

National Aeronautics and Space Administration



Constellation Space Suit System Contract Award Announcement

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www.nasa.gov

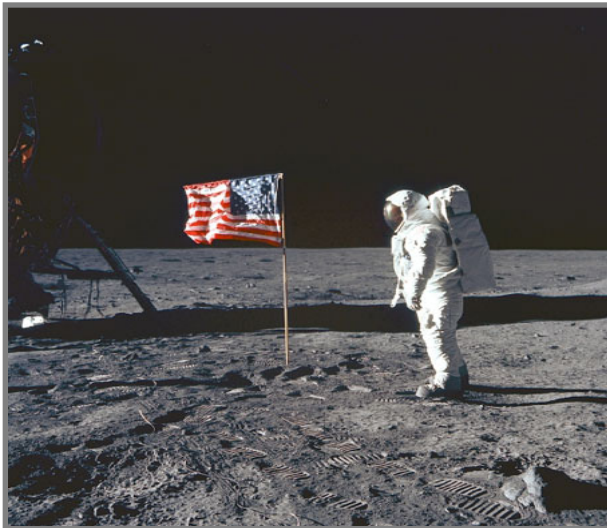
Constellation Systems Division



Extravehicular Activity – “EVA”



- The space-suited astronaut is the ultimate symbol of human exploration
- The spacesuit is essentially a self-contained, one-person spacecraft
- It protects the crew from and enables them to work in the hostile environments of deep space and the lunar surface
- It is the “last line of defense” for astronauts when they leave the relative safety of the crew exploration vehicle, lunar lander, or habitat



The Challenge for Exploration



- **Current spacesuits are not suitable for Exploration**
 - Apollo Extravehicular Mobility Unit
 - Advanced Crew Escape Suit
 - Space Shuttle/International Space Station Extravehicular Mobility Unit

- **A new pressurized suit system will be required to support long-term Exploration requirements**
 - Meets all capability requirements
 - Improves reliability
 - Improves logistics and maintenance
 - Reduces life cycle costs



The EVA System Design Approach



- **A single spacesuit system with two configurations which share many components**
- **Common, evolvable infrastructure**
- **Minimum set of hardware to meet all mission phase requirements**
- **Modular, reconfigurable, component-based open architecture**

