good morning and welcome to today's
mission status breathing with us Gary
whore Locker the sts-134 lead flight
director was just coming off his orbit
one shift his final shift of the nation
and Heather anchor the principal
investigator of the storm test which was
concluded today Gary would you begin
please sure thank you very much good
morning everyone it's really great to be
here absolutely outstanding day today so
far I think the pride the word I'd used
as summon up is pretty much flawless we
obviously undocked today from the space
station pretty much done docked right on
time and as we talked yesterday the pilot Greg Johnson was at the controls
he backed endeavour away from the station out to about 400 feet and then
he initiated the full lap fly around and so we did the fly around got our
standard photos of the entire outside of the space station we also took a few
photos specific photos of the ATV vehicle as requested by our colleagues
across the Atlantic Ocean and once a fly around was complete the crews started the storm trajectory take care of the
storm dto for today all those burns went perfectly as planned the trajectory was was right on the money and everything just went really really well and heathers can give you more details about how the sensor performance went so so we can hang on to that for a few minutes so we got all that accomplished and so once we got outside the range of the sensors we started shifting gears towards thinking about coming home the crew got right into the water dumps that we always have right after we get undocked and those were in progress as I left the
control center then they'll be also

44 00:01:54,569 --> 00:01:57,898 working on getting a cabin in the right

45 00:01:56,188 --> 00:02:02,339 configuration and start configuring the

46 00:01:57,899 --> 00:02:04,049 ship as a reentry vehicle so so I said

47 00:02:02,340 --> 00:02:06,930 things so far we're really really great

48 00:02:04,049 --> 00:02:09,000 today we did have one little distraction

49 00:02:06,930 --> 00:02:12,090 during the storm trajectory shortly

50 00:02:09,000 --> 00:02:14,610 after sep to the crew got a fuel cell

51 00:02:12,090 --> 00:02:15,009 message onboard fuel cell delta volt

52 00:02:14,610 --> 00:02:18,909 mess

53 00:02:15,009 --> 00:02:20,590 and so basically the the orbiter has

54 00:02:18,908 --> 00:02:23,370 three fuel cells that's how we generate

55 00:02:20,590 --> 00:02:26,259 power for the for the entire vehicle and

56 00:02:23,370 --> 00:02:28,299 each of those fuel cells has 96 cells

57 00:02:26,259 --> 00:02:31,179 within it and those are broken down into
three separate sub stacks so there's 32 cells within a sub stack and in the fuel cell has a cell performance monitor attached to it and with this it's a very small black electronic box strictly to monitor the performance of the fuel cell and it basically takes each of those sub stacks and and looks at half of it 16 cells at a time so it compares the voltage across both of those halves of the stack of 16 cells each and so ideally you want that you expect that voltage delta volts between the two halves to be zero in an ideal world but
obviously you know it's going to be very small number in the real world and if that Delta Delta vote value climbs to a certain point it starts it's an indication that the fuel cells degrading and you're starting to have some issues with the fuel cells so that's that's basically the purpose of the cell performance monitor the CPM box so it exceeded that that limit it performs that test every seven and a half minutes it exceed that limit trip the message crew got it we were looking at the fuel cell performance in real time at no
other indications of any problems feel

cell was performing great so we just kept an eye on it next time it ran the self-test it turned out nominal and so basically it was kind of intermittent throughout the storm trajectory think we had 77 self test failures throughout the last few hours and then in between each of the other self tests were just just nominal so so it's kind of a intermittent indication that we're seeing but again the fuel cells performer and absolutely perfectly the way it has all flight we have no
concerns about about its actual

