SUITS EVA SCENARIO

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There may be updates made.

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Notes:

This document will likely undergo several revisions as we do dry runs in preparation for test week. Our goal is to have each test session run for 45-minutes. That allows a little time on each end to setup and to transition from group to group. Therefore, the PR and Spacesuit portions will each take about 20-minutes with a few cutoffs. The cutoffs are essentially, ”Something isn’t working and we are behind, so in order to see your other functionalities, lets move on.”

Change Log:

1.

EVA 1 Summary Timeline

PR	EV	EVA ET Ideal	Time at Task	EVA ET Cutoff
Pre-Nav Checklist		0	2 min	
Point A Terrain Scan		2 min	3 min	
Point B Terrain Scan		5 min	3 min	
Point C Terrain Scan		8 min	3 min	15 min
Nav to new POI	Begin looking at new POI nav.	11 min	4 min	20 min
Park and Prepare for Egress	Prepare for Egress	15 min	2 min	
Monitor Egress	EVA Egress • Connect UIA to DCU • Start Depress • Prep O2 Tanks • End Depress, Check Switches and Disconnect	17 min	6 min	30 min
Monitor Navigation	Navigate to GS worksite	23 min	4 min	
Monitor Scientific Sampling	Geological Sampling • Complete field notes and XRF scan • Flag abnormal Geo Comps in rocks	27 min	10 min	45 min
Monitor Navigation • Demo the Telem you can see of EV.	Navigate to PR • Demo the Telem you can see of PR.	37 min	4 min	50 min
Monitor Ingress	Ingress • Connect UIA to DCU • EMU config • Disconnect	41 min	4min	55 min

Cutoff times are fluid for each station, but 55 min is hard stop.

Procedures

CAPCOM:

- *Reset all UIA switches to Down Position*
- *Reset all DCU switches to Back Position*
- *Switch to respective team room*
- *START PR Telemetry*
- *START EVA Telemetry*
- *Announce scenario start, give go to begin*

PR Terrain Scouting

Begin Pre-Navigation Checklist

PR 1. Pilot verify battery level is > 95%
PR 2. Pilot verify O2 levels are > 95%
PR 3. Verify O2 pressure is > 2900 psi
PR 4. Verify PR Cabin Pressure is > 3.95 psi
PR 5. Pilot verify PR headlights are operational by manually switching lights to ON then to OFF
PR 6. Pilot drop pin at current location
PR 7. Drop point at provided POI for "Point A"

Note: The LTV may send a new POI during one of the traverses below.

Point A Terrain Scan (3 min)

PR 1. Begin navigation to Point A
PR 2. Upon arrival, verify PR has come to a complete stop
PR 3. Begin terrain scan of the area (open to team's interpretation, show off what you have)
PR 4. While terrain is scanning, drop point at provided POI for point "Point B" location for second terrain scan
    4.1 Verify PNR
    4.2 Note anticipated remaining consumables
PR 5. When terrain scan has completed, ensure successful storage of terrain data
PR 6. Announce successful completion of terrain scan.

Point B Terrain Scan (3 min)

PR 1. Begin navigation to Point B
PR 2. Upon arrival, verify PR has come to a complete stop
PR 3. Begin terrain scan of the area
PR 4. While terrain is scanning, drop point at provided POI for point "Point C" location for second terrain scan
4.1 Verify PNR
4.2 Note anticipated remaining consumables
PR 5. When terrain scan has completed, ensure successful storage of terrain data
PR 6. Announce successful completion of terrain scan.

CAPCOM: Send LTV POI during navigation in next section.

Point C Terrain Scan (3 min)

PR 1. Begin navigation to Point C
PR 2. Upon arrival, verify PR has come to a complete stop
2.1 Check telemetry data and look for any off-nominal values
PR 3. Begin terrain scan of the area
PR 4. When terrain scan has completed, ensure successful storage of terrain data
4.1 Verify PNR
4.2 Note anticipated remaining consumables
PR 5. Announce successful completion of terrain scan.
PR 6. Verify path is generated for home base
PR 7. Begin navigation to home base

EVA Egress

CAPCOM:

- *Assign UIA*
- *Monitor UIA Switches*

Verify LTV Coordination

PR 1. Verify ping has been received from LTV
PR 2. Verify worksite POI locations have been provided by LTV
PR 3. Verify that EV1 has received LTV POIs
PR 4. Announce that PR operations are complete, will now begin monitoring EVA. Turning operations over to EVA.

