1
00:01:14,320 --> 00:01:10,480
the thunder of powerful engines echoing

2
00:01:18,700 --> 00:01:14,330
in the desert air a plume of steam

3
00:01:24,640 --> 00:01:18,710
billowing towards the sky sparks flying

4
00:01:29,620 --> 00:01:24,650
from electrical wires the blast from a

5
00:01:31,420 --> 00:01:29,630
controlled explosion these sights and

6
00:01:33,580 --> 00:01:31,430
sounds belong to one of the world's

7
00:01:37,480 --> 00:01:33,590
finest state-of-the-art facilities for

8
00:01:39,100 --> 00:01:37,490
propulsion and materials testing in the

9
00:01:39,969 --> 00:01:39,110
desert northeast of Las Cruces New

10
00:01:42,760 --> 00:01:39,979
Mexico

11
00:01:44,680 --> 00:01:42,770
NASA's white sands test facility stands

12
00:01:46,780 --> 00:01:44,690
ready to challenge the safety and

13
00:02:03,370 --> 00:01:46,790

reliability of items slated for

14
00:02:12,229 --> 00:02:06,770
the goal at White Sands is to minimize

15
00:02:17,240 --> 00:02:12,239
flight risks safety no matter what is

16
00:02:21,740 --> 00:02:17,250
the first concern from rocket engines to

17
00:02:29,090 --> 00:02:21,750
film for a camera everything flown on a

18
00:02:33,390 --> 00:02:30,960
carefully controlled test parameters

19
00:02:38,180 --> 00:02:33,400
determine the strengths and weaknesses

20
00:02:44,880 --> 00:02:41,400
this testing is crucial to mission

21
00:02:48,000 --> 00:02:44,890
success taking the risk here on earth

22
00:02:50,340 --> 00:02:48,010
first will help avoid having to solve a

23
00:02:55,410 --> 00:02:50,350
problem miles away from home in the

24
00:02:57,720 --> 00:02:55,420
unforgiving space environment as part of

25
00:02:59,730 --> 00:02:57,730
NASA's Johnson Space Center the white

26
00:03:04,500 --> 00:02:59,740
sands test facility is primarily a

27
00:03:05,970 --> 00:03:04,510
support organization the testing

28
00:03:08,160 --> 00:03:05,980
requirements for the Johnson Space

29
00:03:12,750 --> 00:03:08,170
Center are the first priority for this

30
00:03:15,120 --> 00:03:12,760
facility however it also supports other

31
00:03:17,760 --> 00:03:15,130
NASA centers various government agencies

32
00:03:23,120 --> 00:03:17,770
and aerospace related commercial

33
00:03:27,810 --> 00:03:25,590
client provides the test article and

34
00:03:34,710 --> 00:03:27,820
defines the technical and schedule

35
00:03:36,960 --> 00:03:34,720
requirements white sands personnel

36
00:03:40,950 --> 00:03:36,970
develop and conduct the test program to

37
00:03:46,720 --> 00:03:43,900
NASA's white sands test facility employs

38
00:03:49,660 --> 00:03:46,730

a team of over 700 civil servants and

39
00:03:53,130 --> 00:03:49,670
contractors this self-sufficient

40
00:03:56,830 --> 00:03:53,140
facility includes an administrative area

41
00:04:02,410 --> 00:03:56,840
two propulsion test areas and a

42
00:04:05,530 --> 00:04:02,420
laboratories area the moderate weather

43
00:04:07,630 --> 00:04:05,540
arid climate and remote location make

44
00:04:12,090 --> 00:04:07,640
this an ideal site for propulsion and

45
00:04:14,470 --> 00:04:12,100
hazardous material testing built in 1964

46
00:04:16,990 --> 00:04:14,480
facilities here contest the entire

47
00:04:23,530 --> 00:04:17,000
propulsion system at one time to see how

48
00:04:25,510 --> 00:04:23,540
the components interact while the larger

49
00:04:27,130 --> 00:04:25,520
Saturn 5 engines which would push the

50
00:04:31,360 --> 00:04:27,140