Launch and Entry



In-space Contingency



Lunar Surface

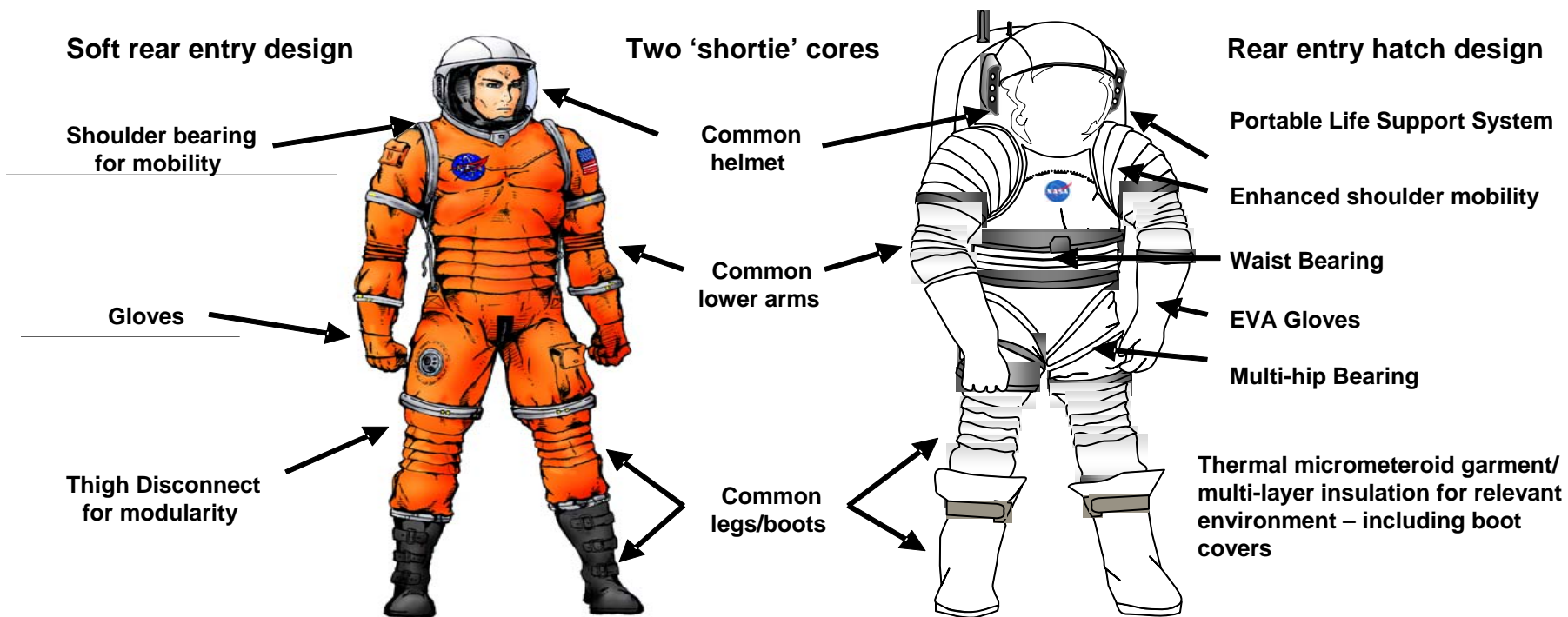


EVA Single Suit System Architecture



**Launch/Entry/Abort
& Microgravity EVA Suit
(Configuration 1)**

**Lunar Surface EVA Suit
(Configuration 2)**



***Overall EVA System architecture approach - modular, reconfigurable, component-based architecture that meets various mission objectives**

Configuration 1 – Launch, Entry, Abort & Microgravity EVA



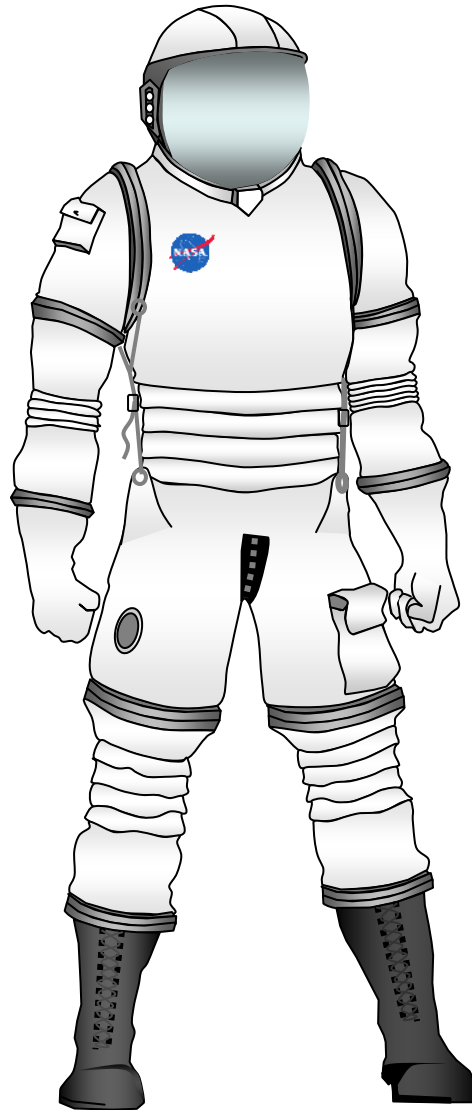
Key Features

Enhanced Helmet Hardware:

- Open flip visor
- Inserts for head-impact protection
- Helmet feed-port (120-hr survival)
- Analog communication (comm) cap
- Thermal Micrometeoroid Garment (Contingency EVA)

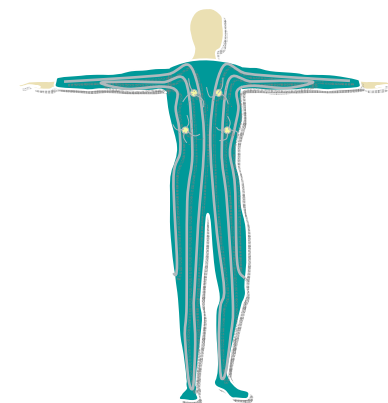
Pressure Garment Subsystem:

- One piece Soft Upper Torso assembly with convolutes at waist and integrated scye shoulder bearings for mobility
- Rear-entry zipper design
- Convoluted joint at elbow and knee
- Thigh, upper arm, glove and boot disconnects
- Modular arm and leg components
- Modular boots
- Thermal Micrometeoroid Garment /Multilayer insulation similar to Extravehicular Mobility Unit
- Extraction harness with attached Personal Floatation Device



Umbilicals and Secondary Oxygen Pack:

