Welcome to the October 25th, 2017, Edition of THE REVENGE HUMP DAY!

I have wonderful week because my college brother, Will Green, was in this area of the country and he stopped by and spent the night on Friday. We had a great time just catching up and reminiscing about our younger days. Brandy and Jason both came over to Casa Bolgeo so see their Uncle Will and it was great. Will left for his meeting on Saturday morning, but stopped back by on his way to the Atlanta Airport on Monday for an hour or so. It was a great time for me.

I have been watching the latest version of Star Trek and I will admit it is a little confusing to me. The Klingons don't look like Klingons to me and the new 'Spore Drive' on the Discovery is a step a little too far. Also, I don't really care fore the lady who is suppose to be the lead in the show. But I do like the Captain. He's quirky enough to be interesting. But the worst part is that the Discovery looks too advanced compared to the difference between the NX01 Enterprise and the NCC1701 Enterprise. Yes, I know that technology advances, but it's like they are not even trying to fit into the cannon of Star Trek.

Also the idea of Spock having an adopted sister that was never even mentioned in the rest of the series. Come on now, that is getting a little too much. Oh well, I have suspended belief and enjoyed most of the stories. So I guess I am ahead of the game.

So on that "accepting note", why don't y'all sit back and relax because here's the best in gossip, jokes and science for your reading pleasure!

Uncle Timmy

<G>~<O>~<S>~<S>~<I>~<P>~~~<S>~<T>~<A>~<R>~<T>~<S>~~~<H>~<E>~<R>~<E>~<!>

SPOILER ALERT: IN THE NEXT FEW WEEKS THERE WILL BE A BIG ANNOUNCEMENT FROM LIBERTYCON

That's all I am going to say on the subject.

<L>~<I>~<B>~<E>~<R>~<T>~<Y>~<C>~<O>~<N>

Re: Kel Tec BDR Bullpup Riffle

From: "Lin \"Otter\" Daniel" lindaniel@usa.net

Thanks for the info on the rifle, the BDR. It sounds like something to look into. Altho the idea that hot casings drop on my feet rather than fling themselves into the shrubbery to light a fire...well, I'd have to try one and see if I need to get fireproof shoes.

<L>~<I>~<B>~<E>~<R>~<T>~<Y>~<C>~<O>~<N>

Re: ASTRONOMY

From: "Bob Bolgeo" bbolgeo@aol.com

Really enjoyed this weeks "Revenge". The Astronomy information was wonderful. I just happen to be reading "watchers of the skies" by Willy Ley (the Viking Press, 1963). It's the best book I have ever found regarding the History of Astronomy.

<L>~<I>~<B>~<E>~<R>~<T>~<Y>~<C>~<O>~<N>

Re: "Liquid Salt" Reactors

From: "Randy Bovell" crbovell@epbfi.com

I'm a reactor geek, so I liked the story on the liquid salt reactors. One gigantic hole in the article is what the "molten salt" is that they want to use for a coolant. Sodium chloride? Melting point is 1,474 deg. F. That's a bit high. In the past, there have been several liquid sodium designs, because sodium melts at 208 deg. F and doesn't boil until 1,621 deg. F. The most notable liquid sodium reactor was Fermi unit 1, in Monroe County, MI. Its first criticality was in 1963, and was decommissioned in 1972. The Fermi plant had two sodium loops, primary and secondary, with the secondary used to generate steam. As everyone knows, sodium and water do not get along, well. The Fermi 1 plant was plagued by steam generator leaks. Operators called the steam generators "kerpow 1" and "kerpow 2." No wonder Detroit Edison shut down the project (the site now has a GE BWR plant). Since then, there have been several proposed liquid sodium cooled designs, but the NRC is, shall we say, not a fan. Liquid sodium reactors can have a positive power coefficient, meaning a positive reactivity addition transient, would not have a negative feedback from the power coefficient. The most famous accident, where that happened, was at Chernobyl unit 4. As Paul Harvey would say, "now you know."

<T>~<H>~<E>~~~<J>~<O>~<K>~<E>~<S>~~~<S>~<T>~<A>~<R>~<T>~~~<H>~<E>~<R>~<E>

From: "Jerry Tollett"

Even you young ones to whom I am sending this might enjoy the perspective of us older people.

CALL THE POLICE - WHEN YOU'RE OLD, AND YOU DON'T MOVE FAST ANYMORE.

George Phillips, an elderly man from Walled Lake, Michigan, was going up to bed, when his wife told him that he'd left the light on in the garden shed, which she could see from the bedroom window. George opened the back door to go turnoff the light, but saw that there were people in the shed stealing things.

He phoned the police, who asked "Is someone in your house?"

He said "No," but some people are breaking into my garden shed and stealing from me."

Then the police dispatcher said "All patrols are busy, you should lock your doors and an officer will be along when one is available."

George said, "Okay." He hung up the phone and counted to 30.

Then he phoned the police again. "Hello, I just called you a few seconds ago because there were people stealing things from my shed. Well, you don't have to worry about them now

because I just shot and killed them both; the dogs are eating them right now," and he hung up.

Within five minutes, six Police Cars, a SWAT Team, a Helicopter, two Fire Trucks, a Paramedic and an Ambulance showed up at the Phillips' residence, and caught the burglars red-handed.

One of the Policemen said to George, "I thought you said that you'd shot them!"
George said, "I thought you said there was nobody available!"

(True Story) Don't mess with old people

<J>~<O>~<K>~<E>~<S>

GETTING OLDER

A distraught senior citizen phoned her doctor's office.
"Is it true," she wanted to know,
"that the medication you prescribed has to be taken for the rest of my life?"
"'Yes, I'm afraid so,'" the doctor told her.
There was a moment of silence before the senior lady replied, "I'm wondering, then, just how serious is my condition because this prescription is marked 'NO REFILLS'.."

<J>~<O>~<K>~<E>~<S>

An older gentleman was on the operating table awaiting surgery and he insisted that his son, a renowned surgeon, perform the operation.
As he was about to get the anesthesia, he asked to speak to his son. "Yes, Dad, what is it?"
"Don't be nervous, son; do your best, and just remember, if it doesn't go well, if something happens to me, your mother is going to come and
live with you and your wife...."
(I LOVE THIS !)

<J>~<O>~<K>~<E>~<S>

Aging:
Eventually you will reach a point when you stop lying about your age and start bragging about it.
This is so true.
I love to hear them say "you don't look that old."

<J>~<O>~<K>~<E>~<S>

The older we get, the fewer things seem worth waiting in line for.
(Mostly because we forgot why we were waiting in line in the first place !!)

<J>~<O>~<K>~<E>~<S>

Some people try to turn back their odometers.
Not me!

I want people to know why I look this way.
I've traveled a long way and some of the roads weren't paved.

<J>~<O>~<K>~<E>~<S>

When you are dissatisfied and would like to go back to youth, think of Algebra.

<J>~<O>~<K>~<E>~<S>

One of the many things no one tells you about aging is that it is such a nice change from being young.

<J>~<O>~<K>~<E>~<S>

Ah, being young is beautiful, but being old is comfortable.

<J>~<O>~<K>~<E>~<S>

First you forget names, then you forget faces.
Then you forget to pull up your zipper... it's worse when you forget to pull it down.

<J>~<O>~<K>~<E>~<S>

Two guys, one old, one young, are pushing their carts around Wal-Mart when they collide.
The old guy says to the young guy, "Sorry about that. I'm looking for my wife, and I guess I wasn't paying attention to where I was going."
The young guy says, "That's OK, it's a coincidence. I'm looking for my wife, too... I can't find her and I'm getting a little desperate."
The old guy says,"Well, maybe I can help you find her... what does she look like?"
The young guy says, "Well, she is 27 yrs. old, tall, with red hair, blue eyes, is buxom...wearing no bra, long legs, and is wearing short shorts. What does your wife look like?'
To which the old guy says, "Doesn't matter, --- let's look for yours."
(ADORABLE)

<J>~<O>~<K>~<E>~<S>

(And this final one especially for me,)

"Lord, keep Your arm around my shoulder and Your hand over my mouth

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From: "Mike Waldrip" waldripk@gmail.com

HORSE BACK RIDING

A blonde decides to try horseback riding, even though she has had no lessons or prior experience.

She mounts the horse unassisted and the horse immediately springs into motion. It gallops along at a steady and rhythmic pace, but the blonde begins to slip from the saddle.