Apollo spacecraft off the launch pad

51
00:04:33,040 --> 00:04:31,370
were tested at another NASA facility the

52
00:04:34,630 --> 00:04:33,050
white sands facility began its

53
00:04:36,880 --> 00:04:34,640
propulsion work with the development and

54
00:04:39,990 --> 00:04:36,890
certification testing of Apollo's

55
00:04:42,460 --> 00:04:40,000
service module and lunar module engines

56
00:04:51,159 --> 00:04:42,470
these engines were crucial to the

57
00:04:53,110 --> 00:04:51,169
success of the Apollo missions the

58
00:04:57,159 --> 00:04:53,120
service module engine put the astronauts

59
00:05:00,120 --> 00:04:57,169
into lunar orbit then the lunar module

60
00:05:02,860 --> 00:05:00,130
descent engine landed them on the moon

61
00:05:04,360 --> 00:05:02,870
the lunar module ascent engine blasted

62
00:05:08,830 --> 00:05:04,370
them off the moon and back into lunar

63
00:05:14,770 --> 00:05:08,840

orbit and the service module engine

64
00:05:16,840 --> 00:05:14,780
brought them back home four dozen tiny

65
00:05:18,820 --> 00:05:16,850
reaction control engines on the lunar

66
00:05:23,650 --> 00:05:18,830
module and command service module

67
00:05:25,570 --> 00:05:23,660
steered the vehicles through space over

68
00:05:27,670 --> 00:05:25,580
the years White Sands has tested more

69
00:05:32,240 --> 00:05:27,680
than three hundred engines in over two

70
00:05:41,010 --> 00:05:35,430
each test is conducted to make sure that

71
00:05:44,160 --> 00:05:41,020
the engines are safe and reliable in the

72
00:05:46,370 --> 00:05:44,170
early 1970s white sands began tests for

73
00:05:49,020 --> 00:05:46,380
the shuttles on-orbit propulsion systems

74
00:05:54,900 --> 00:05:49,030
including the orbital maneuvering system

75
00:05:57,150 --> 00:05:54,910
and the reaction control system three

76
00:05:58,680 --> 00:05:57,160
high fidelity flight light test articles

77
00:06:02,310 --> 00:05:58,690
were used for the development and

78
00:06:03,840 --> 00:06:02,320
qualification of these systems recently

79
00:06:07,710 --> 00:06:03,850
these test articles entered a new phase

80
00:06:09,510 --> 00:06:07,720
of testing in order to identify the life

81
00:06:11,700 --> 00:06:09,520
cycle limitations of the shuttle

82
00:06:18,210 --> 00:06:11,710
propulsion systems nASA has developed

83
00:06:19,710 --> 00:06:18,220
the fleet leader test program as part of

84
00:06:21,720 --> 00:06:19,720
this program white sands will

85
00:06:24,150 --> 00:06:21,730
periodically operate the test articles

86
00:06:28,020 --> 00:06:24,160
to see how repeated firings affect the

87
00:06:30,270 --> 00:06:28,030
system these test articles will undergo

88
00:06:35,040 --> 00:06:30,280

more firings and checkouts than any of

89
00:06:37,290 --> 00:06:35,050
the corresponding flight systems as a

90
00:06:39,659 --> 00:06:37,300
result shuttle component problems

91
00:06:41,210 --> 00:06:39,669
resulting from long-term exposure to

92
00:06:44,310 --> 00:06:41,220
corrosive rocket propellants and

93
00:06:50,270 --> 00:06:44,320
multi-mission operation can be resolved

94
00:06:56,060 --> 00:06:52,890
propulsion testing is conducted in two

95
00:07:02,340 --> 00:06:56,070
separate locations designated 300 and

96
00:07:05,340 --> 00:07:02,350
400 test areas in the 300 test area to

97
00:07:07,900 --> 00:07:05,350
test stands operate at normal or ambient

98
00:07:10,690 --> 00:07:07,910
atmospheric pressure