- Universal umbilical connectors on umbilicals and vehicles
- Short, closed-loop umbilicals (in vehicle)
- Long, closed-loop EVA umbilicals
- Secondary Oxygen Pack Emergency Oxygen
- Umbilicals: provide breathable gas, cooling water, power, comm, and tether function



Liquid Cooling Garment and bio-med sensors



Configuration 2 – Lunar Surface Exploration

Key Features

Enhanced Helmet Hardware:

- Thermal micrometeoroid garment and lighting
- Visor feed-port pass through
- Heads-up display
- Suit-integrated audio

Enhanced Pressure Garment Subsystem:

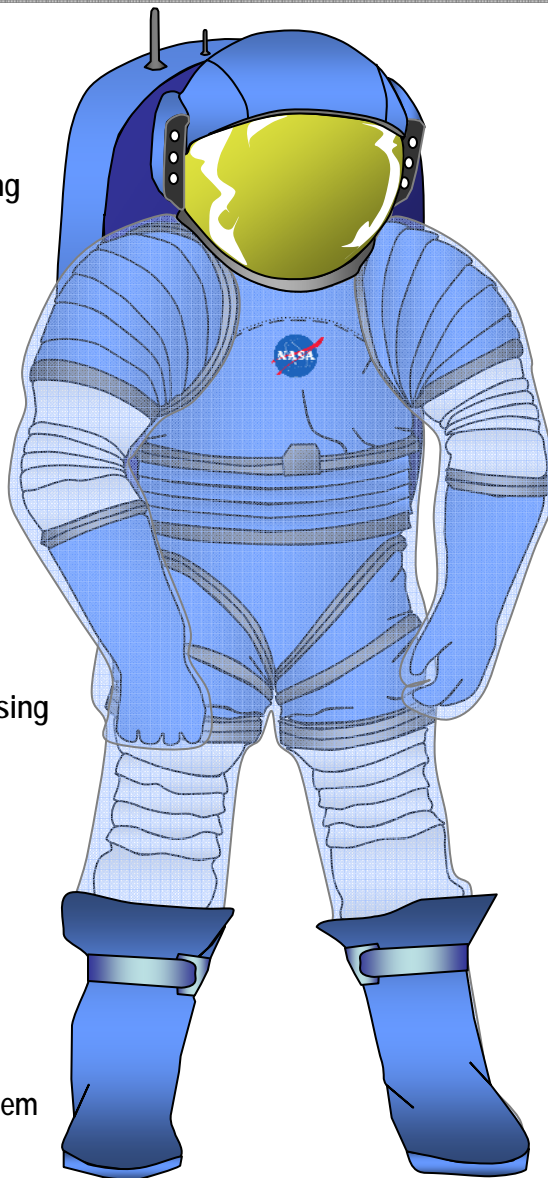
- Rear-entry with waist and scye bearings
- Wear/abrasion-resistant softgoods
- Second generation arm patterned convolute joint
- Thermal micrometeoroid garment /Multi-layer Insulation for relevant environment

Power, Communication, and Informatics:

- Lithium ion batteries
- Command, control, communication processing in Portable Life Support System
- Expanded set of suit sensors
- Advanced Caution & Warning
- On-suit productivity enhancements

Portable Life Support Subsystem:

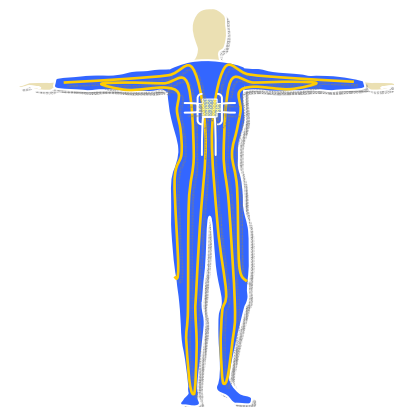
- High pressure Gaseous Oxygen
- Spacesuit Water Membrane Evaporator
- Rapid Cycle Amine
- Upgrade for recharge
- Potable water in Portable Life Support System tank



Umbilicals and Secondary Oxygen Pack:

Same hardware from Configuration 1

- Universal umbilical connectors on umbilicals and vehicles
- Short, closed-loop umbilicals (in vehicle)
- Long, closed-loop EVA umbilicals
- Secondary Oxygen Pack/Emergency Oxygen
- Umbilicals: provide breathable gas, cooling water, power, comm, and tether function



Enhanced Liquid Cooling Garment and bio-med sensors

* Changes or additions of hardware to Configuration 1 are represented by darker blue

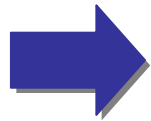
Where Are We Today?