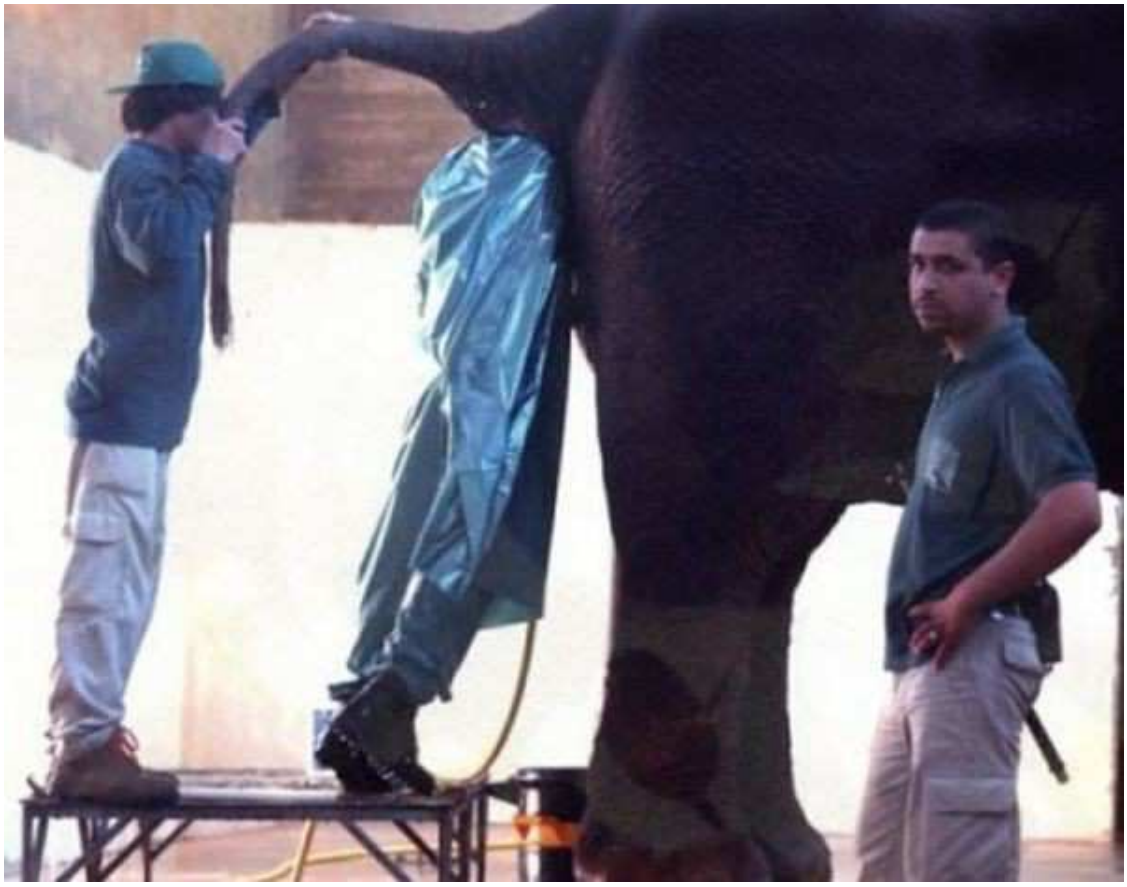
In terror, she grabs for the horse's mane, but cannot seem to get a firm grip. She tries to throw her arms around the horse's neck, but she slides down the side of the horse anyway. The horse gallops along, seemingly impervious to its slipping rider.

Finally, giving up her frail grip, she leaps away from the horse to try and throw herself to safety. Unfortunately, her foot has become entangled in the stirrup and she is now at the mercy of the horse's pounding hooves as her head is struck against the ground again and again. As her head is battered against the ground, she is mere moments away from unconsciousness when to her great fortune...

...the Wal-Mart manager runs out and unplugs the horse.

<J>~<O>~<K>~<E>~<S>

I Don't Know What This Job Pays but It Can't Be Enough!!!



<J>~<O>~<K>~<E>~<S>~~~<of>~<the>~~~<W>~<E>~<E>~<K>

From: "Bob Bolgeo" bbolgeo@aol.com

THE BARBER

A guy stuck his head into a barbershop and asked, "How long before I can get a haircut?" The barber looked around the shop full of customers and said, "About 2 hours." The guy left.

A few days later, the same guy stuck his head in the door and asked, "How long before I can get a haircut?" The barber looked around at the shop and said, "About 3 hours." The guy left.

A week later, the same guy stuck his head in the shop and asked, "How long before I can get a haircut?" The barber looked around the shop and said, "About an hour and a half." The guy left.

The barber turned to his friend and said, "Hey, Bob, do me a favor, follow him and see where he goes. He keeps asking how long he has to wait for a haircut, but he never comes back." A little while later, Bob returned to the shop, laughing hysterically.

The barber asked, "So, where does he go when he leaves?" Bob looked up, wiped the tears from his eyes and said, "Your house!"

<J>~<O>~<K>~<E>~<S>~~<of>~<the>~~<W>~<E>~<E>~<K>

From: "Chris Cowan" cowanc1028@earthlink.net

This is from "The Shirk Report", I also attached the photo in case the picture does not show up in the message. (see if the kids can guess this one)

<J>~<O>~<K>~<E>~<S>~~~<of>~<the>~~~<W>~<E>~<E>~<K>

From: "Mike Williamson" mzmadmike@gmail.com

Far too subtle for the present age.

https://www.youtube.com/watch?v=heAxSmpW0S8

<YOU>~<>~<JUST>~<>~<CAN'T>~<>~<MAKE>~<>~<THIS>~<>~<STUFF>~<>~<UP!>

YOU JUST CAN'T MAKE THIS STUFF UP!

From: "Tim Bolgeo" tbolgeo@epbfi.com

DELINGPOLE: NOW 400 SCIENTIFIC PAPERS IN 2017 SAY 'GLOBAL WARMING' IS A MYTH

by JAMES DELINGPOLE, 24 Oct 2017153
http://www.breitbart.com/big-government/2017/10/24/delingpole-now-400-scientific-papers-in-2017-say-global-warming-is-a-myth/

ADRIAN DENNIS/AFP/Getty Images

When I reported earlier this year on the 58 scientific papers published in 2017 that say global warming is a myth the greenies' heads exploded.
Since then, that figure has risen to 400 scientific papers.

Can you imagine the misery and consternation and horror this is going to cause in the corrupt, rancid, rent-seeking world of the Climate Industrial Complex?

I can. It will look something like this.

Just to be clear, so the greenies can't bleat about being misrepresented, here is what these various papers say:

Modern temperatures, sea levels, and extreme weather events are neither unusual nor unprecedented. Many regions of the Earth are cooler now than they have been for most of the last 10,000 years.

Natural factors such as the Sun (106 papers), multi-decadal oceanic-atmospheric oscillations such as the NAO, AMO/PDO, ENSO (37 papers), decadal-scale cloud cover variations, and internal variability in general have exerted a significant influence on weather

and climate changes during both the past and present. Detecting a clear anthropogenic forcing signal amidst the noise of unforced natural variability may therefore be difficult.

And current emissions-mitigation policies, especially related to the advocacy for renewables, are often costly, ineffective, and perhaps even harmful to the environment. On the other hand, elevated CO2 and a warmer climate provide unheralded benefits to the biosphere (i.e., a greener planet and enhanced crop yields).

In other words, nobody is denying that climate changes, nobody is denying that the planet has warmed by 0.8 degrees C in the last 150 years, while only a handful deny that carbon dioxide (and other greenhouse gases) has the power to influence temperatures.

What they are saying in their different ways is that "global warming" – as in the big scare story that the planet is heating up at a catastrophic unprecedented rate because of man-made CO2 emissions – is bunk; or that the methods being used to combat the problem are bunk.

Here – courtesy of Kenneth Richard, who has waded through them all – are some examples of what they say.

It's the sun, stupid! (106 papers stress solar influence on climate)

<SNIP>

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This is a very long and interesting article and I urge you to go to the website and read it in it's entirety. VT

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YOU JUST CAN'T MAKE THIS STUFF UP!

From: "Chris Cowan" cowanc1028@earthlink.net

And now that I know it's a real train, I want to ride it! (Nell, you are included because of the name, "Jacobite Express"; I don't know whether or not you are interested in Harry Potter per se.)

Scottish police send 'Hogwarts Express' to rescue stranded family

By Travis M. Andrews October 16, This is a Washington post story:
https://www.washingtonpost.com/news/morning-mix/wp/2017/10/16/scottish-police-sends-hogwarts-express-to-rescue-stranded-family/?tid=hybrid_mostsharedarticles_3_na&utm_term=.769df85bd617

Jon and Helen Cluett were stranded with their four children, ages 6, 8, 10 and 12.

The family of six was spending a vacation camping in the Scottish Highlands. But on Friday, Jon Cluett woke up and walked out of his hut on Loch Eilt to find that their 16-foot red canoe had disappeared, probably washed away by the river, the Associated Press reported.

Children run toward a train near Loch Eilt in the Scottish Highlands. (Jon Cluett/AP)

"The entire area was underwater. The rocks I'd tied the boat to were pulled apart and the boat was gone," Cluett, a pastor from Stirling — 120 miles away — told the BBC.

The hike back to the family's car was three miles, too far to walk for the young children, particularly since the ground was so marshy. Train tracks ran through the area, but walking along them seemed too dangerous.

"In the end I decided the only option was to phone the police and mountain rescue, ask if they have any local knowledge that could help us out," Jon Cluett told the BBC.

Little did he know their solution would end up delighting his children.

The Hogwarts Express train at the Universal Orlando Resort in Orlando, in 2014. (David Manning/Reuters)

One of the trains that runs on that remote set of railroad tracks is the Jacobite, an old-fashioned steam train immediately recognizable to fans of the Harry Potter movie series. In the Harry Potter universe, young wizards and witches take a train called the Hogwarts Express to school each year.

Warner Bros. cast a Jacobite steam train as the Hogwarts Express and even filmed the Harry Potter movies along the route it runs from Fort William and Mallaig. The one used in the films is in Los Angeles, but other Jacobite trains look identical, the Press and Journal reported.

And the police were sending one to pick up the family.

"The policeman said, 'We've arranged for the next train passing to stop for you, and you're not going to believe this but it's the Hogwarts Express steam train. Your kids are going to love it,'"

Cluett told the Associated Press. "They know the Harry Potter films and they know that are filmed in the Highlands. But they hadn't put all of that together in their heads until they saw the train."