99
00:07:12,550 --> 00:07:10,700
these stands are hinged to accommodate

100
00:07:14,490 --> 00:07:12,560
rocket systems which must be tested in

101
00:07:17,380 --> 00:07:14,500
both horizontal and vertical

102
00:07:19,120 --> 00:07:17,390
orientations such as the steering

103
00:07:25,330 --> 00:07:19,130
thrusters which control the shuttles

104
00:07:26,950 --> 00:07:25,340
position in orbit a third test chamber

105
00:07:28,990 --> 00:07:26,960
allows rocket engine tests to be

106
00:07:34,390 --> 00:07:29,000
conducted under simulated space vacuum

107
00:07:37,900 --> 00:07:34,400
condition the largest of these tests and

108
00:07:40,330 --> 00:07:37,910
302 was extended to a height of 58 feet

109
00:07:45,220 --> 00:07:40,340
during the Viking Mars Lander program in

110
00:07:47,470 --> 00:07:45,230
the early 1970s at that time it was used

111
00:07:49,960 --> 00:07:47,480
to simulate the physical and biological

112
00:07:52,810 --> 00:07:49,970
effects of a rocket engine landing on

113
00:07:54,490 --> 00:07:52,820

Martian soil this work led to

114
00:07:56,800 --> 00:07:54,500
improvements to the rocket engine and

115
00:08:00,970 --> 00:07:56,810
its fuel prior to the launch of the

116
00:08:03,130 --> 00:08:00,980
Viking probe the stand has since been

117
00:08:08,740 --> 00:08:03,140
modified to accommodate vacuum testing

118
00:08:10,960 --> 00:08:08,750
of space station propulsion systems one

119
00:08:13,210 --> 00:08:10,970
of the largest instant steam generating

120
00:08:17,260 --> 00:08:13,220
systems in the country is located in the

121
00:08:19,210 --> 00:08:17,270
400 test area it can generate over 3/4

122
00:08:22,270 --> 00:08:19,220
of a million horsepower which would

123
00:08:27,499 --> 00:08:22,280
equal the power of over 5,000 automobile

124
00:08:32,579 --> 00:08:30,570
this steam generator closely simulates

125
00:08:34,589 --> 00:08:32,589
the space environment by allowing the

126
00:08:36,990 --> 00:08:34,599
interior of the altitude chambers to

127
00:08:44,040 --> 00:08:37,000
remain in a near vacuum during an engine

128
00:08:46,500 --> 00:08:44,050
firing to create the vacuum the engine

129
00:08:50,700 --> 00:08:46,510
fires into a large specially shaped duct

130
00:08:52,650 --> 00:08:50,710
which vents to the outside inside the

131
00:08:54,960 --> 00:08:52,660
duct our nozzles that inject cooling

132
00:08:56,670 --> 00:08:54,970
water and shoot high-pressure steam in

133
00:09:00,090 --> 00:08:56,680
the same direction as the exhaust is

134
00:09:03,030 --> 00:09:00,100
traveling the steam is accelerated to

135
00:09:05,730 --> 00:09:03,040
supersonic speeds as it is ejected by

136
00:09:07,980 --> 00:09:05,740
the system this creates a low pressure

137
00:09:10,530 --> 00:09:07,990
which has enough suction to pull all the

138
00:09:14,430 --> 00:09:10,540

atmosphere and the Rockets exhaust out

139
00:09:16,680 --> 00:09:14,440
of the info stand as a result the engine

140
00:09:20,850 --> 00:09:16,690
and exhaust plume are kept in a near

141
00:09:22,980 --> 00:09:20,860
vacuum testing under vacuum conditions

142
00:09:25,320 --> 00:09:22,990
is vital because rocket engines perform

143
00:09:28,530 --> 00:09:25,330
significantly better in space than in

144
00:09:30,300 --> 00:09:28,540
tests at atmospheric pressure this

145
00:09:35,519 --> 00:09:30,310
difference in performance must be

146
00:09:38,970 --> 00:09:35,529
measured precisely test stands for o1

