# Spaceflight America™ Museum and Science Center
## Arthur Storer Planetarium

## Mission

To promote, preserve and restore artifacts and technology that chronicle the history of manned and unmanned spaceflight. We educate the public, and inspire the next generation of dreamers

The Spaceflight America Museum and Science Center is part of Volanz Aerospace, a non-profit (IRS 501c3) Maryland corporation formed to provide science and space-related education and research opportunities.

The Spaceflight America Museum and Science Center is an extension of the educational work to enhance science literacy using manned spaceflight operations as the theme.

## From The Director

Welcome to a new issue of the museum newsletter. The museum has undergone significant growth since it opened in November 2015. However, we have a long way to go. We have over 1000 artifacts still in storage that need to be put on display. So how do we do that? We need your support - as docents and volunteers, and we need your continuing financial support. For example, we have 6 space suits in storage, ranging from Apollo to

***The Museum and Planetarium are located beside Calvert High School at 520 Fox Run Boulevard in Prince Frederick, MD.***

http://www.spaceflightamericamuseum.org

On Twitter @SpaceMuseumMd

On Facebook Spaceflightamericamuseum

Email: sa-museum@wsi-edu.org

### *Mailing address:*

P.O. Box 81
Dunkirk, MD 20754-0081

### *Hours:*

Usually open the third Saturday of the month from 10 AM – 4 PM. Check the calendar on the museum web site for confirmed openings.

### *Entrance Fees:*

**$5.00 per adult**
**$4.00 for 10 and younger**
**3 years and younger free**

**CASH ONLY/NO CREDIT CARDS**

### *BRING A GROUP TO THE MUSEUM*

Contact us at sa-museum@wsi-edu.org to schedule a visit.

Chinese. Many are historic. The problem is we have no cases to display them in. They need to be purchased, and that requires financial contributions.

**No amount of support is too little. Come join us! We can use all the help we can get!**

Alan

## *At the Museum*

On May 20th, the museum was open. We had 20 visitors tour the museum and enjoy a planetarium show. Visitors were treated to demonstrations and hands on experiences with actual space gear.

On August 19th, the museum was open for the day and hosted 25 families and couples. Visitors were treated to demonstrations and hands on experiences with actual space gear. We had three members of the Civil Air Patrol train as docents and help guide visitors through the museum. Visitors were treated to air rocket launches.


## *Help us make the museum a success.*

## *Volunteer!*

Volunteers are what makes the museum such an exciting place. The artifacts are interesting but the docents and curators help tell the stories.

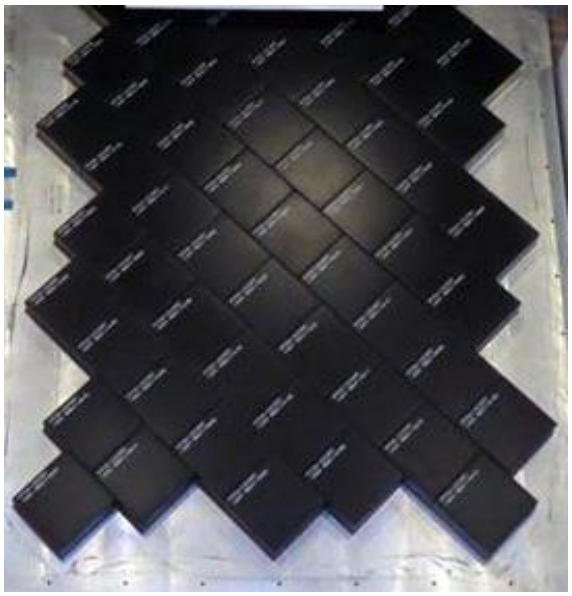
If you are looking for a unique volunteering opportunity, join us at the Spaceflight America Museum and Science Center. Volunteering at the museum is a fun and rewarding experience. Because we are a non-profit, we rely on volunteers for support in many areas, to share their creativity, talents, and expertise or simply use their skills to assist with special events, daily operations, and programs. Join Us!