When they finally saw it, they lit up with glee.

"We threw all our stuff into some bags and boxes and ran out of the door .?.?. at the same time as the train is coming around the tracks," Cluett told the BBC. "The train is getting closer, we're running down, stuff bouncing everywhere, big smiles on the kids faces. It all started to be fun at that point."

"When they saw the steam train coming, all sadness left their little faces and was replaced by excitement and fun," he added.

The train dropped the family off at the next stop, where Cluett managed to get a ride to the family car. While he's happy his children had "an adventure," he wishes he still had his canoe and asked campers to keep an eye out for it.

"It's got to turn up at some point. The thing is 16-foot-long, red and floats," he told the Associated Press.

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YOU JUST CAN'T MAKE THIS STUFF UP!

From: "Frank Brayman" afranklin3@gmail.com

YOU COULDN'T MAKE THIS UP !

Do all black lives matter? Apparently this guy's didn't, even to himself. Too bad he didn't piss off someone who knew how to shoot a year ago, right after he got out of prison. An innocent bystander (woman in her 50s) would have been spared multiple life-threatening wounds, Birmingham Police would have avoided a lot of paperwork, and Alabama

taxpayers would have saved the considerable cost that the State Medicaid Agency spent patching him up. Article follows, exactly as printed.

Frank Brayman

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Birmingham News, Friday, October 20, 2017:

SLAIN MAN ONCE SHOT 10 TIMES IN 6-MONTH SPAN

by Carol Robinson

A man fatally gunned down at a Birmingham gas station in broad daylight Tuesday was previously shot 10 times in a six-month period.

Authorities identified the victim as 29-year-old Antione Collier, known to many by his nickname, "Twin." Court records identify him as Antoine Collier.

A woman in her 50's, who police described as an innocent bystander, was fighting for her life at UAB Hospital after she was struck multiple times by the more than 40 bullets fired in the store parking lot.

Collier died on the sidewalk of the Exxon service station at the corner of Graymont Avenue and Arkadelphia Road just before 1:30 p.m., and his mother told AL.com just six months ago that she braced herself every time the phone rang.

"I'm the mother who hates to answer the phone," Kimberly Flowers said in April. "You worry about your child."

Collier was released from prison just over a year ago and, though he said he wanted to do better, trouble followed him, his mother previously said. He remained a target for those who wanted to harm him and his mother turned to Birmingham police to help her help her son. BPD, through its Violence Reduction Initiative, tried to give him what he needed to turn his life around. They visited him in the hospital, and he even sent a text from the hospital to one official that read, in part, "I've cried till I can't anymore cause I'm blessed. I think when my health gets better, I wanna speak to young black males about violence."

In the most recent shooting prior to the one that ended his life Tuesday, Collier was shot in the face and spent a considerable amount of time in the hospital and a secure rehabilitation facility. He was released over the summer.

Flowers on Tuesday said she wasn't ready to talk about her son's death, but said she was doing OK because, "I've got Jesus."

Lt. Sean Edwards said Collier and his girlfriend were entering the store when two black males shot him. The shooters fled in an unknown vehicle.

"Brazen. Very reckless. It's a total disregard for life," said Birmingham police Sgt. Bryan Shelton. "We are looking for an individual or individuals who clearly have no regard for life at all."

Collier was shot while standing in front of his vehicle, which was parked at Good Tyme Pizza, which adjoins the Exxon. His girlfriend was shaken, but not injured.

The female victim, police said, had just ordered pizza prior to being shot. She was not an acquaintance of Collier.

Residents who live near the busy intersection said the gunfire sounded like fireworks at first, but then they realized it was gunfire. More than 100 onlookers gathered at the intersection and remained there for nearly three hours while investigators marked and collected evidence, and documented the scene.

At one point, a female police officer told anyone who had brought their children to the crime scene — and there were many — needed to take them home.

Collier's mother and father both were at the scene.

Collier was previously shot near Legion Field, not far from Tuesday's shooting. Edwards said in two of Collier's past shootings, he was allegedly stealing illegal narcotics from another individual.

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YOU JUST CAN'T MAKE THIS STUFF UP!

From: "Mike Waldrip" waldripk@gmail.com

SUPERHEROS?

Russia Wants Bulgarians to Stop Painting Soviet Monuments To Look Like American Superheroes.

According to a report by the Moscow Times, pranksters in Bulgaria are repainting Soviet-era monuments so that Soviet military heroes look like American Superheroes. Needless to say, the Russians are not too happy about it:

Russia is demanding that Bulgaria try harder to prevent vandalism of Soviet monuments, after yet another monument to Soviet troops in Sofia was spray-painted, ITAR-Tass reported.

The Russian Embassy in Bulgaria has issued a note demanding that its former Soviet-era ally clean up the monument in Sofia's Lozenets district, identify and punish those responsible, and take "exhaustive measures" to prevent similar attacks in the future, the news agency reported Monday.

The monument was sprayed with red paint on the eve of the Bulgarian Socialist Party's celebration of its 123rd anniversary, the Sofia-based Novinite news agency reported.

The vandalism was the latest in a series of similar recent incidents in Bulgaria - each drawing angry criticism from Moscow...

Ronald McDonald? Really?

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From: "Tim Bolgeo" tbolgeo@epbfi.com

JAGUAR REBIRTHS THE E-TYPE ... AND IT'S THE OPPOSITE OF PAINFUL

C.C. Weiss, March 31st, 2017
https://newatlas.com/jaguar-e-type-reborn/48726/

Jaguar Land Rover Classic has been all about Rovers in its Reborn series, presenting the Series I and Range Rover Classic models. Now it's adding a bit more Jag, putting its automotive talents toward the very worthy goal of restoring Series 1 E-types. At this year's Techno-Classica Essen, it will reveal the first of 10 E-types it plans to rebirth, this one a beautifully revitalized 1965 Series 1 Fixed Head Coupe 4.2.

Jaguar Classic proved beyond a shadow of a doubt that it knows its way around classic cars with the fascinating work it did bringing the Lightweight E-type and XKSS back to life. Those two models were ground-up recreation projects, and now Jaguar takes on the simpler but still impressive work of factory restorations. The E-type makes a natural first for the series, and Jaguar Classic plans an initial batch of 10 cars, each of which will be "expertly sourced and comprehensively restored."

"The E-type is the most iconic sports car of all time," opines Tim Hannig, Jaguar Land Rover Classic director. "We are delighted to be able to give new life to expertly selected examples for discerning customers around the world to own and enjoy. The resources and

information available to Jaguar Classic's expert technicians are unrivaled, which results in the most authentic E-type restorations possible."

Jaguar's first E-type Reborn

Jaguar's experts source each E-type before restoring it according to 1960s factory specification, relying on original drawings and build records stored in the Jaguar Heritage Trust. The process includes retaining or refurbishing as much of the original car as possible while replacing safety-critical parts with new ones from Jaguar Classic Parts, swapping out unsalvageable body panels with Jaguar Classic reverse-engineered panels, and using period-appropriate spot welding when affixing those panels.

Buyers can also choose to improve performance by adding carefully selected options based on later E-type models, such as an improved cooling system with Lightweight E-type-derived parts and Series 2 front brake calipers.

The 1965 Fixed Head Coupe that's the first to roll out of the Reborn program was originally exported to California in May 1965. Jaguar says

the 265-hp 4.2-liter inline six-powered car recorded 78,000 miles (125.5K km) before being stored away back in 1983. Jaguar's team has rebuilt the original bodyshell, engine and gearbox. The Opalescent Gunmetal Grey paint provides just enough shimmer to fully accentuate the E-type's timeless curves without overpowering the eyes like a brighter treatment might.

Each E-type Reborn will start at £285,000 (approx. US$358K), a very pretty penny in its own right but well under the £1 million+ price tags of the recreated XKSS and Lightweight E-types.

Source: Jaguar Land Rover

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HOW 2 AEROSPACE COMPANIES PLAN TO LAUNCH AN INFLATABLE MOON-ORBITING HABITAT

By Harrison Tasoff, Space.com Staff Writer | October 17, 2017 06:16pm ET
https://www.space.com/38490-private-lunar-space-station-bigelow-ula.html?utm_source=sdc-newsletter&utm_medium=email&utm_campaign=20171018-sdc