147
00:09:42,079 --> 00:09:38,980
and 403 our altitude chambers used for

148
00:09:44,460 --> 00:09:42,089
testing liquid propellant engines a

149
00:09:47,070 --> 00:09:44,470
full-scale shuttle orbital maneuvering

150
00:09:49,650 --> 00:09:47,080
system pod and a flight type orbital

151
00:09:54,800 --> 00:09:49,660
maneuvering engine are installed in test

152
00:10:00,930 --> 00:09:57,660
another specialized vacuum test stand

153
00:10:02,520 --> 00:10:00,940
designated 405 was designed to determine

154
00:10:04,470 --> 00:10:02,530
the performance of the solid rocket

155
00:10:06,810 --> 00:10:04,480
motors typically used to boost

156
00:10:10,830 --> 00:10:06,820
spacecraft into orbits higher than the

157
00:10:12,780 --> 00:10:10,840
shuttle can reach solid rocket motor

158
00:10:15,630 --> 00:10:12,790
testing is difficult because these

159
00:10:19,470 --> 00:10:15,640
motors are often spun as they are fired

160
00:10:22,890 --> 00:10:19,480
a special fixture was set up to spin the

161
00:10:26,520 --> 00:10:22,900
motors at rates up to 125 revolutions

162
00:10:28,710 --> 00:10:26,530
per minute motor pressures temperatures

163
00:10:30,870 --> 00:10:28,720

and thrust outputs are measured to

164
00:10:34,710 --> 00:10:30,880
verify compliance with performance

165
00:10:37,020 --> 00:10:34,720
guidelines this stand can also test

166
00:10:43,320 --> 00:10:37,030
liquid fuel rocket engines such as the

167
00:10:44,520 --> 00:10:43,330
shuttles steering thrusters each test

168
00:10:48,140 --> 00:10:44,530
stand is operated from the

169
00:10:50,340 --> 00:10:48,150
blast-resistant control center

170
00:10:52,530 --> 00:10:50,350
underground tunnels connect the stands

171
00:11:03,050 --> 00:10:52,540
with the control center and protect the

172
00:11:07,740 --> 00:11:06,120
each test article is instrumented with

173
00:11:10,920 --> 00:11:07,750
hundreds of devices each measure

174
00:11:14,819 --> 00:11:10,930
pressures temperatures vibrations and

175
00:11:16,500 --> 00:11:14,829
flow rates the test procedure is

176
00:11:24,259 --> 00:11:16,510
precisely controlled to allow a

177
00:11:31,129 --> 00:11:27,120
for sets of computers acquire and

178
00:11:36,329 --> 00:11:33,930
these computers offer real-time test

179
00:11:41,790 --> 00:11:36,339
control plus digital and color graphic

180
00:11:43,800 --> 00:11:41,800
data displays engineers analyze the data

181
00:11:47,490 --> 00:11:43,810
to determine if the system met

182
00:11:48,990 --> 00:11:47,500
performance objectives following a

183
00:11:50,910 --> 00:11:49,000
firing the propulsion system is

184
00:11:56,850 --> 00:11:50,920
carefully checked out and examined for

185
00:12:00,120 --> 00:11:56,860
damage propulsion testing is more than

186
00:12:02,220 --> 00:12:00,130
just fire and smoke often white sands

187
00:12:04,079 --> 00:12:02,230
personnel must develop procedures were

188
00:12:07,319 --> 00:12:04,089

safely handling toxic or hazardous

189
00:12:10,550 --> 00:12:07,329
propellants in various situations such

190
00:12:12,990 --> 00:12:10,560
as loading propellants onto the shuttle

191
00:12:15,120 --> 00:12:13,000
other work involves continued

192
00:12:17,579 --> 00:12:15,130
development of environmentally safe

193
00:12:21,520 --> 00:12:17,589
systems or destroying toxic fuel waste

194
00:12:26,180 --> 00:12:23,840
techniques are also developed for

195
00:12:27,830 --> 00:12:26,190