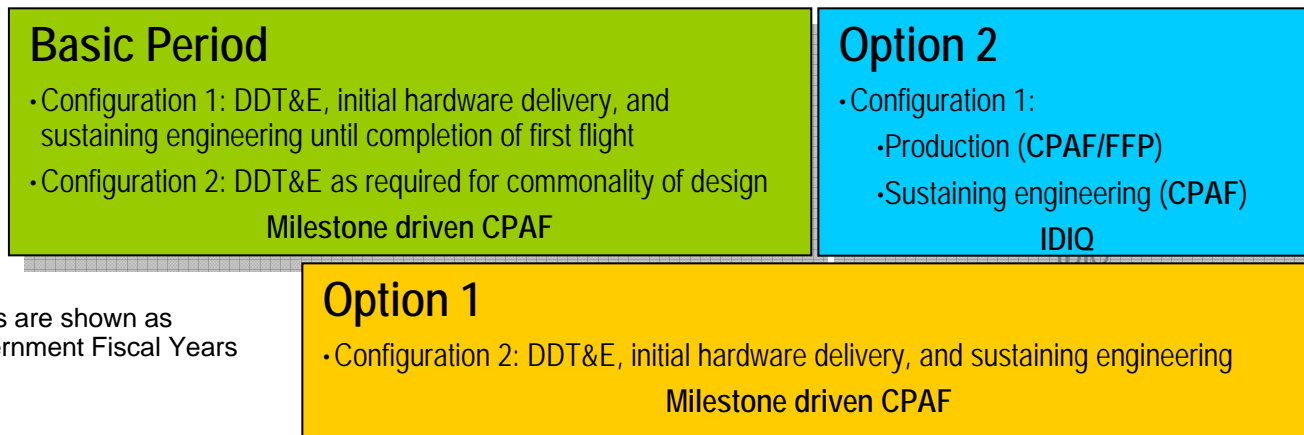
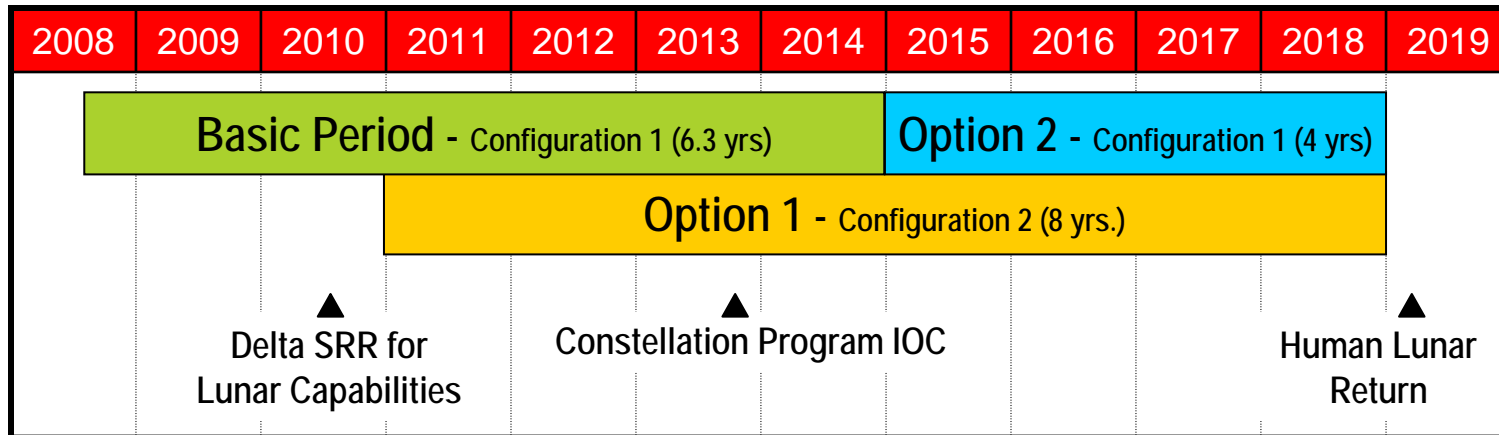
Constellation Space Suit System Acquisition Schedule

Plan

- | | |
|--------------------------------|----------------------|
| • Draft Request for Proposal | July 17, 2007 |
| • Request for Proposal Release | November 1, 2007 |
| • Proposals Received | December 20, 2007 |
| • Selection | June 11, 2008 |
| • Contract Award | June 12, 2008 |
| • Contract Start | June 30, 2008 |