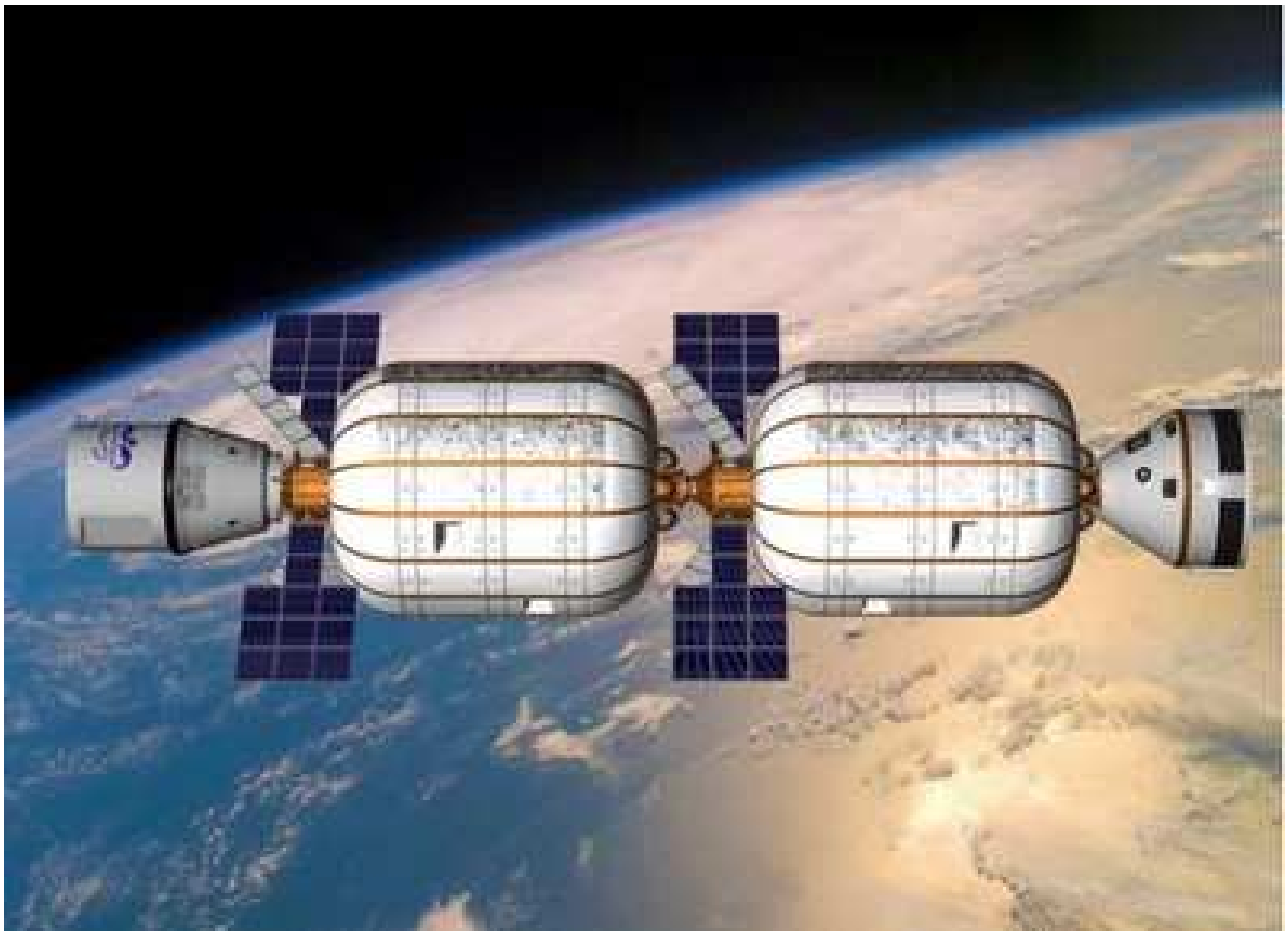
A United Launch Alliance Atlas V rocket launches on Oct. 2, 2015, from Cape Canaveral Air Force Station in Florida. The company's launch vehicles are a mainstay in the modern aerospace industry. Credit: United Launch Alliance

United Launch Alliance (ULA) and Bigelow Aerospace will collaborate to place a space station in orbit around the moon by 2023, the companies announced in a joint statement today (Oct. 17). The collaboration comes as the U.S. government has grown increasingly interested in returning to the moon.

ULA is itself a joint venture between the established aerospace companies Boeing and Lockheed Martin. ULA boasts three families of rockets — Atlas V, Delta II and Delta IV — which have launched a combined total of more than 1,300 missions, according to the company's website.

Bigelow Aerospace made headlines in May 2016 when astronauts attached and activated the Bigelow Expandable Activity Module (BEAM) to the International Space Station. The company's expandable habitats are lighter than traditional, rigid ones and collapse to fit more living space into a given rocket.

The two companies plan to send another of Bigelow's expandable modules, called the B330, into low lunar orbit by late 2022, aboard one of ULA's Vulcan rockets, according to the joint statement.Unlike BEAM, the newer B330 is a stand-alone station, though according to Bigelow Aerospace, it still has the modular capabilities of its predecessor, with the capability to dock with the International Space Station, other B330s, and possibly additional spacecraft. The B330 could serve as a way station for future missions to the moon, said the statement said.



Two Bigelow Aerospace B330 modules are joined into an orbiting space station in this artist's conception of the company's expandable habitats. Credit: Bigelow Aerospace

"This lunar depot could be deployed easily by 2022 to support the nation's re-energized plans for returning to the Moon," Bigelow Aerospace President Robert Bigelow said in the Oct. 17 statement.

Lunar orbit is only one step in Bigelow's plans, however. The company's website lists dozens of applications for the B330, including use as a base on foreign bodies. "Our lunar depot plan is a strong complement to other plans intended to eventually put people on Mars," Bigelow said.

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ARMY EYEING 6.5MM FOR ITS FUTURE BATTLE RIFLE

POSTED BY: MATTHEW COX OCTOBER 13, 2017
https://kitup.military.com/2017/10/lethality.html?ESRC=army-a_171018.nl

The U.S. Army's chief of staff recently made a bold promise that future soldiers will be armed with weapons capable of delivering far greater lethality than any existing small arms.

Textron Systems maintains that its Intermediate Case-Telescoped Carbine, chambered for 6.5mm, delivers 30 percent more lethality than 7.62mm x 51mm brass ammunition. Photo: Textron Systems.

"Our next individual and squad combat weapon will come in with a 10X improvement over any existing current system in the world, and that will be critical," Gen. Mark Milley told an audience at AUSA 2017 on Oct. 10.

Milley's pledge to "significantly increase investments" in a leap-ahead small arms technology appeared low in the story I wrote for Military.com since soldier lethality was the lowest of the Army's top six modernization priorities.

As Milley was speaking, Textron Systems officials were showing off their new Intermediate Case-Telescoped Carbine, chambered for 6.5mm on the AUSA exhibition floor.

The working prototype has evolved out Textron's light and medium machine guns that fire 5.56mm and 7.62mm case-telescoped ammunition developed under the Lightweight Small Arms Technology program.

Over the last decade, the Army has invested millions in the development of the program, which has now been rebranded to Textron's Case-Telescoped Weapons and Ammunition.

Textron's cased-telescoped ammunition relies on a plastic case rather than a brass one to hold the propellant and the projectile, like a conventional shotgun shell.

The ICTC is a closed bolt, forward feed, gas piston operated weapon, weighing 8.3 pounds. The 6.5mm case-telescoped ammunition weighs 35 percent less and offers 30 percent more lethality than 7.62mm x 51mm brass ammunition, Textron officials maintain.

"I think the most important thing is what we have been able to do with the intermediate caliber, the 6.5mm in this case," Wayne Prender, vice president of Textron's Control & Surface Systems Unmanned Systems told Military.com. "We are able to not only provide a weight reduction … and all the things that come with it – we are also able to provide increased lethality because of the ability to use a more appropriate round."

Textron officials maintain they are using a low-drag "representative" 6.5mm bullet while U.S. Army Armament Research, Development and Engineering Center, or ARDEC, is developing the actual projectile.

"We actually used three different bullet shapes and we scaled it," said Paul Shipley, program manager for of Unmanned Systems. "We scaled 5.56mm up, we scaled 7.62mm down and took a low-drag shape and ran that between the two" to create the 125 grain 6.5mm bullet that's slightly longer than the Army's new 130 grain M80A1 Enhanced Performance Round.

Photo 18 **6.5 mm CT configuration cartridge cutaway diagram**

Source: Textron Systems–Unmanned Systems

Textron officials maintain that the new round retains more energy at 1,200 meters than the M80A1. At that distance, the 6.5mm has an impact-energy of 300 foot pounds compared to the M80A1 which comes in at about 230 foot pounds of energy, Textron officials maintain.

"The increased lethality we are referring to has to do with the energy down range," Shipley said. "You can take whatever kind of bullet you want, compare them and it's going to have increased energy down range."

Lethality has always been a vague concept. Is it the amount of foot pounds of energy at the target? Or is it the terminal performance, or the size of the wound channel, it creates after it penetrates an enemy soldier?

It's hard to predict how much performance will change if and when ARDEC creates a 6.5mm projectile that meets the Army's needs.

A lot can be done to predict performance with computer modeling, but ultimately there is no way of knowing how a conceptual bullet will perform until it is live-fire tested thousands of times under multiple conditions, according to a source with intimate knowledge of military ballistics testing.

The Army has also spent years developing its current M855A1 5.56mm and M80A1 7.62mm Enhanced Performance Rounds. After many failures, the service came up with a copper-jacketed round composed of a solid copper slug that sits behind a steel penetrator tip designed to defeat battlefield barriers and remain effective enough to kill or incapacitate.

Is the Army going to throw all of that away, invest millions of dollars to redesign its ammunition-making infrastructure to switch to case-telescoped ammunition?

"What they've got in stockpile does what it does, and they know that is not good enough anymore, so they are faced with that choice," Shipley said.

The Army has not come to a definitive conclusion on a future caliber, but it has been very open about its waning trust in the 5.56mm round.

In late May, Milley revealed to Congress that the M4 Carbine's M855A1 Enhanced Performance Round cannot penetrate modern enemy body armor plates similar to the U.S. military-issue rifle plates such as the Enhanced Small Arms Protective Insert, or ESAPI.

In August, the service launched a competition to find an Intermediate Service Combat Rifle chambered 7.62mm NATO. The Army intended to purchase up to 50,000 new 7.62mm rifles to meet the requirement, according to the solicitation, but sources say that the service has already backed away from that endeavor.