00:04:14,318 --> 00:04:18,250
performance we think it's really just an

00:04:16,238 --> 00:04:21,189
issue with this performance monitor box

00:04:18,250 --> 00:04:25,089
so it's very similar to a signature we

00:04:21,189 --> 00:04:27,009
saw on sts-131 endeavor flew it was

00:04:25,089 --> 00:04:28,359
actually a indication on a different sub

00:04:27,009 --> 00:04:30,389
stack in the same fuel cell

00:04:28,360 --> 00:04:33,699
and after that flight they replaced this

00:04:30,389 --> 00:04:36,460
CPM box of performance monitoring box so

00:04:33,699 --> 00:04:38,259
so it's very interesting but again the

00:04:36,459 --> 00:04:39,879
fuel cell looks like it's working fine

00:04:39,879 --> 00:04:45,699
continuing to watch it and talking about

00:04:42,009 --> 00:04:47,468
it throughout the day so I think that's

00:04:45,699 --> 00:04:48,879
really all I got dad hand it over to
Heather to give you the details on how the storm activity went today thanks.

Gary the storm team had a great night.

tonight we were able to get vns data throughout the entire undock rendezvous and final separation trajectory the software performed flawlessly drew foy still put us into all the rights modes right on schedule we had no anomalies and we're real excited about getting a lot more vns data we've accumulated throughout rendezvous and including today nearly six hundred gigabytes of data so we have
a lot of good data analysis days coming ahead of us once we get the boxes off the vehicle in Florida and the team will start working together to analyze all that data so from a ground perspective during real time we get to see data over the sequential still video so we don't get all the detailed data that I showed yesterday which had some I guess detailed plots of some of the performance of the vns so what we get to see is one snap every 30 seconds versus the I guess 30 times per second that the laser is actually firing and we do
calculate a range estimate based on that

and that looked really great we compared it against TCS in close and out further

against the shuttle state vector and that matched really well we're very happy with what we saw it looks again like we've exceeded our five kilometer goal so that was very exciting we were lots of smiles and cheers we had nice words from Drew at the end of the mission and the storm team has done phenomenally we are throwing a curveball the other day with our docking camera data recorder did not come up today as
we were all kind of crossing our fingers

00:06:38,408 --> 00:06:42,300
that might initialize correctly so there

00:06:41,050 --> 00:06:45,990
was no new docking cam

00:06:42,300 --> 00:06:50,069
data to collect today but we did get our

00:06:45,990 --> 00:07:00,000
primary objective on the Orion MPCV like

00:06:50,069 --> 00:07:02,069
trajectory for the rear on oovoo is

00:06:52,348 --> 00:07:00,000
flown exactly per design and we believe

00:06:56,158 --> 00:07:02,069
we will have met those objectives we do

00:07:00,000 --> 00:07:04,019
have all the docking camera data

00:07:02,069 --> 00:07:06,090
collected from rendezvous safely stored

00:07:04,019 --> 00:07:09,240
on the data recorders so that should be

00:07:06,089 --> 00:07:11,098
no problem when we get it back and just

00:07:09,240 --> 00:07:14,400
like to thank the wonderful storm team

00:07:11,098 --> 00:07:16,408
from Johnson Space Center from Langley

00:07:14,399 --> 00:07:18,299
Research Center from Ball Aerospace and
from Lockheed Martin is a fantastic group of folks a lot of talents and a pleasure to have worked with everybody for the last few years Thank You Heather thanks Kerry we'll start with questions now first here in Houston if you'd step to the microphone once you recognize please remember to say your name and your affiliation well folks lost with NASA Space Flight calm how were you able to how far out were you able to maintain a lock on the station going out and then coming back so again it's a little difficult to tell especially on the way
out it happens to be a part of space

station that has no visible reflectors

on there so data was showing that that

the laser was likely shooting and timing

out for most of that area but again we

are only getting one frame every 30

seconds and once we get all the data

back on the ground will have the 30

Hertz data and we believe will see some

intermittent acquisition of the space

station during that time but without any

visible reflectors when you start

going out at ranges that far we'll

have to kind of see what happened with
it and how it performed again one of our objectives for the vns getting flown is what is the reflectivity of the space station like in this wavelength versus when you do and do not have reflectors visible in the field of view I'll just going to add to that you know the outbound trajectory was really designed to set up the inbound trajectory to meet their prime objective and you know of course station did reconfigure to get some power generation during the time frame as well so was an optimized for the
the storm reflectors for that phase so