Connect UIA to DCU and start Depress

UIA and DCU	1. EV1 verify umbilical connection from UIA to DCU
UIA	2. EV-1, EMU PWR – ON
DCU	3. BATT – UMB
UIA	4. DEPRESS PUMP PWR – ON

Prep O2 Tanks

UIA	1. OXYGEN O2 VENT – OPEN
HMD	2. Wait until both Primary and Secondary OXY tanks are < 10psi
UIA	3. OXYGEN O2 VENT – CLOSE
DCU	4. OXY – PRI
UIA	5. OXYGEN EMU-1 – OPEN
HMD	6. Wait until EV1 Primary O2 tank > 3000 psi
UIA	7. OXYGEN EMU-1 – CLOSE
DCU	8. OXY – SEC
UIA	9. OXYGEN EMU-1 – OPEN
HMD	10. Wait until EV1 Secondary O2 tank > 3000 psi
UIA	11. OXYGEN EMU-1 – CLOSE
DCU	12. OXY – PRI

END Depress, Check Switches and Disconnect

HMD	1. Wait until SUIT Pressure and O2 Pressure = 4
UIA	2. DEPRESS PUMP PWR – OFF
DCU	3. BATT – LOCAL
UIA	4. EV-1 EMU PWR - OFF
DCU	5. Verify OXY – PRI
DCU	6. Verify COMMS – A
DCU	7. Verify FAN – PRI
DCU	8. Verify PUMP – CLOSE
DCU	9. Verify CO2 – A
UIA and DCU	10. EV1 disconnect UIA and DCU umbilical

DCU Verify Comms are working between DCU and PR.

"EV1 to PR, comm check, can you hear me?"

PR respond appropriately.

CAPCOM: Unassign UIA

Determine Navigation Path

EV1	1. Drop pins and determine best path for each POI provided by LTV
EV1	2. Verify the path has been generated. Wait for go from PR
PR	3. Unlock Airlock, announce all clear for EV
EV	4. Exit airlock and begin navigation to worksite

Navigation

EV	1. Navigate to first POI (Your team can create procedures to guide your EV in how to use the HMD.)
PR	2. Monitor location data and video streams.

Geologic Sampling

CAPCOM:

- *Assign SPEC when team arrives at worksite*
- *Monitor XRF scans on SPEC tab*

1. Announce arrival to worksite over comms
    a. "Arrived at site, beginning sampling."
2. Perform Sampling Procedures
3. Upon completion of sampling procedures at worksite, announce completion over comms
    a. "Sampling is complete at this location.
    b. "PR please verify receipt of data.
    c. "Beginning nav to next location."
4. Proceed to next location if available and restart Geologic Sampling procedures
    a. If sampling is complete at all locations or return is required, announce completion and begin ingress procedures
    b. PR, monitor EV locations and scientific data throughout the entire sampling process.

Sampling Procedure

HMD	1. EV Open Sampling Procedure
HMD	2. If available, perform Field Notes on Rock, which can include picture, voice notes, etc.
HMD	3. Perform XRF Scan
XRF	4. Press and HOLD trigger
XRF	5. Aim close to sample until beep, then release trigger
HMD	6. Announce “Scan Complete, PR verify data received.”
HMD	7. If Rock Composition outside of nominal parameters (define), collect rock.
HMD	8. If able, drop and label a pin
	9. Repeat until all samples in area are scanned.

For SUITS purposes, samples are considered scientifically significant if:

Element	%
SiO_2	<30
TiO_2	>10
Al_2O_3	>25
FeO	>20
MnO	>0.5
MgO	>10
CaO	<5
K_2O	>1
P_2O_3	>1
other	>50

Return to Pressurized Rover

HMD	1. Verify path to rover.
HMD	2. Begin return to PR.

EVA Ingress

CAPCOM: Unassign SPEC

Connect UIA to DCU and start Depress

UIA and DCU	1. EV1 connect UIA and DCU umbilical
UIA	2. EV-1 EMU PWR – ON
DCU	3. BATT – UMB

Vent O2 Tanks

UIA	1. OXYGEN O2 VENT – OPEN
HMD	2. Wait until both Primary and Secondary OXY tanks are < 10psi
UIA	3. OXYGEN O2 VENT – CLOSE

Empty Water Tanks

DCU	1. PUMP – OPEN
UIA	2. EV-1 WASTE WATER – OPEN
HMD	3. Wait until water EV1 Coolant tank is < 5%
UIA	4. EV-1, WASTE WATER – CLOSE

Disconnect UIA from DCU

UIA	1. EV-1 EMU PWR – OFF
DCU	2. EV1 disconnect umbilical

CAPCOM

- *Stop PR Telemetry*
- *Stop EV Telemetry*
- *Prep for next team*
    - *Reset LTV to home base*
    - *Verify DCU and UIA are in default state*