Textron's 6.5mm case-telescoped carbine certainly looks like the leap-ahead, small-arms tech that the Army is searching for to arm its future soldiers.

Then again, the Army's imagination was also captured in the late 1990s by the Objective Individual Combat Weapon, or XM29.

Remember that? It featured a 20mm airburst weapon mounted on top of a 5.56mm carbine. XM29 had an advanced fire-control system that could program 20mm shells to burst at specific distances. At 18 pounds, it proved to be too heavy and bulky for the battlefield.

Textron officials maintain that case-telescoped carbine can be customized to whatever the Army wants.

"It's configurable," Shipley said. "The technology that is inside is what counts."

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DISCOVERY OF 50KM CAVE RAISES HOPES FOR HUMAN COLONISATION OF MOON

Japan says lunar chasm measuring 50km long and 100 metres wide could be used as a base for astronauts and their equipment

Justin McCurry in Tokyo, Thursday 19 October 2017 04.25 EDT
https://www.theguardian.com/science/2017/oct/19/lunar-cave-discovery-raises-hopes-for-human-colonisation-of-moon#img-1

Earth rises over the lunar horizon. Photograph: Historical/Corbis via Getty Images

Scientists have fantasised for centuries about humans colonising the moon. That day may have drawn a little closer after Japan's space agency said it had discovered an enormous cave beneath the lunar surface that could be turned into an exploration base for astronauts.

The discovery, by Japan's Selenological and Engineering Explorer (Selene) probe, comes as several countries vie to follow the US in sending manned missions to the moon.

Using a radar sounder system that can examine underground structures, the orbiter initially found an opening 50 metres wide and 50 metres deep, prompting speculation that there could be a larger hollow.

This week scientists at the Japan Aerospace Exploration Agency (Jaxa) confirmed the presence of a cave after examining the hole using radio waves.

The chasm, 50km (31 miles) long and 100 metres wide, appears to be structurally sound and its rocks may contain ice or water deposits that could be turned into fuel, according to

data sent back by the orbiter, nicknamed Kaguya after the moon princess in a Japanese fairytale.

Jaxa believes the cave, located from a few dozen metres to 200 metres beneath an area of volcanic domes known as the Marius Hills on the moon's near side, is a lava tube created during volcanic activity about 3.5bn years ago.

"We've known about these locations that were thought to be lava tubes … but their existence has not been confirmed until now," said Junichi Haruyama, a senior researcher at Jaxa.

Lava tubes "might be the best candidate sites for future lunar bases, because of their stable thermal conditions and potential to protect people and instruments from micrometeorites and cosmic ray radiation," Haruyama said.

"The same stable and protected environment that would benefit future human explorers also makes them an enticing target for scientific study.

"Careful examination of their interiors could provide unique insights concerning the evolutionary history of the moon."

The agency said the chamber could be used as a base for astronauts and their equipment, because it would protect them from extreme temperatures – ranging from an average of 107C during the day to -153C at night – and radiation from the sun's ultraviolet rays.

"We haven't actually seen the inside of the cave itself so there are high hopes that exploring it will offer more details," Haruyama said.

The discovery will boost plans by several countries to send astronauts to the moon almost half a century after the Apollo 11 mission.

Jaxa recently announced that it aimed to put a Japanese astronaut on the moon for the first time by around 2030, most likely as part of an international mission.

In another sign that the US and Soviet Union's cold war battle for supremacy has been replaced by an Asian space race, China has said it wants to conduct its first manned mission to the moon in around 2036 as part of its ambitious lunar and Mars exploration programmes. Last year it said it had plans to eventually create a colony there.

"Our long-term goal is to explore, land, and settle," Wu Weiren, the chief designer of China's moon and Mars missions, told the BBC. "We want a manned lunar landing to stay for longer periods and establish a research base."

Russia, too, has said it hopes to start building a human colony – initially for just four people – on the moon by 2030.

China, Russia, India and the US have made successful unmanned moon landings, but the US is the only country to have put humans on the lunar surface.

This article was amended on 19 October to correct the length of the cave, which is 50km not 500km

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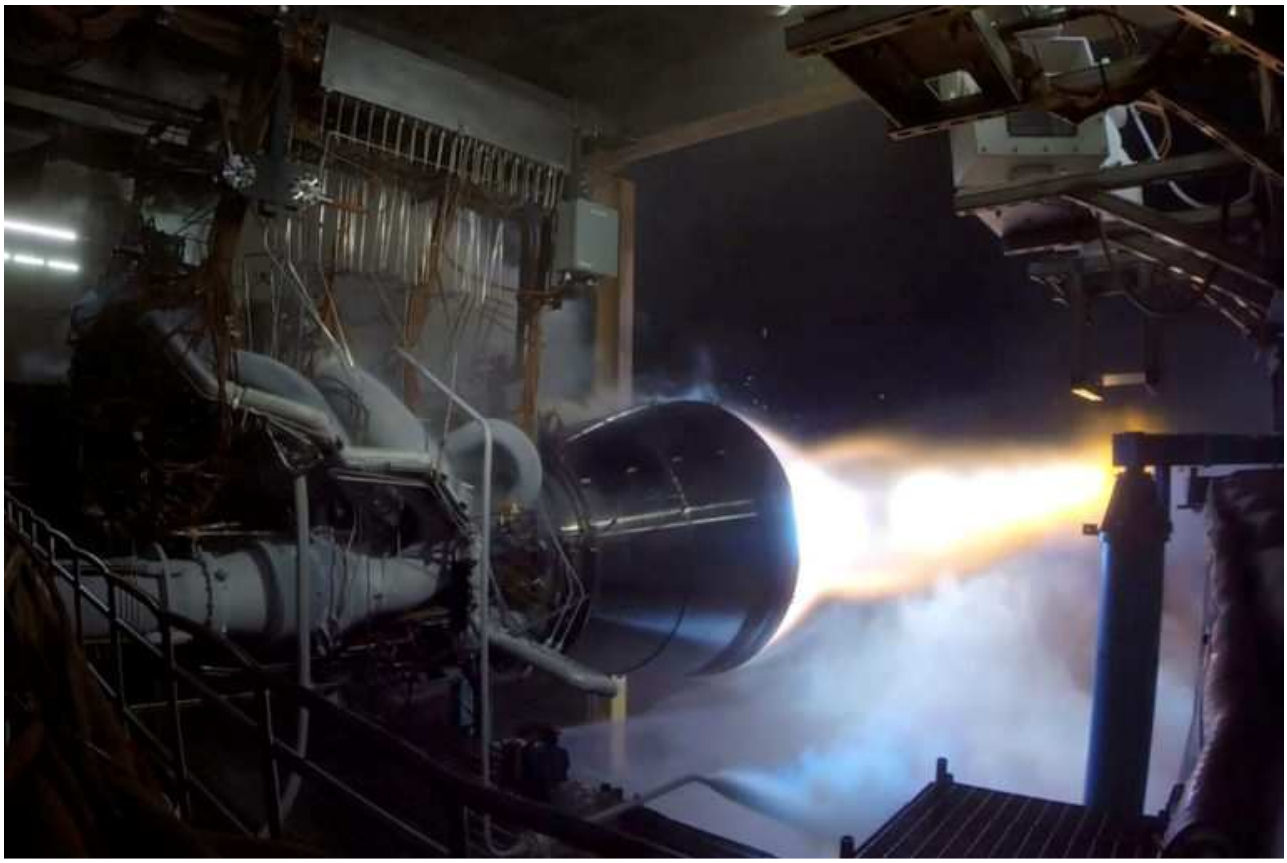
BLUE ORIGIN SPACE VENTURE FIRES UP BE-4 ROCKET ENGINE, MARKING A WIN FOR JEFF BEZOS

BY ALAN BOYLE on October 19, 2017 at 1:39 pm
https://www.geekwire.com/2017/blue-origin-space-venture-fires-4-rocket-engine-marking-win-jeff-bezos/



Blue Origin's BE-4 rocket engine blasts through its initial hot-fire test. (Blue Origin Photo)

Amazon billionaire Jeff Bezos' Blue Origin space venture says it has successfully test-fired its BE-4 rocket engine, marking a key step in the development of its own New Glenn rocket as well as United Launch Alliance's next-generation rocket.

Billions of dollars are at stake in the BE-4 project, United Launch Alliance CEO Tory Bruno told GeekWire last year.

ULA has been waiting for months to get good news about the BE-4 tests in West Texas. The company wanted to see a successful full-scale test before going ahead with plans to use the BE-4 engine on its Vulcan rocket, which is due to have its first flight in 2019.

A Blue Origin competitor, Aerojet Rocketdyne, has been waiting in the wings with its AR1 engine, which ULA saw as a "Plan B" for the Vulcan in case the BE-4 faltered. Wednesday's

initial hot-firing didn't reach full power or full duration, but the test's success nevertheless reduces the likelihood that ULA would turn to the AR1.

The hot firing came as particularly welcome news to Blue Origin after the company lost a set of powerpack hardware during an earlier round of tests in May.

"There was a very, very good party in West Texas last night," Blue Origin software engineer Brandon Haber said today in a tweet.

ULA's Bruno, meanwhile, tweeted his congratulations.

Bezos was in Texas this week for the inauguration of an Amazon wind farm about 300 miles from Blue Origin's test site, and he clearly kept close track of Wednesday's engine firing as well.

