND THIS YEAR.

428

00:28:43,020 --> 00:28:47,210

IT WILL BE ON THE ORDER.

3, 4 Gs OF INITIAL DEPLOYMENT.

429

00:28:47,210 --> 00:28:55,260

A LOT OF THAT BECAUSE OF THE
STREAM, EVEN IF IT'S FULL SCALE.

430

00:28:55,260 --> 00:29:00,750

IT'S ONE-THIRD THE MASS OF THE

ENTRY VEHICLE.

431

00:29:00,750 --> 00:29:04,150

THE G-FORCES ARE HIGHER THAN
THIS TEST AND OTHERWISE WOULD BE

432

00:29:04,150 --> 00:29:07,600

AT MARS.

>> GREAT QUESTION FROM SOCIAL.

433

00:29:07,600 --> 00:29:15,789

REMEMBER IF YOU'RE FOLLOWING US
ON SOCIAL USE THE †#†@NASA.

434

00:29:15,789 --> 00:29:19,730

NEXT BACK TO THE PHONE BRIDGE.
WE HAVE IRENE?

435

00:29:19,730 --> 00:29:24,690

>> THANKS.

I DON'T RECALL FROM LAST YEAR

436

00:29:24,690 --> 00:29:27,820

WHAT THE TIME FRAME IS FOR WHEN
A DECISION WOULD BE MADE ABOUT

437

00:29:27,820 --> 00:29:31,570

WHETHER AN ATTEMPT TO CONDUCT
THE TEST TOMORROW WOULD TAKE

438

00:29:31,570 --> 00:29:34,140

PLACE.

>> SO, WE HAVE OPPORTUNITIES

439

00:29:34,140 --> 00:29:37,159

EVERY DAY TO TRY AND LAUNCH FROM
JUNE 2nd TO JUNE 12th.

440

00:29:37,159 --> 00:29:39,700

WE DECIDE THE DAY BEFORE THE

LAUNCH ATTEMPT WHETHER OR NOT WE

441

00:29:39,700 --> 00:29:43,350

HAVE GOOD CONDITIONS SO WE
ACTUALLY HAVE A NOON MEETING ON

442

00:29:43,350 --> 00:29:45,840

THE DAY BEFORE THE LAUNCH DATE
TO GO THROUGH THE CONDITION,

443

00:29:45,840 --> 00:29:48,210

WEATHER CONDITIONS, THE SAFETY
CALCULATIONS TO DETERMINE IF

444

00:29:48,210 --> 00:29:50,679

IT'S GOOD.
WE THEN, IF THE CONDITIONS DO

445

00:29:50,679 --> 00:29:52,159

LOOK GOOD WE'LL PROCEED WITH THE
LAUNCH.

446

00:29:52,159 --> 00:29:56,760

THE FOLK COME IN IN THE INNING.
THE TEAM COMES IN AT 10:00 IN

447

00:29:56,760 --> 00:30:00,460

THE EVENING TO START TO GET THE
VEHICLE PREPARED AND START

448

00:30:00,460 --> 00:30:03,490

PREPARING IT ON THE BAD.
A LOT OF CREW COMES IN OVER THE

449

00:30:03,490 --> 00:30:05,980

MORNING, 2:00 IN THE MORNING,
4:00 IN THE MORNING TO FILL OUT

450

00:30:05,980 --> 00:30:08,950

THE OPERATIONS TEAM AND WE

PREPARE FOR A LAUNCH THAT'S

451

00:30:08,950 --> 00:30:12,159
BETWEEN ABOUT 7:30 AND 8:00 IN
THE MORNING MOST LIKELY.

452

00:30:12,159 --> 00:30:15,580
THEN THE VEHICLE WILL LAUNCH
FROM†-- AT THAT TIME AND GO UP

453

00:30:15,580 --> 00:30:18,960
TO AN ALTITUDE OF TWO HOURS.
WE MIGHT WAIT FOR AN HOUR OR TO

454

00:30:18,960 --> 00:30:21,820
TO GET TO A GOOD POSITION AND
FLOAT.