00:08:57,799 --> 00:09:06,449
and then on when do you expect to get

00:09:02,759 --> 00:09:09,419
your data and your hardware back yes so

00:09:06,450 --> 00:09:12,600
we've kind of been told by KSC returned

00:09:09,419 --> 00:09:14,429
to Florida plus about a week we will get

00:09:12,600 --> 00:09:17,220
to get back in the vehicle and perform a

00:09:14,429 --> 00:09:19,589
post flight test we'll just fire

00:09:17,220 --> 00:09:22,139
everything up and do a return to Earth

00:09:19,590 --> 00:09:25,200
great just like we expected to then

00:09:22,139 --> 00:09:27,419
we'll get the the sensors and the data

00:09:25,200 --> 00:09:30,090
recorder package will get moved over to

00:09:27,419 --> 00:09:33,269
another facility at KSC and that will

00:09:30,090 --> 00:09:35,399
start our data retrieval if we pulled 24

00:09:33,269 --> 00:09:39,299
hours a day we would get everything off

00:09:35,399 --> 00:09:41,159
in six days so then we'll have that six
hundred gigabytes of data passed on all

the analysts to go have their fun

additional questions Robert Robert

Pearlman with collectspace.com to follow

up on that question for Heather what's

the end product what do you what do you

have at the end of all the end after all

the analysis is done is it an animation

of the approach individual stills what's

what are we going to see when everything

is ready so I think we'll see all of

that and from a usability of all of that

what will happen is the Orion MPCV

program will take in all of this data
and utilize the lessons learned the actual performance we saw for Space Station to update any of the models of the vns that they use on the ground with those models that they feed into the relative nav system then into the overall guidance navigation and control they'll be able to very accurately design around that for performance of the vehicle for all their mission planning and the data will go ahead and also proof of the docking camera perspective the situational awareness that the crew will use for flying out
angular misalignment and such just as the shuttle crew does today thanks and for Gary realizing that the the CPM intermittent failure is not a huge concern at this point if it did become more of a concern what are your options as opposed to just ignoring it yeah so the CPM is in simplistic terms is just telemetry on how those fuel sales performance oh so if that box were to fail completely you know what we're also talking about doing is setting up the fuel cell monitoring system FCMs and that's basically just a application on
the onboard laptop that ties into the

00:11:31,110 --> 00:11:35,759
vehicle data system and it'll give us

00:11:34,139 --> 00:11:37,708
the next layer of inside we can go down

00:11:35,759 --> 00:11:38,939
and look at the each cell level in the

00:11:37,708 --> 00:11:42,119
fuel cell and look at each cell

00:11:38,940 --> 00:11:44,610
separately which we can't do at the CPM

00:11:42,120 --> 00:11:46,889
level so it'd be the next step in data

00:11:44,610 --> 00:11:48,360
gathering if you will but again all the

00:11:46,889 --> 00:11:50,879
all the data coming from the fuel cell

00:11:48,360 --> 00:11:54,659
and that we watch in real-time as its as

00:11:50,879 --> 00:11:57,028
it's running is again looking great okay

00:11:54,659 --> 00:11:59,600
a desktop Weston's here in Houston say

00:11:57,028 --> 00:12:02,939
none will go to the phone bridge Marsha

00:11:59,600 --> 00:12:04,560
hi good morning um arey I have a couple

00:12:02,940 --> 00:12:06,470
questions for you the first thing I
heard you and Mark Kelly discussing potentially when windy weather here at the Kennedy Space Center on Wednesday morning could you fill us in on what the latest foot weather update might be sure Marsha I know the last forecast I saw was was pretty old and and of course you know Florida is what it is until you're just about to either launcher land there so you know I'm not too excited about it yet but the forecast was outside the flight rolled limits for the for the crosswinds I know we're looking at the data actually coming off the runways
just an hour two ago and there it was