cleaning and refurbishing shuttle

196
00:12:30,080 --> 00:12:27,840
propellant components which have

197
00:12:38,060 --> 00:12:30,090
accumulated contamination during more

198
00:12:40,100 --> 00:12:38,070
than 10 years of flight operations many

199
00:12:42,200 --> 00:12:40,110
special projects at white sands are

200
00:12:47,420 --> 00:12:42,210
supported by an extensive laboratory

201
00:12:50,090 --> 00:12:47,430
complex the laboratories area has nine

202
00:12:52,040 --> 00:12:50,100
remote tested cells designed for high

203
00:12:55,270 --> 00:12:52,050
pressure testing with gaseous and liquid

204
00:13:01,000 --> 00:12:58,520
there are also 14 remote test cells

205
00:13:03,350 --> 00:13:01,010
capable of withstanding explosions and

206
00:13:07,280 --> 00:13:03,360
designed for operation with hazardous

207
00:13:08,900 --> 00:13:07,290
toxic fluids in this area special

208
00:13:14,990 --> 00:13:08,910
equipment is used to examine the

209
00:13:16,700 --> 00:13:15,000
ignition combustion and explosive

210
00:13:21,140 --> 00:13:16,710
properties of typical spacecraft

211
00:13:23,120 --> 00:13:21,150
materials and propellers white sands has

212
00:13:26,390 --> 00:13:23,130
one of the most extensive materials

213
00:13:29,360 --> 00:13:26,400

testing laboratories in the world this

214
00:13:32,140 --> 00:13:29,370
lab characterizes materials on earth so

215
00:13:35,180 --> 00:13:32,150
that they can be depended on in space

216
00:13:37,850 --> 00:13:35,190
over 90% of all the nonmetallic

217
00:13:40,610 --> 00:13:37,860
materials flown during the Apollo Skylab

218
00:13:44,480 --> 00:13:40,620
and shuttle programs have been tested at

219
00:13:46,280 --> 00:13:44,490
white sands currently work focuses on

220
00:13:50,530 --> 00:13:46,290
materials proposed for use on the

221
00:13:53,480 --> 00:13:50,540
shuttle its payloads and space station

222
00:13:57,470 --> 00:13:53,490
among the unique tests conducted here is

223
00:13:59,240 --> 00:13:57,480
the flammability of metals white sands

224
00:14:07,820 --> 00:13:59,250
is a proven leader in this type of

225
00:14:11,870 --> 00:14:10,190
recently hypervelocity particle

226
00:14:25,160 --> 00:14:11,880
launchers have been added to white sands

227
00:14:26,990 --> 00:14:25,170
arsenal of tools these light gas guns

228
00:14:29,600 --> 00:14:27,000
propel objects up to one inch in

229
00:14:33,199 --> 00:14:29,610
diameter at speeds of nearly seven

230
00:14:36,590 --> 00:14:33,209
kilometers per second or ten times as

231
00:14:39,079 --> 00:14:36,600
fast as a high-powered rifle this

232
00:14:43,009 --> 00:14:39,089
simulates the impact of meteoroids and

233
00:14:47,000 --> 00:14:43,019
orbital debris on hazardous targets such

234
00:14:52,630 --> 00:14:47,010
as pressurized containers propellant

235
00:14:59,920 --> 00:14:55,400
there is more to the lab area than

236
00:15:02,360 --> 00:14:59,930
testing materials or studying explosions

237
00:15:05,449 --> 00:15:02,370
often parts that have failed on board

238
00:15:06,860 --> 00:15:05,459

the shuttle are analyzed in the

239
00:15:10,819 --> 00:15:06,870
controlled environment of the lab

240
00:15:12,650 --> 00:15:10,829
engineers try to mimic the failures from

241
00:15:17,930 --> 00:15:12,660
that they can identify the specific

242
00:15:20,210 --> 00:15:17,940
problem and work on a solution an other

243
00:15:23,120 --> 00:15:20,220
area of interest is payloads outgassing