455

00:30:21,820 --> 00:30:24,980
THERE'S A CHANCE WE COULD BE GO
FOR A LAUNCH THE DAY BEFORE BUT

456

00:30:24,980 --> 00:30:29,529
LATER IN THE EVENING WE MAY
DETERMINE THE WIND IS NOT

457

00:30:29,529 --> 00:30:31,049
APPROPRIATE FOR A BALLOON
LAUNCH.

458

00:30:31,049 --> 00:30:35,590
WE MAY HAVE TO SCRUB AND COME
BACK AND HAVE ANOTHER MEETING AT

459

00:30:35,590 --> 00:30:40,340
NOON THAT DAY TO SEE IF THE NEXT
DAY IS A GOOD LAUNCH DAY.

460

00:30:40,340 --> 00:30:43,950
NEXT BILL HARWOOD WITH CBS NEWS.

BILL?

461

00:30:43,950 --> 00:30:45,760

OKAY.

>> BILL HARWOOD.

462

00:30:45,760 --> 00:30:50,580

CAN YOU HEAR ME NOW?

>> WE GOT YOU.

463

00:30:50,580 --> 00:30:52,380

THANKS.

>> I APOLOGIZE.

464

00:30:52,380 --> 00:31:00,210

I'M ON A CELL PHONE.

I KNOW YOU ALL TOLD US THIS LAST

465

00:31:00,210 --> 00:31:04,070

YEAR.

I MAY HAVE MISSED IT EARLIER

466

00:31:04,070 --> 00:31:06,929

TODAY.

CAN YOU REVIEW THE COST OF THE

467

00:31:06,929 --> 00:31:10,059

WHOLE PROJECT I GUESS WITH THE
FLIGHT LAST YEAR, THIS ONE AND

468

00:31:10,059 --> 00:31:12,940

WHAT YOU HAVE PLANNED?

THANKS.

469

00:31:12,940 --> 00:31:17,820

>> SO, THE TOTAL COST OF LDS D IS
APPROXIMATELY 230 MILLION DOLLAR

470

00:31:17,820 --> 00:31:24,610

WAS OUR CURRENT MANIFESTED

LAUNCHES IN 2014, 2015 AND 2016.

471

00:31:24,610 --> 00:31:32,590

OKAY.

ANY OTHER CALLS ON THE LINE?

472

00:31:32,590 --> 00:31:35,500

ANY OTHER CALLS HERE?

AT PMRS?

473

00:31:35,500 --> 00:31:37,770

SOCIAL?

>> I HAVE ONE THAT CAME IN

474

00:31:37,770 --> 00:31:45,390

FROM†-- LET'S SEE HERE, PETER

KING ASKED WHAT IS THE WEATHER

475

00:31:45,390 --> 00:31:47,010

FAST FOR TOMORROW FOR THE LAUNCH

ATTEMPT?

476

00:31:47,010 --> 00:31:49,489

I THINK YOU MIGHT HAVE COVERED

PART OF THAT.

477

00:31:49,489 --> 00:31:53,279

>> YOU'RE LOOKING AT THE WEATHER

EVERY DAY FOR THE NEXT SELFIE

478

00:31:53,279 --> 00:31:55,710

DAYS.

WE'RE WATCHING VERY INTENTLY.

479

00:31:55,710 --> 00:31:58,299

IT'S DIFFICULT TO MAKE

PREDICTIONS.

480

00:31:58,299 --> 00:31:59,940

TOMORROW IS NOT LOOKING

FAVORABLE.

481

00:31:59,940 --> 00:32:04,320

WE HAVE TO GO THROUGH THE
PROCESS TO GIVE IT A SHOT.

482

00:32:04,320 --> 00:32:07,240

RIGHT NOW I'M HOPEFUL BY THE END
OF THE WEEK OR EARLY NEXT WEEK

483

00:32:07,240 --> 00:32:10,960

WE'LL HAVE SOME BETTER
OPPORTUNITIES.

484

00:32:10,960 --> 00:32:14,020

>> MARK'S BEEN HONING HIS SKILLS
AS A WEATHER FORECASTER.

485

00:32:14,020 --> 00:32:17,279

>> IF WE HAVE NO OTHER
QUESTIONS.

486

00:32:17,279 --> 00:32:26,220

THIS CONCLUDES TODAY'S BRIEFING.
YOU CAN FOLLOW US FOR MISSION