Phil Larson, a former White House aide and SpaceX spokesman who is now an assistant dean of engineering at the University of Colorado in Boulder, said the successful test was a milestone for Blue Origin and commercial space ventures — and evoked one of former Vice President Joe Biden's classic euphemisms in the process.

"As Joe Biden would say, this is a BFD for the space industry — and goes to show we're accelerating into the moment where commercial space is driving our national space infrastructure," Larson said in a text.

The BE-4 engine, which uses liquefied natural gas as fuel, is built at Blue Origin's production facility in Kent, Wash., and shipped down to Texas for testing. Assuming that it's accepted for ULA's use, engine production will eventually shift to a factory in Huntsville, Ala.

Engines for the orbital-class New Glenn rocket will go to Blue Origin's rocket factory in Florida, which is due to be completed by the end of this year.

The New Glenn is due to start flying by 2020, and Blue Origin already has signed up several commercial customers for satellite launches in the early 2020s. Bezos also wants to use the rocket for national security launches and, potentially, for NASA missions to the moon.

The BE-4 is designed to deliver 550,000 pounds of thrust, and seven of the engines would be used on the New Glenn's first stage for total liftoff thrust of 3.9 million pounds. That would give it more power than SpaceX's Falcon 9 rocket (1.7 million pounds), but not as much as the Falcon Heavy (5.1 million pounds), which is due for its maiden flight within the next few months.

Blue Origin has been working on the BE-4 for five years, but if the pace of development picks up as expected, Bezos' space venture could tighten up the competition with SpaceX and its billionaire founder, Elon Musk. The Amazon founder sums up his approach in Blue Origin's Latin motto, "Gradatim Ferociter," which translates as "Step by Step, Ferociously."

In addition to New Glenn, Blue Origin is testing a suborbital spaceship known as New Shepard, which uses a 110,000-pound-thrust, hydrogen-fueled BE-3 engine. A now-retired New Shepard craft made five successful test flights to space and back, and Blue Origin is

gearing up to resume uncrewed testing with an upgraded New Shepard by the end of the year. If all goes according to plan, passengers could start taking suborbital space trips within a year or so.

Blue Origin's BE-4 wasn't the only rocket engine facing a big test this week: Today NASA fired up an Aerojet Rocketdyne RS-25 rocket engine for eight minutes at Stennis Space Center in Mississippi, as part of the certification process for its heavy-lift Space Launch System rocket.

The engine was assembled from hardware left over from the space shuttle program. Eventually, four of the 512.000-pound-thrust RS-25 engines, based on a design adapted from the shuttle's main engines, will be installed on the SLS for launch in 2019.

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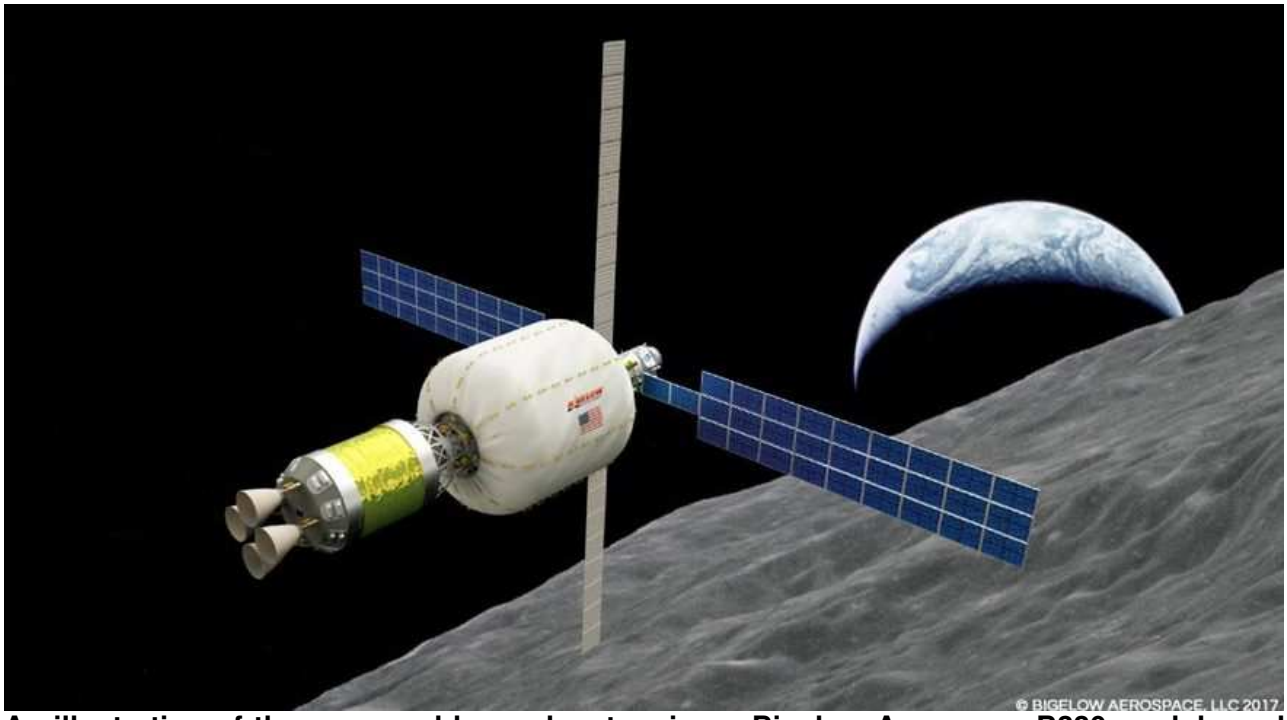
BIGELOW AND ULA ANNOUNCE PLANS FOR LUNAR ORBITING FACILITY

by Jeff Foust — October 17, 2017
http://spacenews.com/bigelow-and-ula-announce-plans-for-lunar-orbiting-facility/



An illustration of the proposed lunar depot, using a Bigelow Aerospace B330 module and launched by United Launch Alliance using its Vulcan rocket and ACES upper stage. Credit: Bigelow Aerospace

WASHINGTON — Bigelow Aerospace and United Launch Alliance said Oct. 17 that they are cooperating on the development of a habitat orbiting the moon that they hope to build in a public-private partnership with NASA.

The companies said they are working together on a concept for a "lunar depot" using an expandable module provided by Bigelow and launched by a next-generation ULA rocket that could support both NASA and commercial uses as soon as 2022.

Under the concept, a ULA Vulcan 562 rocket would launch the Bigelow B330 module into low Earth orbit. The module would remain in Earth orbit for up to a year to undergo tests and be visited by crews.

ULA would then launch two more Vulcan rockets, each placing an Advanced Cryogenic Evolved Stage (ACES) upper stage in orbit. One of the ACES would refuel the other, which would then dock with the B330 and send the module into a low lunar orbit.

The announcement build upon existing work between the two companies to study launching B330 modules, originally on the Atlas 5, Bigelow Aerospace President Robert Bigelow said in an Oct. 17 interview. He said his company decided to shift to the Vulcan vehicle and then build upon its capabilities, such as the ACES upper stage that is intended to also serve as a refuelable space tug.

"There is synchronicity between what ULA has in the way of capabilities and what we're doing," Bigelow said. "We decided to collaborate and prepare a proposal that the White House and NASA could accept as part of an overall space plan."

Bigelow emphasized he saw this proposal as a public-private partnership. He estimated NASA's share of the costs to be $2.3 billion, in addition to the "hundreds of millions" being spent by both Bigelow Aerospace and ULA. "It's executable within four years of receiving funding and NASA giving us the word," he said.

The lunar depot would be available for both NASA and commercial uses, according to Bigelow. It could be visited by NASA Orion spacecraft launched by the Space Launch System, but he said it's possible other spacecraft, like a version of SpaceX's Dragon spacecraft, could also provide transportation to and from the facility.

The depot, he said, is not intended to be a replacement for the Deep Space Gateway, the proposed cislunar habitat announced by NASA earlier this year. That facility would consist of several modules, including some potentially provided by international or commercial partners, and support lunar missions as well as prepare for later expeditions to Mars.

"It is not interfering with the gateway," he said. That gateway will likely be more expensive than his proposed lunar depot and operate in a different orbit. The longer time needed to develop the gateway — current NASA concepts don't anticipate completing the core gateway until the mid-2020s — make it "subject to cancellation by the next administration."

Bigelow said the initial depot could be supplemented by additional modules, or even other depots in different orbits, but that the companies want to keep the concept relatively simple for now. "We're trying to keep it simple to get it done," he said.

Prior to the public announcement of the lunar depot concept, Bigelow said the companies had briefed several "key" but unidentified people in the U.S. government about it. "They're excited about this," he said, adding he believed that Jim Bridenstine, nominated to become NASA administrator in September, would also support something like this.

He acknowledged, though, that the depot is "not a done deal" and will require support from the government as part of development of a new space exploration strategy. "We need to create an appetite for this," he said. "In the end, it's up to what President Trump wants to do and what Vice President Pence wants to do."

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NASA RELEARNING LOST X-PLANE SKILLS WITH LOW-BOOM DEMO

Low-boom demo will be NASA's next X-plane

Oct 20, 2017Guy Norris and Graham Warwick | Aviation Week & Space Technology
http://aviationweek.com/technology/nasa-relearning-lost-x-plane-skills-low-boom-demo?NL=AW-05&Issue=AW-05_20171023_AW-05_239&sfvc4enews=42&cl=article_3&utm_rid=CPEN1000003019593&utm_campaign=12237&utm_medium=email&elq2=3bd6d0bb5c284a4d93137440390aa047

Preparations for NASA's first purpose-designed, large-scale X-plane in decades are underway at its research centers across the U.S. as the agency moves toward selecting a company to build the eagerly awaited low-boom supersonic demonstrator.

