1
00:00:29,069 --> 00:00:26,550
Space Station freedom the next step in

2
00:00:33,090 --> 00:00:29,079
our continuing effort to explore beyond

3
00:00:36,569 --> 00:00:33,100
Earth's boundaries as we establish a

4
00:00:40,110 --> 00:00:36,579
permanent presence in space new medical

5
00:00:44,579 --> 00:00:40,120
challenges will have to be met with

6
00:00:47,729 --> 00:00:44,589
longer missions larger crews and the

7
00:00:49,680 --> 00:00:47,739
complexities of a medical rescue the

8
00:00:51,810 --> 00:00:49,690
health of freedoms international crew

9
00:01:05,100 --> 00:00:51,820
will be essential for the success of

10
00:01:11,590 --> 00:01:09,490
the crew health care system or checks is

11
00:01:18,270 --> 00:01:11,600
currently being designed and developed

12
00:01:23,140 --> 00:01:20,620
distributed throughout the space station

13
00:01:25,690 --> 00:01:23,150

this system will provide the total

14
00:01:29,850 --> 00:01:25,700
spectrum of crew health care with three

15
00:01:33,960 --> 00:01:29,860
distinct but interconnected components

16
00:01:38,350 --> 00:01:33,970
the exercise countermeasures facility

17
00:01:50,170 --> 00:01:38,360
the environmental health system and the

18
00:01:57,340 --> 00:01:54,280
air and water two of the most important

19
00:02:03,430 --> 00:01:57,350
elements for human survival on earth as

20
00:02:05,260 --> 00:02:03,440
well as in space Space Station freedom

21
00:02:07,540 --> 00:02:05,270
will provide crew members with the

22
00:02:11,650 --> 00:02:07,550
opportunity to live and work in space

23
00:02:13,300 --> 00:02:11,660
for extended periods of time but how

24
00:02:16,960 --> 00:02:13,310
will we ensure the quality of the

25
00:02:19,690 --> 00:02:16,970
environment there how will air and water

26
00:02:24,250 --> 00:02:19,700
be kept clean for human consumption now

27
00:02:26,170 --> 00:02:24,260
and 30 years from now these are some of

28
00:02:29,470 --> 00:02:26,180
the questions that the environmental

29
00:02:35,260 --> 00:02:29,480
health system or EHS is seeking to

30
00:02:39,400 --> 00:02:35,270
answer here to explain more on EHS is

31
00:02:42,490 --> 00:02:39,410
dane russo PhD project manager of the

32
00:02:45,070 --> 00:02:42,500
environmental health system a unique and

33
00:02:47,080 --> 00:02:45,080
versatile concept the Space Station

34
00:02:50,560 --> 00:02:47,090
freedom will determine what we do in

35
00:02:52,930 --> 00:02:50,570
space and how we do it its diversity is

36
00:02:54,960 --> 00:02:52,940
reflected in its design which includes

37
00:02:58,330 --> 00:02:54,970
pressurized living quarters and

38
00:03:00,190 --> 00:02:58,340

laboratories maintenance of a safe and

39
00:03:03,460 --> 00:03:00,200
habitable environment will be a

40
00:03:05,680 --> 00:03:03,470
significant challenge space stations air

41
00:03:08,199 --> 00:03:05,690
and water will be recycled in a

42
00:03:11,229 --> 00:03:08,209
closed-loop environmental control system

43
00:03:13,000 --> 00:03:11,239
and such a system all of the elements of

44
00:03:17,199 --> 00:03:13,010
the internal environment are linked

45
00:03:20,380 --> 00:03:17,209
together EHS scientists and engineers

46
00:03:23,050 --> 00:03:20,390
are working together to develop new

47
00:03:25,360 --> 00:03:23,060
techniques for monitoring contaminants

48
00:03:27,610 --> 00:03:25,370
and the internal environment thus

49
00:03:31,000 --> 00:03:27,620
working together to help make the space

50
00:03:34,270 --> 00:03:31,010
station freedom a safe place to live and

51
00:03:39,199 --> 00:03:36,949
the laboratory module will provide the

52
00:03:41,270 --> 00:03:39,209
space station with facilities for life

53
00:03:44,539 --> 00:03:41,280