For more information, check us out at http://www.spaceflightamericamuseum.org.

**Spaceflight America Museum and Science center needs display cases.** Currently, we have many more artifacts than can be displayed in the three used display cases we have. We have floor space for displays but no funds to buy them. If you know anyone with a business who has display cases they are not using, please pass along our need. We have spacesuits we would like to display but cannot display them without the protection of a display case.


**We could display this!** It is an actual Apollo Space Suit that was made for the Apollo 18 mission. While it has never been in space (Apollo program was cancelled after Apollo 17) it was used in the training program for Sky Lab.

## *Space Shuttle Thermal Protection System Museum Exhibit*



You are looking at a section of 57 Space Shuttle tiles in flight orientation. These tiles are part of the Space Shuttle thermal protection system (TPS), the barrier that protects the Space Shuttle Orbiter during the searing heat of atmospheric reentry. A secondary goal is to protect it from the heat and cold of space.

Black High-temperature reusable surface insulation (HRSI) tiles provide protection against temperatures up to 1,260 °C (2,300 °F). There are 20,548 HRSI tiles which cover the orbiters under surfaces. They are also used in areas on the upper forward fuselage, parts of the orbital maneuvering system pods, vertical stabilizer leading edge, elevon trailing edges, and upper body flap surface as well. They vary in thickness from 1 to 5 inches (2.5 to 13 cm), depending upon the heat load encountered during reentry. Except for closeout areas, these tiles are normally 6 by 6 inches (15 by 15 cm) squares. The HRSI tile is composed of high purity silica fibers. Ninety percent of the volume of the tile is empty space giving it a very low density making it light enough for spaceflight.

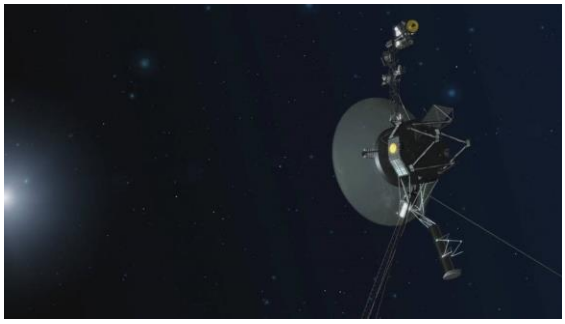
The black coating on the tiles is Reaction Cured Glass (RCG). RCG is applied to all but the bottom of the tile to protect the porous silica and to increase the heat sink properties. The coating feels like a thin, hard shell and encapsulates the white insulating ceramic to protect it. Chemicals to waterproof the tile are injected into the center of each tile by syringe.

An HRSI tile held in the hand feels like very light foam, lighter than a same-sized block of Styrofoam. The delicate, easily crumbled material must be handled with extreme care to prevent damage. Silica tiles are odorless and inert.

The tiles are attached to the shuttle using silicon-rubber glue, like common bathtub calk, bonded to a felt pad that is in turn bonded to the orbiter's aluminum skin. The felt pad absorbs the stress of the airframe bending that could either damage the tile, or cause it to fall off.

This section of tiles comes from the Shuttle lower wing area. They were prepared by Boeing for NASA in 2005 to support the TPS testing being conducted after the loss of STS-107 (Space Shuttle Columbia) in January 2003.

## Voyager



Voyager 1 and 2 achieve 40 years of operation and exploration this August and September, 2017. Despite their vast distance, they continue to communicate with NASA daily.

Voyager 1 is in "Interstellar space" and Voyager 2 is currently in the "Heliosheath" -- the outermost layer of the heliosphere where the solar wind is slowed by the pressure of interstellar gas. Both Voyagers use real spacecraft trajectories and are updated every five minutes. Distance and velocities are updated in real-time.