Low-speed testing of the preliminary X-plane design produced by Lockheed Martin Skunk Works is wrapping up at the 14 X 22-ft. wind tunnel here at NASA Langley Research Center in Virginia, while flight tests are refining the external vision system (XVS) the pilot will need to fly the unusual aircraft.

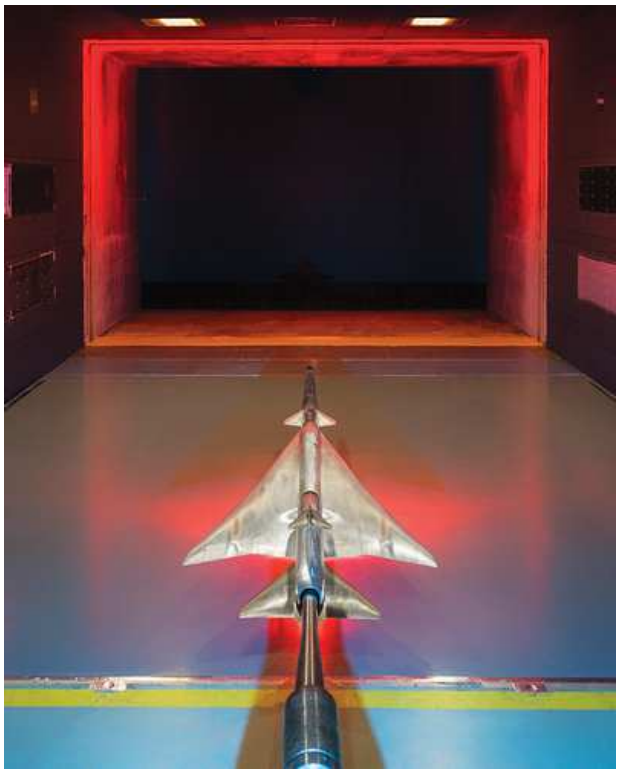
High-speed testing of the preliminary design review (PDR) configuration has been conducted in the 8 X 6-ft. supersonic tunnel at NASA Glenn Research Center in Ohio, where wind-tunnel tests to measure its reduced sonic boom are planned.

At NASA Armstrong Flight Research Center, work is underway on preparing the single-seat, single-engine X-plane to be flown, first to expand the flight envelope at Edwards AFB, California, then to measure public response to low booms with flights over U.S. communities.

Proposals to build the Low-Boom Flight Demonstration (LBFD) X-plane have been submitted, and NASA is in source selection. Only Lockheed and supersonic startup Spike Aerospace are known to have bid, and the number of proposals received has not been released.

Lockheed's offering for NASA's first manned supersonic X-plane since the thrust-vectoring X-31 in 1990 is based on the slender aircraft concept developed under a 17-month Quiet Supersonic Transport (QueSST) preliminary design contract awarded in 2016 (AW&ST March 14-27, 2016, p. 21). NASA and Lockheed completed the PDR in June 2017, and the data generated was provided to potential bidders.

The LBFD will build and fly a clean-sheet X-plane that will be used to support a potential change in regulations to enable civil supersonic flight over land. The low-boom program, which builds on NASA's development of design tools for future quiet commercial supersonic transports, aims to demonstrate a sonic boom of 70-75 PLdB, compared with 105 PLdB for the Concorde.



Low-speed tests of Lockheed Martin's preliminary X-plane design are close to completion at NASA Langley. Credit: NASA

"We developed the control laws and did high-speed wind-tunnel tests at NASA Glenn in February, which showed more favorable results than we expected," says Peter Iosifidis, QueSST program manager at the Skunk Works.

Following the PDR, "we are now moving forward and doing a low-speed wind-tunnel test in NASA Langley's 14-X-22-ft. wind tunnel," he says. Scheduled to be completed by the end of October, these tests involve a 15%-scale, 15-ft.-long model of Lockheed's PDR configuration.

The tests are measuring forces on the model at speeds up to 235 mph, both clean (landing gear and flaps up), with the control surfaces in different positions, and with gear and flaps down in the takeoff and landing configuration.

The design is unusual. The long nose, which will be an empty structure in the X-plane, is shaped to prevent formation of a strong bow shock and instead generate a series of weaker booms. These will not coalesce as they propagate through the atmosphere, preventing formation of the overpressure peak that creates the first bang of a classic "double-bang" N-wave boom.

With a flattened tip, the X-plane's long nose is shaped to prevent strong bow shock formation. Credit: NASA

To avoid formation of the strong aft shock that creates the second bang in that boom, the rear of the aircraft is carefully designed to bleed off lift, says David Richwine, NASA manager for the PDR effort. This involves the wing, horizontal tail and a small trim surface at the top of the fin. Trimming the aircraft to minimize aft boom is part of the "secret sauce," he says.

Other features of the PDR configuration include fixed canard surfaces for trim, a cockpit embedded in the upper fuselage

with limited forward view, a camera fairing ahead of the cockpit for the XVS, a dorsal engine to block the inlet shockwaves from reaching the ground and a "gull" wing to help spread the sonic boom more evenly over a broad swath below the aircraft.

The centerline engine has a diverterless supersonic inlet, a row of vortex generators just aft of the cockpit that diverts air disturbed by the camera and canopy away from entering the engine. This location "is the right answer" for the single-engine X-plane, says Richwine, but a commercial supersonic transport would likely have two engines on the wing.

Within the next two months, Lockheed will conduct large-scale tests of the inlet to validate static and low-speed performance. Ahead of the external-compression inlet is a bump that diverts slow-moving fuselage boundary-layer air away from the engine. The tests at its Fort Worth site will evaluate the slightly larger inlet introduced in the later phases of tunnel runs at Glenn.

Although the design is optimized for low boom, Iosifidis says some compromises had to be made. "How do you get existing subsystems on a very low aspect-ratio wing? It is difficult to fit everything on this that you want, hence the bumps on top of the wing, for example. We could not find actuators small enough, but to support affordability we decided we could live with blisters on the wing," he told the SAE International AeroTech Congress and Exhibition in Fort Worth in October.

To cope with landing speeds up to 185 kt., the design incorporates F-16 landing gear and brakes. Credit: NASA

With an overall weight similar to an F-16 fighter, the QueSST is largely composed of parts scavenged from other aircraft. "The only thing new about it is the shape. The General Electric F414 it will use is an off-the-shelf engine that will be provided by NASA," he says. The canopy and crew station, including ejection seat, is from the rear cockpit of a T-38 trainer, to minimize any qualification that might be needed. Landing gear and brakes are from an F-16 Block 25.

For a forward view over the aircraft's long nose, the pilot will rely on the NASA-supplied synthetic external vision system. This uses a high-definition camera just forward of the cockpit, image processing and a 4K ultra-high-definition (UHD) display to enable the pilot to see other air traffic. Prototype flight-testing at Langley using a Beechcraft UC-12 King Air is evaluating the system's ability to enable pilots to detect conflicts visually as well as they can with the naked eye.

Mounted close to the pilot's line of sight, the camera has a 33-deg. horizontal by 19-deg. vertical field of view and provides 3,480 X 2,160-pixel UHD color imagery at 60 Hz, with only

25-millisec. latency, to the 24-in. LED-backlit LCD monitor—the largest ruggedized commercial UHD screen that can fit in the slender aircraft's cockpit.

Because it is mounted above and well back on the nose, the camera cannot see under the aircraft, so a lower-resolution camera under the nose provides a view downward when the gear is extended. This is precisely stitched into the UHD imagery to provide a full picture. When the gear is up, a synthetic vision system provides computer-generated terrain imagery to fill in the lower arc.

The design requirement for XVS is for pilots to be able to detect the targets on the display at the same distance they would see them with the naked eye. Initial flight tests in 2013 showed "humans can adapt to changes in visibility better than the camera, so we needed to put image processing between the camera and the monitor," says Steve Williams, XVS team lead.

This processing "brings out the contrast so that it is more like what the eye sees; it brings out the detail without increasing the noise," he says. The system knows where the Sun is and can detect the target within the image even when the camera automatically corrects its exposure. Video from flight tests in the UC-12 shows the target is visible against the Sun while the ground is clearly detailed.

F-18-style head-up display flight symbology is overlaid on the XVS imagery, and NASA is looking at displaying automatic dependent surveillance-broadcast data from other aircraft to help the pilot visually acquire conflicting traffic. "Version 2" of the XVS is to fly two years from now, and NASA will supply the system—cameras, processor and display—to the selected X-plane contractor.

In the low-speed tunnel at Langley, meanwhile, the QueSST model has been tested as low as just inches off the ground to determine the influence of ground effect on aerodynamics. The conventional tail "is really good for stability and control at high landing speed," says Iosifidis, who adds that touchdown is expected to be at around 180 kt.

The QueSST is designed to replicate the 75-PLdB shaped sonic boom of a small supersonic airliner flying at Mach 1.4 and will be used to collect data on public perception of low sonic booms. "But how does that translate when it only weighs around 10% of the commercial product?" asks Iosifidis. "As it turns out, as you translate ground overpressure over time, all the way from 8 Hz up, the energy levels of the two configurations [demonstrator and airliner] are in lockstep."

