1
00:00:00,000 --> 00:00:00,009
\h

2
00:00:00,010 --> 00:00:01,010
(Music)

3
00:00:01,140 --> 00:00:04,079
Mike Leinbach, Shuttle Launch Director: There are so many things that can keep a shuttle on the ground,

4
00:00:04,080 --> 00:00:04,753
weather being one of them. It's one of the more visible ones to the public, of course.

5
00:00:09,140 --> 00:00:11,373
Narrator: Weather is often the difference between "go" and "no go" when a space shuttle is ready to lift

6
00:00:13,840 --> 00:00:17,040
off from NASA's Kennedy Space Center in Florida.

7
00:00:17,250 --> 00:00:18,876
The task of tracking the weather and determining whether or not it's safe for a shuttle to launch falls to

8
00:00:22,690 --> 00:00:24,490
the Launch Weather Officer.

9
00:00:24,780 --> 00:00:25,566
It's a service provided by the U.S. Air Force 45th Weather Squadron, based at nearby Cape Canaveral Air Forc

10
00:00:31,860 --> 00:00:34,740
Kathy Winters, Shuttle Launch Weather Officer: Well it's a very tropical environment here in Florida.

11
00:00:35,780 --> 00:00:37,186
We have the sea breeze that occurs, we have the river breezes that occur.

12
00:00:39,240 --> 00:00:41,080
Anytime we get some low-level convergence and we have enough moisture, we can develop showers

13
00:00:43,600 --> 00:00:43,920

and thunderstorms, particularly in the summer time. And so, working the weather, you want to really be

14
00:00:50,080 --> 00:00:51,326
able to nail it down, but there's a lot of times where there's a lot of iffy situations.

15
00:00:54,700 --> 00:00:55,193
And so that's where it's really challenging.

16
00:00:57,140 --> 00:00:59,780
Narrator: Space shuttle launches are governed by a complex set of weather rules, called "launch commit

17
00:01:01,300 --> 00:01:05,300
criteria," designed to keep the shuttle and astronauts safe.

18
00:01:05,860 --> 00:01:06,080
There are limits for rain, lightning, clouds and winds. And if any one of the rules is violated,

19
00:01:12,040 --> 00:01:13,173
that's a "no-go."

20
00:01:13,980 --> 00:01:16,296
Winters: It may look good out here, but we actually could be red. And so I know a lot of people think, "It

21
00:01:18,730 --> 00:01:19,416
wasn't that bad!" But it's violating our launch commit criteria and we have a safety issue.

22
00:01:24,110 --> 00:01:25,576
So we have to call it.

23
00:01:26,430 --> 00:01:28,456
Narrator: The team can only begin filling the shuttle's 15-story external fuel tank if weather permits –

24
00:01:31,470 --> 00:01:31,626
and of course, conditions must be favorable at the launch pad at liftoff.

25
00:01:36,180 --> 00:01:38,310
They also need good conditions for a landing, in case the shuttle develops a problem during flight and

26
00:01:40,850 --> 00:01:41,800
must come back to land at Kennedy -- an unlikely, last-resort emergency landing option called a Return

27
00:01:46,700 --> 00:01:48,100
to Launch Site abort.

28
00:01:48,900 --> 00:01:49,783
Winters relies on several forecasting tools including radars, satellite imagery, weather balloons and

29
00:01:54,750 --> 00:01:56,016
other data sources.

30
00:01:56,590 --> 00:01:58,416
Winters: The location of the radar is off to the west, as opposed to the south. So our new radar being off

31
00:02:01,830 --> 00:02:03,556
to the left allows us to pick up the sea breeze a lot better, particularly now because we have

32
00:02:06,370 --> 00:02:08,703
Doppler capability with this radar.

33
00:02:09,340 --> 00:02:11,146
Narrator: Conditions can change quickly, so the launch team often will go ahead with a countdown –

34
00:02:14,200 --> 00:02:14,943
despite a gloomy forecast -- just to be ready in case the weather changes for the better.