244
00:15:27,170 --> 00:15:23,130
or the migration of molecules out of

245
00:15:31,460 --> 00:15:27,180
organic products tests are conducted on

246
00:15:35,540 --> 00:15:31,470
everything from laptop computers to

247
00:15:38,480 --> 00:15:35,550
animal enclosures to film for onboard

248
00:15:40,250 --> 00:15:38,490
cameras to ensure that nothing toxic is

249
00:15:44,120 --> 00:15:40,260
released from materials due to

250
00:15:46,370 --> 00:15:44,130
outgassing also payloads that fly

251
00:15:48,410 --> 00:15:46,380
together are tested to make sure that

252
00:15:52,790 --> 00:15:48,420
one payloads outgassing does not

253
00:15:54,769 --> 00:15:52,800
contaminate other payloads and white

254
00:15:57,889 --> 00:15:54,779
sands clean rooms are used continuously

255
00:15:59,510 --> 00:15:57,899
to precision clean all the parts used in

256
00:16:03,800 --> 00:15:59,520
rocket propellant and liquid oxygen

257
00:16:07,040 --> 00:16:03,810
tests these clean rooms are an integral

258
00:16:08,900 --> 00:16:07,050
part of the test program tests using

259
00:16:12,620 --> 00:16:08,910
rocket fuels cannot be conducted without

260
00:16:14,840 --> 00:16:12,630
precision clean parts if a small bit of

261
00:16:17,870 --> 00:16:14,850
organic material is on the test article

262
00:16:19,360 --> 00:16:17,880
and it is tested in pure oxygen a fire

263
00:16:21,280 --> 00:16:19,370

could result

264
00:16:23,950 --> 00:16:21,290
the clean room not only ensures

265
00:16:26,620 --> 00:16:23,960
uncontaminated test results but more

266
00:16:35,410 --> 00:16:26,630
importantly provides a necessary safety

267
00:16:38,170 --> 00:16:35,420
factor one indispensable and rather

268
00:16:42,640 --> 00:16:38,180
unusual test capability is the odor

269
00:16:45,310 --> 00:16:42,650
panel since 1967 a panel of volunteers

270
00:16:47,800 --> 00:16:45,320
has sniffed literally every item that

271
00:16:51,520 --> 00:16:47,810
has flown in the crew cabins of NASA's

272
00:16:53,290 --> 00:16:51,530
manned spacecraft this is important

273
00:17:09,600 --> 00:16:53,300
because a bad odor permeating an

274
00:17:24,770 --> 00:17:16,390
and alysus calibration valve disassembly

275
00:17:34,910 --> 00:17:30,730
x-ray special component-level testing

276
00:17:39,770 --> 00:17:34,920
and photography for all propulsion and

277
00:17:41,660 --> 00:17:39,780
laboratory activities technical support

278
00:17:45,470 --> 00:17:41,670
at white sands doesn't stop with the

279
00:17:47,450 --> 00:17:45,480
completion of the test these engineers

280
00:17:49,220 --> 00:17:47,460
scientists and technicians are

281
00:17:53,330 --> 00:17:49,230
determined to provide the answers to

282
00:17:55,370 --> 00:17:53,340
whatever questions might be posed they

283
00:17:58,520 --> 00:17:55,380
have even compiled several handbooks on

284
00:17:59,750 --> 00:17:58,530
aerospace fluid hazards as well as

285
00:18:07,310 --> 00:17:59,760
provided support for special

286
00:18:09,500 --> 00:18:07,320
investigations and hazard assessments in

287
00:18:11,960 --> 00:18:09,510
addition to providing top-notch test

288
00:18:13,850 --> 00:18:11,970

cells and laboratories the white sands

289
00:18:22,270 --> 00:18:13,860
test facility also supports another

290
00:18:27,650 --> 00:18:25,220
dry gypsum lake bed at the nearby US

291
00:18:30,530 --> 00:18:27,660
Army White Sands Missile Range provides

292
00:18:32,600 --> 00:18:30,540