## *Commercial Space*

# SpaceX and Boeing in home stretch for Commercial Crew readiness

August 11, 2017 by Chris Gebhardt

From NASASpaceflight.com

With just one year to go until the scheduled completion of all uncrewed and crewed test flights for SpaceX and Boeing's commercial crew transportation services, the NASA Advisory Council recently held a routine review of the technical, hardware, software, and training progress the two companies are making toward the goal of returning the capability to launch people into space from the United States.

At the end of July, the NASA Advisory Council (NAC) held a standard, two-day series of meetings with various NASA Directorates, gaining input and insight into the agency's continued work across a variety of fields.

In specific regard to Commercial Crew, NASA's Deputy Manager for Commercial Crew, Steve Stitch, updated NAC members on the general progress of SpaceX and Boeing toward next year's inaugural crew flights of their respective vehicles.

In terms of significant pre-flight milestones still on the books for both SpaceX and Boeing are the in-flight abort test for SpaceX and the pad abort test for Boeing.

Mr. Stitch noted that Boeing's pad abort test is slated for February 2018 with SpaceX's in-flight abort test scheduled for April 2018.

This would place the notional schedule of events for Commercial Crew next year as follows:
February – Boeing: pad abort test
February – SpaceX: Demo 1 (uncrewed) test flight of Dragon 2
April – SpaceX: in-flight abort test
June – Boeing: Orbital Flight Test (OFT – uncrewed) of Starliner

June – SpaceX: Demo 2 (crewed) test flight of Dragon 2
August – Boeing: Crewed Flight Test (CFT) of Starliner

As Mr. Stitch noted to the NAC, "In terms of overall progress, we've made a lot of headway in delivering water recovery trainers for both partners, and both providers continue to work through a lot of critical testing of hardware.

"We are really in the middle of qualification of both spacecraft and also for the Falcon 9 Block 5 launch vehicle. And so we're really in that hard part of development where you start to see lots of problems, but the contractors are showing a lot of promise working through those."

Mr. Stitch also noted that teams are busy working to clear items from the hazards list for the overall commercial crew program – including but not limited to the issue of closing the LOC (Loss Of Crew) gap with both providers.

"Inability to meet the LOC gap continues to be a concern, and we continue to work with the partners on how to reduce that. Had a discussion with the ASAP recently with the LOC strategy and the numbers there," stated Mr. Stitch.

Notably, given the NAC's involvement and review beyond these regularly scheduled public meetings, there was no follow-on discussion or questions regarding the LOC gap posed by members of the NAC – indicating that work to close and/or disposition the LOC gap is proceeding to the NAC's recommendations and NASA's safety standards.

Additionally, Mr. Stitch went into great detail regarding Search & Rescue (S&R) in the event of a pad or in-flight abort.

"Search-and-rescue posture has been one of our top risks, and we've worked on that very hard for the last six months. We now have the recovery trainers in place, and we're starting to work with the various rescue jumpers on how they're going to do that training."

A key element here is the budget allocated to S&R, as NASA is responsible for the coordination and cost of such efforts with the 88th Rescue Squadron while SpaceX and Boeing participate to some degree.

"We have delivered the rescue trainers, and we've completed a rescue trainer test with SpaceX in the Banana River. We had the 88th Rescue Squadron, and they were doing basic procedures of how they would approach a capsule and how they would have people get inside and how to get flotation power established," noted Mr. Stitch.

"This was a training to develop the procedures for how to go do all of that."

Moreover, Mr. Stitch noted that while a large portion of the risk for this had been the delivery of the trainers for both Dragon and Starliner capsules (a risk eliminated by the delivery of those trainers), there is an ongoing disagreement about the number of calendar months required to properly train rescue forces for each vehicle.

"We're still converging on [the training timeline]," stated Mr. Stitch. "I think now that we have the trainers in place, we've actually taken a risk asset out and done some training. And we can bring the schedule together to do some more training as early as August.

For the complete article see https://www.nasaspaceflight.com/2017/08/spacex-boeing-home-stretch-commercial-crew-readiness/