sciences and materials processing

54
00:03:47,059 --> 00:03:44,549
research development and testing these

55
00:03:49,220 --> 00:03:47,069
types of operations while important for

56
00:03:51,890 --> 00:03:49,230
the commercial and scientific success of

57
00:03:53,929 --> 00:03:51,900
the station carry with them the inherent

58
00:03:57,020 --> 00:03:53,939
risk of contamination of the space

59
00:03:59,660 --> 00:03:57,030
stations internal environment a chemical

60
00:04:01,940 --> 00:03:59,670
spill or leak or even the common flu

61
00:04:05,500 --> 00:04:01,950
guards could present a potential hazard

62
00:04:10,460 --> 00:04:07,909
appropriate crew and ground response

63
00:04:13,460 --> 00:04:10,470

will require the capability to monitor

64
00:04:17,599 --> 00:04:13,470
detect and identify space station

65
00:04:21,259 --> 00:04:17,609
internal contaminants one area of

66
00:04:23,960 --> 00:04:21,269
concern is water quality on shuttle

67
00:04:27,320 --> 00:04:23,970
flights water systems are serviced after

68
00:04:29,629 --> 00:04:27,330
every flight the goal for freedom is to

69
00:04:34,189 --> 00:04:29,639
minimize resupply needs through water

70
00:04:38,999 --> 00:04:37,079
Limited earth-based experience with lot

71
00:04:40,919 --> 00:04:39,009
of reclamation means that new water

72
00:04:47,759 --> 00:04:40,929
quality standards will have to be

73
00:04:49,829 --> 00:04:47,769
established for freedom the EHS water

74
00:04:52,439 --> 00:04:49,839
quality subsystem will set these

75
00:04:54,599 --> 00:04:52,449
standards and provide instrumentation

76
00:04:59,909 --> 00:04:54,609
for monitoring the quality of freedoms

77
00:05:02,609 --> 00:04:59,919
water an experiment being examined is

78
00:05:06,989 --> 00:05:02,619
the efficiency of iodine for controlling

79
00:05:09,509 --> 00:05:06,999
biofilm formation biofilm is a

80
00:05:11,850 --> 00:05:09,519
combination of microorganisms and their

81
00:05:13,799 --> 00:05:11,860
extracellular products that can build up

82
00:05:15,689 --> 00:05:13,809
on the inside of water systems and

83
00:05:21,829 --> 00:05:15,699
decrease the effectiveness of

84
00:05:24,359 --> 00:05:21,839
disinfectants in this experiment

85
00:05:27,149 --> 00:05:24,369
untreated and iodine ated water is

86
00:05:32,209 --> 00:05:27,159
recirculated with samples taken for

87
00:05:37,169 --> 00:05:34,439
preliminary results have shown that

88
00:05:42,649 --> 00:05:37,179

iodine disinfects the water effectively

89
00:05:49,859 --> 00:05:46,489
microbiology is another EHS subsystem

90
00:05:52,639 --> 00:05:49,869
many factors including in flight crew

91
00:05:55,439 --> 00:05:52,649
exchanges and long tours of crew duty

92
00:05:57,749 --> 00:05:55,449
increase the possible risk of infectious

93
00:06:03,659 --> 00:05:57,759
disease and contribute to the need for

94
00:06:06,329 --> 00:06:03,669
onboard microbial analysis methods to

95
00:06:08,219 --> 00:06:06,339
identify microbial contaminants must be

96
00:06:13,169 --> 00:06:08,229
developed which are compatible with

97
00:06:15,539 --> 00:06:13,179
freedom size and weight constraints one

98
00:06:17,699 --> 00:06:15,549
instrument the vitek automated

99
00:06:19,739 --> 00:06:17,709
microbiology system has been

100
00:06:25,139 --> 00:06:19,749
miniaturized for use on the space

101
00:06:27,509 --> 00:06:25,149
station the vitek system utilizes the

102
00:06:29,999 --> 00:06:27,519
same technology used in many hospitals

103
00:06:32,009 --> 00:06:30,009
for the purpose of identifying bacteria

104
00:06:36,959 --> 00:06:32,019
and determining appropriate medical

105
00:06:39,359 --> 00:06:36,969
treatment it can help determine the

106
00:06:42,089 --> 00:06:39,369
