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Ground Systems Development and Operations: Return of Human Spaceflight

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Ground Systems Development & Operations (GSDO)

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SLS, Orion, and GSDO

Building the capability to pioneer deep space.

Orion Crew Capsule

Space Launch System

Ground Systems Development & Operations
**Exploration Mission 1 | EM-1**

**Uncrewed Distant Retrograde Orbit**

**Objectives:**
- Demonstrate spacecraft systems performance prior to crewed flight
- Demonstrate high speed entry (~11 km/s) and TPS performance prior to crewed flight

**DRM - Uncrewed MPCV**
- Lunar capable heat shield
- 4 tank SM with full prop load
- EM-2 systems not included: ECLSS, Crew Systems, LAS Abort Motors (Inert)

**Interim Cryogenic Propulsion Stage (ICPS)** used to provide TLI burn
Orion Production Operations and Exploration Flight Test 1
Making Progress at KSC

Firing Room 1 outfitted and Spaceport Command and Control Software validated

Designed and fabricated Orion ammonia ground support equipment; performed EFT-1 flight load

Multi-Purpose Processing Facility upgrades wrapping up this summer followed by ground support equipment installation and testing

Successful EFT-1 recovery of the crew module

Rotation, Processing and Surge Facility platform modifications complete
Mobile Launcher structural modifications progressing, fabrication of umbilicals and other equipment in work.

Launch Pad 39B largely complete, only flame trench work and IOP/SS water routing remains.

Vehicle Assembly Building shuttle platform demo complete, new SLS platforms in fabrication.

Crawler-transporter modifications and upgrade to ~18 million lbs capacity.
GSDO: EXPLORATION BEGINS HERE
Path to EM-1 Launch - Every Milestone Counts

Legend:
- VIL
- C3R
- OPI

Top Priorities
1. GSDO PDR ✓
2. EFT-1 Launch ✓
3. GSDO CDR
4. EM-1 ORD
5. EM-1 Launch
6. EM-2 ORD
7. EM-2 Launch

2012
- VAB HB 3 VAB Door Refurb
- Low Bay Ceiling Platform Concepts Started 2012
- LC-39 Pad B EES/Multi-Use Study Complete, ML Mod Contract Start 2013
- MPPF Construction Restart Feb 2013
- Range 50MHz Doppler Radar Capability Sep 2015
- MPPF Construction Complete Oct 2015
- VAB HB 3 Construction Complete Aug 2016
- VAB H B Const. Complete Nov 2016
- VAB V & V Complete Mar 2017
- MPPF & V Complete Feb 2017
- LC-39 Pad B Emergency Egress/ V & V Complete 2018
- EM-1 Recovery Complete Jul 2018

2013
- Crawler Transporter 49 + Modification Projects Completed Dec 2013
- MPPF GSE Installation Complete Dec 2015
- L&R Underway Exercise Complete Aug 2016
- MLGSE Installation Complete Sep 2016
- ML Pad V & V Complete Sep 2017
- ML Pad V & V Complete 2018

2014
- Pad B Const. Complete Aug 2016
- Range Autonomous Flight Safety System Apr 2015
- C&C – Operational Spaceport C&C
- Pad B V & V Complete

2015
- Range 50MHz Doppler Radar Capability Sep 2015
- Pad B Const. Complete Aug 2016
- C&C – Operational Spaceport C&C
- Pad B V & V Complete

2016
- Range Autonomous Flight Safety System Apr 2015
- C&C – Operational Spaceport C&C
- Pad B V & V Complete

2017
- Range 50MHz Doppler Radar Capability Sep 2015
- Pad B Const. Complete Aug 2016
- C&C – Operational Spaceport C&C
- Pad B V & V Complete

2018-2021
- Range 50MHz Doppler Radar Capability Sep 2015
- Pad B Const. Complete Aug 2016
- C&C – Operational Spaceport C&C
- Pad B V & V Complete
SLS / ORION / GSDO ... LAUNCHING EM-1 2018!