actually fairly calm so again you know

until till we a little bit closer I'm

not too excited about that forecast

thank you and could you also reflect for

a moment on the fact that this isn't

Deborah's final journey into space and

that there is only one more shuttle

mission left before it all ends sure you

know it's a long long time coming that

it's been incredible program you know

I've been focused on making sure we get

this mission accomplished is fairly

aggressive from the beginning and a
pretty long mission and we

we met every objective got everything

accomplished so you know right now I'm

just going to tell you deep breath and

and enjoy the fact that we've gone

through the 99 percent of the mission

all we got to do is get the crew in the

ship home now so you know I think it

will be bittersweet seeing it on the

runway here hopefully in two days and

then we got Atlantis rolling out that

same night to the launch pad and then

one last flight for the program so so

it's kind of sad to see it end in but
it's time to move on to the next chapter thank you Bill Harwood equipment

for Gary I'm just just based on your nav data how far how far back did you guys fall off and how far did you come up before the before it stalled out the trajectory you're asking about trajectory distance on I believe we've got we got right around 29,000 feet which was what we were targeting on the outbound part of the trajectory and then you know coming up in in close to station after we did the TPI burn which puts you on target for your your final point just below the space station
targeted a thousand feet below and 300 feet behind we were we got to about 950 feet from the space station and the trajectory stalled out who did not have to do any braking pulses whatsoever and then we just fell away and did sep three so again the trajectory was was right on the money almost the whole way tonight it was really really outstanding and one more quick one for me and maybe this is for Heather what is the advantage of again what do you call this a co Olympic approach versus an r bar or a V Bar apart so what is the advantage of that
if there is one or is it just a different different way of doing things

Thanks sure so it is a different way of doing things and as a matter of fact

once you're past that either stable

orbit rendezvous like the shuttle

performs or a co olympic the trajectory

beyond that looks pretty similar as far

as flying around to the v bar and then

approaching along the positive V Bar to

the station for docking so there's a couple of differences one

you get on a trajectory that's a delta

height below the trajectory of the space
station so you could just kind of stay

in that orbit it's a safe orbit it's an

on collision and you can kind of

approach from below and then you just

make some burns to close that Delta

height and then you could come up right

below on the r bar and then fly around

to the v bar so I know back in the days

when they were designing the shuttle

trajectory they they did not have that

cross feed for the reaction control

system jets and and it kind of ruled out

any kind of an approach like this it

just just took types of burns that it

just just took types of burns that it
would require so with a new vehicle for

the Orion it was able to kind of open

back up that trade space and and this

was a trajectory they picked it's a good

fuel efficient trajectory and a good

safe trajectory okay Stephen Clark I

just a one more question of wondering if

stephen clark was spaceflight now just a

quick question on cost of wondering if

you had a chance to go over the cost

that's the question yesterday of the

cost of the storm experiment thanks ya

think so we've been pretty focused on

since we had our dr you three failure we

were pretty much working around the
clock to get new procedures up to Drew

he had to take several different actions

to get things powered down so I was not able to follow up with the project on

getting those final cost numbers for you

but it has the principal investigator I was sort of responsible for the technical success of the experiment so I didn't have those numbers readily available I'm sure in the days to come

will be able to close the loop on that

and might be able to follow up with the

Orion project for a better number thanks

James Dean
I thank you James Dean with Florida today Gary I know we have additional briefings to come but just because the timing is little awkward wondered if you could say any more about the preliminary plan for her entry if with it would be right to assume that only KFC will be active Wednesday morning I guess and the next day would be your landing day if need be yeah the entry flight director and the program will be discussing that you know throughout the morning this morning actually laying out the strategy and and picking the
strategy but I would suspect that at the first the first night will probably be que se le and and for whatever reason we can't get land in that first day that second day we'll have Casey and Edwards but again they'll be discussing that here this morning and coming up with the final strategy right for sure thank you okay I believe that's it for the phone bridge do we have additional questions here in Houston seeing none we'll wrap up the briefing you can follow the progress of the sts-134 mission of endeavor and activities on the
International Space Station at WWDC gov

thank you for coming