two seven mile long runways for shuttle

293
00:18:36,740 --> 00:18:32,610
landing operations and astronaut

294
00:18:39,170 --> 00:18:36,750
training designated white sands Space

295
00:18:41,810 --> 00:18:39,180
Harbor this area of the Missile Range

296
00:18:52,310 --> 00:18:41,820
serves as an alternate landing site for

297
00:18:57,230 --> 00:18:54,710
although only one shuttle has landed

298
00:18:59,990 --> 00:18:57,240
here the Space Harbor is used everyday

299
00:19:03,230 --> 00:19:00,000
and often at night as an essential

300
00:19:05,180 --> 00:19:03,240
training ground for shuttle pilots here

301
00:19:06,620 --> 00:19:05,190
astronauts practice approaches and

302
00:19:08,899 --> 00:19:06,630
landings using the shuttle training

303
00:19:10,360 --> 00:19:08,909
aircraft which mimics the shuttles

304
00:19:18,350 --> 00:19:10,370
flight characteristics and

305
00:19:20,480 --> 00:19:18,360
instrumentation in 1989 a third runway

306
00:19:23,389 --> 00:19:20,490
was added to Train astronauts for

307
00:19:26,419 --> 00:19:23,399
transatlantic abort landings this

308
00:19:28,340 --> 00:19:26,429
shorter and narrower runway is almost an

309
00:19:35,710 --> 00:19:28,350
exact duplicate in size and appearance

310
00:19:39,950 --> 00:19:37,759
located near the white sands test

311
00:19:41,659 --> 00:19:39,960
facility is another installation which

312
00:19:44,450 --> 00:19:41,669
provides an important service to the

313
00:19:47,680 --> 00:19:44,460

shuttle program the tracking and data

314
00:19:50,419 --> 00:19:47,690
relay satellite system ground terminals

315
00:19:53,119 --> 00:19:50,429
two terminals are located about four

316
00:19:56,240 --> 00:19:53,129
miles apart each is responsible for

317
00:19:59,060 --> 00:19:56,250
receiving voice television and data from

318
00:20:00,710 --> 00:19:59,070
orbiting shuttles both terminals are

319
00:20:03,470 --> 00:20:00,720
supervised by nasa's goddard space

320
00:20:13,780 --> 00:20:03,480
flight center and are not related to the

321
00:20:19,060 --> 00:20:15,910
the outstanding track record at white

322
00:20:21,520 --> 00:20:19,070
sands centers around its people they are

323
00:20:24,160 --> 00:20:21,530
involved in all facets of the test from

324
00:20:25,830 --> 00:20:24,170
inception to completion these

325
00:20:28,630 --> 00:20:25,840
professionals have the resources

326
00:20:30,790 --> 00:20:28,640
training and experience necessary to

327
00:20:33,910 --> 00:20:30,800
provide state-of-the-art support for

328
00:20:35,770 --> 00:20:33,920
various test requirements the future

329
00:20:40,510 --> 00:20:35,780
holds many challenges for the white

330
00:20:42,460 --> 00:20:40,520
sands test facility at white sands years

331
00:20:44,770 --> 00:20:42,470
of experience combined with the physical

332
00:20:46,900 --> 00:20:44,780
assets of the facility will continue to

333
00:20:49,240 --> 00:20:46,910
provide the capability to safely

334
00:20:53,950 --> 00:20:49,250
evaluate potential hazards which may

335
00:20:57,450 --> 00:20:53,960
arise on earth and in space whether it

336
00:21:01,750 --> 00:20:57,460
involves firing rocket engines

337
00:21:06,250 --> 00:21:01,760
evaluating advanced materials studying

338
00:21:11,080 --> 00:21:06,260

explosions or testing new exotic

339
00:21:13,600 --> 00:21:11,090
propellants today's work at the white

340
00:21:15,970 --> 00:21:13,610
sands test facility will continue to