Constellation Space Suit System Contract Scope & Structure



Note: Years are shown as Government Fiscal Years

100 % of the contract is Performance-based

CPAF – Cost Plus Award Fee
DDT&E – Design, Development, Test, and Evaluation
FFP – Firm Fixed Price

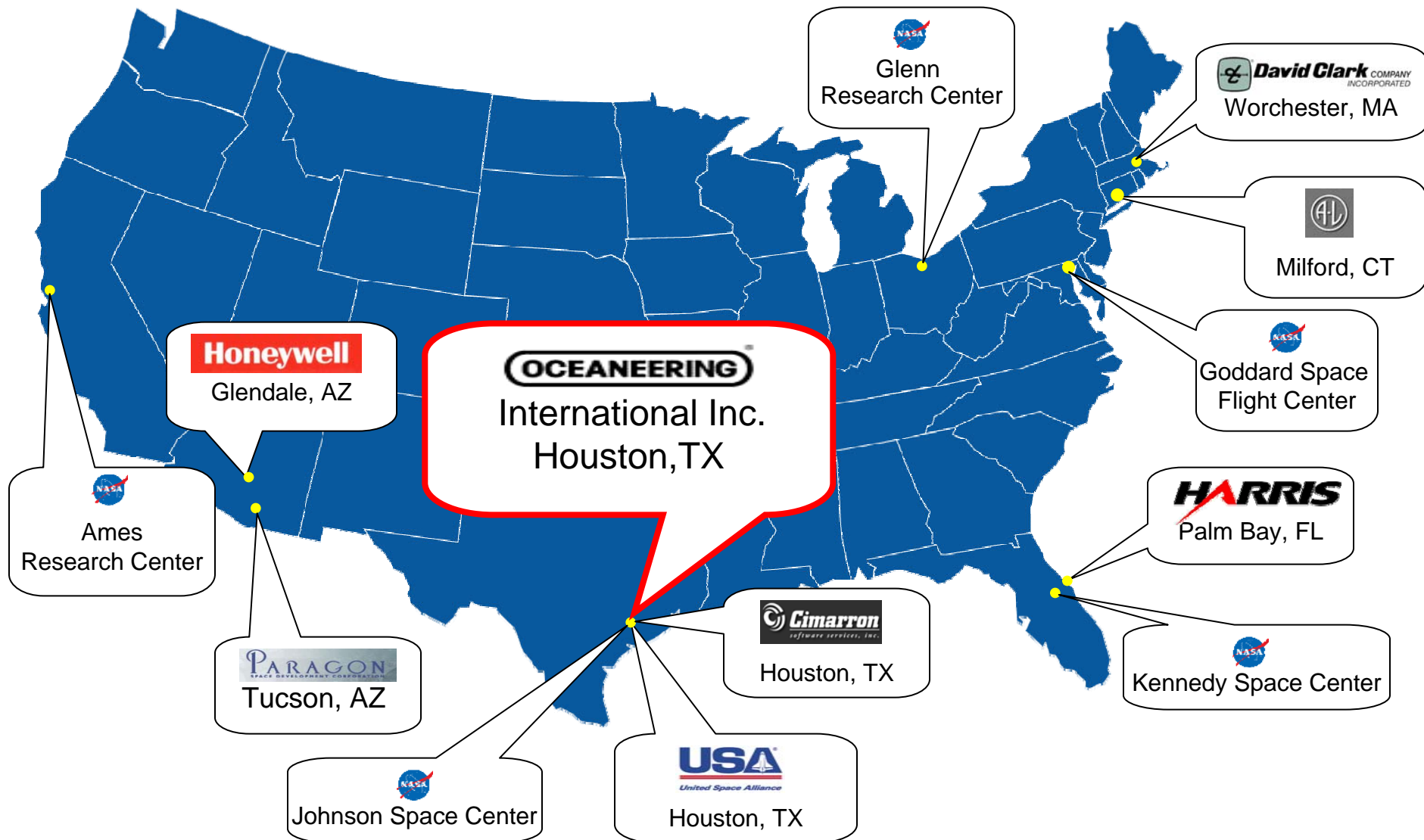
IDIQ – Indefinite Delivery Indefinite Quantity
IOC – Initial Operational Capability
SRR – System Requirements Review

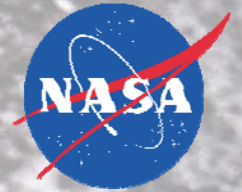


CONGRATULATIONS

**OCEANEERING
INTERNATIONAL
INC.**

NASA and Constellation Space Suit System Industry Team





NASA

and

Oceaneering

International Inc.

are

"GO FOR EVA"