cause of an infectious disease or

107
00:06:45,089 --> 00:06:42,099
identify a microorganism involved in

108
00:06:46,370 --> 00:06:45,099
environmental contamination by matching

109
00:06:48,740 --> 00:06:46,380
patterns of known my

110
00:06:55,130 --> 00:06:48,750
for organisms against those produced by

111
00:06:57,560 --> 00:06:55,140
the specimen the EHS toxicology

112
00:06:59,570 --> 00:06:57,570
subsystem is developing a suite of

113
00:07:01,370 --> 00:06:59,580

instrumentation for the detection of

114
00:07:03,920 --> 00:07:01,380
chemical and particulate contamination

115
00:07:08,510 --> 00:07:03,930
in the atmosphere of Space Station

116
00:07:10,640 --> 00:07:08,520
freedom the goal of this subsystem is to

117
00:07:13,700 --> 00:07:10,650
make these units operate independently

118
00:07:19,100 --> 00:07:13,710
and notify the crew only if there is a

119
00:07:22,100 --> 00:07:19,110
problem these instruments will monitor

120
00:07:26,500 --> 00:07:22,110
the air for possible contaminants giving

121
00:07:26,510 --> 00:07:33,550
in-depth information within an hour

122
00:07:40,430 --> 00:07:36,260
research in the field of radiation is

123
00:07:42,440 --> 00:07:40,440
another area of study under EHS a group

124
00:07:44,860 --> 00:07:42,450
of instruments including the current

125
00:07:47,450 --> 00:07:44,870
firma luminescent dosimeter zeeeee or

126
00:07:51,980 --> 00:07:47,460
tlds will be used to assess the

127
00:07:55,670 --> 00:07:51,990
biological impact of radiation until

128
00:07:57,980 --> 00:07:55,680
recently the technology used the tlds

129
00:08:01,880 --> 00:07:57,990
measured only the average dosage

130
00:08:04,040 --> 00:08:01,890
acquired during flight a new EHS

131
00:08:06,290 --> 00:08:04,050
instrument the charged particle

132
00:08:08,540 --> 00:08:06,300
directional spectrometer consists of

133
00:08:11,180 --> 00:08:08,550
sensors that electronically register the

134
00:08:16,520 --> 00:08:11,190
quality or type of radiation as it

135
00:08:19,550 --> 00:08:16,530
occurs charged particles enter the

136
00:08:21,400 --> 00:08:19,560
spectrometer depending on the level of

137
00:08:24,500 --> 00:08:21,410
penetration through the sensors

138
00:08:30,500 --> 00:08:24,510

scientists can determine the mass charge

139
00:08:32,420 --> 00:08:30,510
and velocity of the particle this

140
00:08:34,610 --> 00:08:32,430
understanding will provide the necessary

141
00:08:37,550 --> 00:08:34,620
groundwork for future long-duration

142
00:08:41,839 --> 00:08:37,560
missions as we continue our exploration

143
00:08:44,300 --> 00:08:41,849
of the solar system it's because of

144
00:08:46,670 --> 00:08:44,310
NASA's concern about maintaining a safe

145
00:08:48,160 --> 00:08:46,680
crew environment that we have begun

146
00:08:52,220 --> 00:08:48,170
development of the space station

147
00:08:54,320 --> 00:08:52,230
Environmental Health System the EHS will

148
00:08:57,200 --> 00:08:54,330
provide the program with two essential

149
00:08:59,180 --> 00:08:57,210
products a suite of flight hardware for

150
00:08:59,510 --> 00:08:59,190
monitoring the space station's internal

151
00:09:04,550 --> 00:08:59,520
and

152
00:09:06,980 --> 00:09:04,560
personnel to assist with environmental

153
00:09:09,260 --> 00:09:06,990
planning and to help make environmental

154
00:09:15,560 --> 00:09:09,270
health assessments once the station

155
00:09:19,700 --> 00:09:15,570
becomes operational as an integral part

156
00:09:22,220 --> 00:09:19,710
of the crew health care system EHS the

157
00:09:24,920 --> 00:09:22,230
environmental health system will provide

158
00:09:26,930 --> 00:09:24,930
essential technology for maintaining a