35
00:02:19,390 --> 00:02:21,056
Leinbach: I recall one mission where we decided to tank and go for launch with only 5 percent chance of

36
00:02:24,590 --> 00:02:25,873
launching that day, and indeed, we launched. And so that's a case where we got lucky, probably.

37
00:02:29,640 --> 00:02:30,483
There've been other cases where we had, you know, about an 80 percent "go" for launch, and then we

38
00:02:35,330 --> 00:02:36,150

end up scrubbing for weather. More often than not, we'll give it a shot.

39
00:02:39,310 --> 00:02:40,383
Narrator: The team has weathered some memorable days -- one of which took place in August 2006,

40
00:02:44,570 --> 00:02:45,596
when Hurricane Ernesto threatened Kennedy Space Center as shuttle Atlantis waited on the launch pad.

41
00:02:50,210 --> 00:02:51,543
Leinbach: Hurricanes and a shuttle on the launch pad are incompatible, as you might imagine.

42
00:02:55,010 --> 00:02:55,603
And so we have very strict criteria to roll the vehicle back to the VAB in

43
00:02:59,350 --> 00:03:01,816
the event of a threatening hurricane.

44
00:03:04,040 --> 00:03:05,970
Narrator: Space shuttle Atlantis began the long, slow roll from the launch pad to the safety of the

45
00:03:08,710 --> 00:03:12,043
Vehicle Assembly Building in advance of the storm.

46
00:03:12,480 --> 00:03:13,286
But when the shuttle was only a third of the way through the six-hour move, Leinbach learned Ernesto

47
00:03:18,340 --> 00:03:18,883
had not strengthened -- and he sent the shuttle back to the launch pad.

48
00:03:22,530 --> 00:03:23,970
Leinbach: And we went back to the pad, the storm passed about 50 miles offshore, got a little bit of rain

49
00:03:28,090 --> 00:03:29,660
and some wind, but no big deal -- and we were able to launch about seven or eight days later.

50
00:03:32,720 --> 00:03:35,436
Winters: It was just so unique. It was very challenging. At the time I probably wouldn't have called it my

51
00:03:37,070 --> 00:03:42,403
favorite, but now, looking back, it's one of our favorite stories to talk about.

52
00:03:43,260 --> 00:03:44,200
Narrator: Winters is part of a team of about 40 people supporting launch at the 45th Weather Squadron.

53
00:03:49,120 --> 00:03:50,110
That's in addition to personnel at Johnson Space Center's Spaceflight Meteorology Group in Houston,

54
00:03:54,730 --> 00:03:54,980
the Marshall Space Flight Center in Huntsville, and the weather office here at Kennedy.

55
00:04:00,280 --> 00:04:01,820
But the working relationship between the launch director and launch weather officer is critical.

56
00:04:05,140 --> 00:04:06,176
Leinbach: We do a daily weather tag-up every day. Monday through Friday, every day, for about 10, 15

57
00:04:10,770 --> 00:04:11,763
minutes. Doing a daily with her is really helpful, not only for the people processing the vehicle at the

58
00:04:16,710 --> 00:04:17,886
pad, but it builds that relationship between she and I that is very critical on launch day.

59
00:04:21,600 --> 00:04:22,030
Leinbach: Range weather.

60
00:04:22,770 --> 00:04:24,089
Winters: Weather has no constraints for launch.

61
00:04:24,090 --> 00:04:24,520
Leinbach: Thank you, Kathy.

62
00:04:25,460 --> 00:04:27,503
Winters: There's been times we've been in tough situations and I think Mike can tell just from the sound

63
00:04:30,350 --> 00:04:35,483

of my voice what I'm feeling, what I'm thinking about a particular situation.

64
00:04:36,030 --> 00:04:37,180
So he knows if I'm getting more concerned about something just by the tone of my voice.