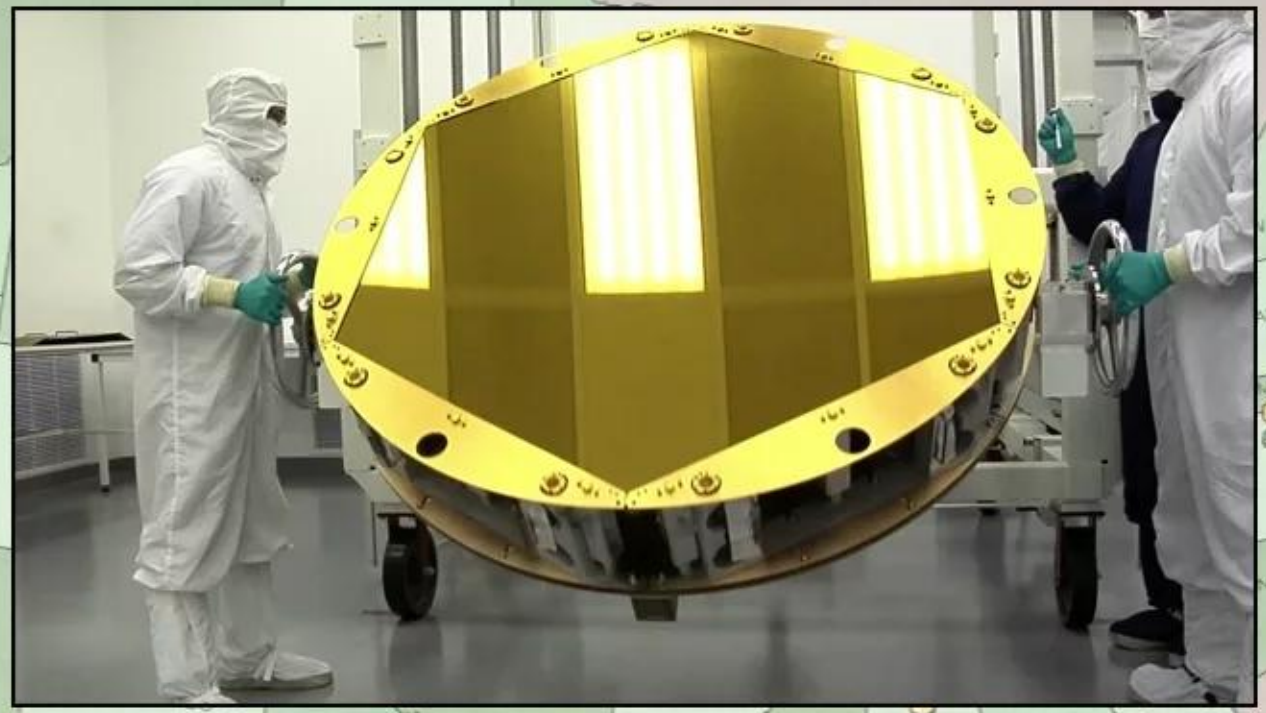
WASHINGTON
OREGON
IDAHO
NEVADA
CALIFORNIA
UTAH
ARIZONA
TEXAS
LOUISIANA
MISSISSIPPI
ALABAMA
GEORGIA
FLORIDA
MAINE
VERMONT
MASS
CONN

1
00:00:14,150 --> 00:00:12,390
our most powerful window in the universe

2
00:00:16,870 --> 00:00:14,160
is nearing final assembly

3
00:00:19,029 --> 00:00:16,880
a 21 foot diameter segmented array of

4
00:00:22,150 --> 00:00:19,039
mirrors is the heart of nasa's james

5
00:00:24,070 --> 00:00:22,160
webb space telescope

6
00:00:25,349 --> 00:00:24,080
this powerful successor to the hubble

7
00:00:27,429 --> 00:00:25,359
space telescope

8
00:00:31,029 --> 00:00:27,439
will allow humans to see farther into

9
00:00:32,870 --> 00:00:31,039
the universe than ever before

10
00:00:35,110 --> 00:00:32,880
this herculean effort has pulled

11
00:00:36,389 --> 00:00:35,120
together technical experts from across

12
00:00:38,389 --> 00:00:36,399
the nation

13
00:00:40,229 --> 00:00:38,399

the mirror odyssey begins in a mine

14
00:00:41,350 --> 00:00:40,239
where the precious metal beryllium is

15
00:00:43,110 --> 00:00:41,360
extracted

16
00:00:45,350 --> 00:00:43,120
beryllium is the choice for mere

17
00:00:46,069 --> 00:00:45,360
material because it is lightweight and

18
00:00:49,190 --> 00:00:46,079
stable

19
00:00:51,510 --> 00:00:49,200
at the cold temperatures of space

20
00:00:54,470 --> 00:00:51,520
the beryllium powder is cast into four

21
00:00:56,549 --> 00:00:54,480
foot wide hexagonal mirror segments

22
00:00:58,389 --> 00:00:56,559
they are precisely ground and polished

23
00:01:00,549 --> 00:00:58,399
to a precision a thousand times

24
00:01:01,910 --> 00:01:00,559
smaller than the thickness of a human

25
00:01:03,910 --> 00:01:01,920
hair

26
00:01:05,750 --> 00:01:03,920
the mirrors are then tested to simulate

27
00:01:09,429 --> 00:01:05,760
the cold of deep space

28
00:01:11,510 --> 00:01:09,439
at minus 400 degrees fahrenheit

29
00:01:12,550 --> 00:01:11,520
mirrors are next coated with a very thin

30
00:01:14,870 --> 00:01:12,560
layer of gold

31
00:01:16,870 --> 00:01:14,880
which is needed to efficiently reflect

32
00:01:19,190 --> 00:01:16,880
infrared light to the telescope's

33
00:01:21,350 --> 00:01:19,200
cameras

34
00:01:24,149 --> 00:01:21,360
the mirrors are then vibrated to see if

35
00:01:26,070 --> 00:01:24,159
they can survive the rigors of launch

36
00:01:27,910 --> 00:01:26,080
at present the mirrors are nearly

37
00:01:30,789 --> 00:01:27,920
completed they are ready to be

38
00:01:32,710 --> 00:01:30,799

positioned on a giant skeletal frame

39
00:01:34,069 --> 00:01:32,720
cameras and other instruments will be

40
00:01:37,510 --> 00:01:34,079
added to the rear

41
00:01:39,510 --> 00:01:37,520
of this back plane the telescope will

42
00:01:39,990 --> 00:01:39,520
then be rolled into the giant thermal

43
00:01:42,630 --> 00:01:40,000
vacuum

44
00:01:44,230 --> 00:01:42,640
chamber used to test the apollo lunar

45
00:01:46,469 --> 00:01:44,240
spacecraft

46
00:01:47,830 --> 00:01:46,479
after that the two-story high optical

47
00:01:50,069 --> 00:01:47,840
telescope assembly

48
00:01:51,030 --> 00:01:50,079
will be attached to a tennis court size

49
00:01:53,830 --> 00:01:51,040
sun shape

50
00:01:55,830 --> 00:01:53,840
designed to deflect heat from the sun

51
00:01:58,069 --> 00:01:55,840
the telescope's gold mirrors will be

52
00:02:00,950 --> 00:01:58,079
used to seek our cosmic origins

53
00:02:02,789 --> 00:02:00,960
by seeing earliest galaxies and perhaps