Public annoyance at sonic booms is linked not only to the noise level when outdoors but the secondary effects of vibration and rattle when indoors. Likening the effect to the vibration felt inside a car standing beside another in which loud music is playing, he says, "Even if humans can only hear down to about 20 Hz, the frequency [of concern] is down to 10 Hz because of the 'rumble' effect on buildings."

Beyond Lockheed, other major U.S. aerospace companies, notably Boeing and Gulfstream, were involved in earlier phases of NASA's supersonic technology research. But only Spike Aerospace, a relative newcomer that is developing the S-512 quiet supersonic business jet, is believed to have submitted a competing bid for the LBFD X-plane program.

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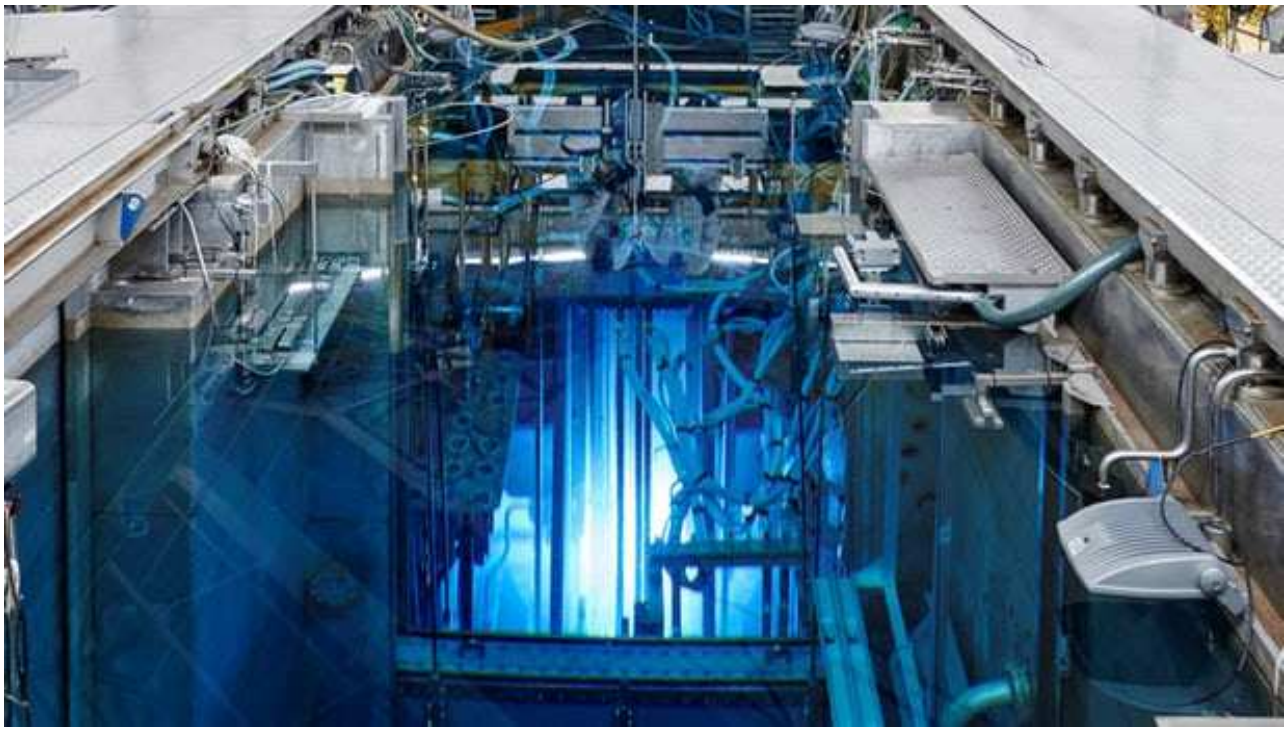
THORIUM SALT REACTOR EXPERIMENTS RESUME AFTER 40 YEARS

David Szondy, August 24th, 2017
https://newatlas.com/thorium-salt-reactor-experiment/51051/



This is the first thorium salt experiment since the 1970s(Credit: Thorium Energy World)

Scientists at the Nuclear Research and Consultancy Group (NRG) the Netherlands, are looking back to the 1970s to meet the energy needs of the future. For the first time since 1976, the NRG team is conducting experiments in thorium molten salt reactor technology that could lead to cleaner, safer nuclear reactors capable of supplying energy on a global scale.

In a world marked by strong political pressure to create a carbon-neutral economy, nuclear energy seems like an ideal alternative. Despite their reputation, nuclear reactors have a remarkable record for reliability, produce carbon emissions that are lower than even wind and solar when construction, operation, and life cycles are taken into account, and have the lowest fatality rate per watt of any competitor.

However, nuclear power does suffer from four major drawbacks. First, the uranium needed to power reactors is rare and expensive to process. Second, the technology to produce nuclear fuel can also be adapted to create weapons. Third, there is the danger in older reactor designs of an unlikely, but frightening catastrophic meltdown. And fourth, no one has come up with a long-term nuclear waste disposal strategy that is acceptable to everyone.

One way of overcoming these issues is to replace the uranium and the plutonium derived from it with a different fissile material. Since the 1940s, the most attractive alternative has been thorium. Unlike uranium, thorium is abundant and widespread, it doesn't require the sort of elaborate enrichment process that uranium needs, and it isn't easily made into bombs. In addition, thorium reactors have an inherently safe design that shuts down if the reaction goes out of control, and the radioactive waste products from thorium are relatively short lived – becoming harmless in only a matter of centuries.

The main obstacle is that thorium can't achieve critical mass on its own. If you take enough uranium that's been refined to fuel grade and stack it together, the amount of neutron radiation released will start a chain reaction that will cause the uranium atoms to split in a self-sustaining process. Unfortunately, thorium can't do this, so thorium fuel must be mixed with uranium or subjected to an outside neutron source to start the reaction cycle.

From the 1960s until 1976, the Oak Ridge National Laboratory in the United States carried out reactor experiments using thorium fluoride dissolved in a molten salt instead of solid fuel elements. Though the results were promising, that approach was abandoned. Since then, India, China, Indonesia, and others have been experimenting with thorium reactors and have toyed with the idea of using molten salts as fuel, but it wasn't until NRG took up the baton that the Oak Ridge approach was resumed.

The custom built test equipment showing the thorium salt in the center (Credit: Thorium Energy World)

Working in cooperation with the European Commission Laboratory Joint Research Center, NRG's SALt Irradiation ExperimeNT (SALIENT) is a multi-stage experiment aimed at turning Thorium Molten Salt Reactors (TMSR) into an industrial scale energy source with commercial possibilities.

According to advocacy group Thorium Energy World, the first phase of the experiment is focusing on removing the noble metals produced by the thorium fuel cycle. That is, the metals created in the steps in the nuclear fission process where the thorium transmutes into uranium before splitting to give off energy.

Once this has been achieved, the next step will be to determine how well commonplace materials used in the construction of TSRMs stand up to the corrosive high-temperature salt mixture or to find alternatives to keep down maintenance and operation costs. These might include an

alloy of nickel called hastelloy, or Titanium-Zirconium-Molybdenum (TZM alloy

The ultimate goal is to create TMSRs that are modular and scalable to meet local energy demand, yet provides 24-hour power that is available year round. In addition, using molten salts mean that refueling can take place while the reactor is still in operation, drastically reducing downtimes.

The video at the website introduces the SALIENT experiment.

Source: Thorium Energy World

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THE PLACE SPACECRAFT GO TO DIE

By Dr David WhitehouseAuthor and astronomer, 21 October 2017
http://www.bbc.com/news/science-environment-41683839

Image copyrightCHINA MANNED SPACE ENGINEERINGImage captionChina's Tiangong I spacecraft is expected to fall to Earth soon

China's Tiangong-1 space station is currently out of control and expected to fall back to Earth next year. But not in the remote place where many other spacecraft end their days.

Explorers and adventurers often look for new places to conquer now that the highest peaks have been climbed, the poles reached and vast oceans and deserts crossed.

Some of these new places are called the poles of inaccessibility. Two of them are particularly interesting.

One is called the continental pole of inaccessibility - it's the place on Earth furthest from the ocean. There is some debate as to its exact position but it's considered by many to be near the so-called Dzungarian Gate - a mountain pass between China and Central Asia.

The equivalent point in the ocean - the place furthest away from land - lies in the South Pacific some 2,700km (1,680 miles) south of the Pitcairn Islands - somewhere in the no-man's land, or rather no-man's-sea, between Australia, New Zealand and South America.

This oceanic pole of inaccessibility is not only of interest to explorers, satellite operators are interested in it as well. That's because most of the satellites placed in orbit around the Earth will eventually come down, but where?

Smaller satellites will burn up but pieces of the larger ones will survive to reach the Earth's surface. To avoid crashing on a populated area they are brought down near the point of oceanic inaccessibility.

Scattered over an area of approximately 1,500 sq km (580 sq miles) on the ocean floor of this region is a graveyard of satellites. At last count there were more than 260 of them, mostly Russian.

The wreckage of the Mir space station lies there. It was launched in 1986 and was visited by many teams of cosmonauts and international visitors.

With a mass of 120 tonnes it was never going to burn up in the atmosphere, so it was ditched in the region in 2001 and was seen by some fishermen as a fragmenting mass of glowing debris racing across the sky.

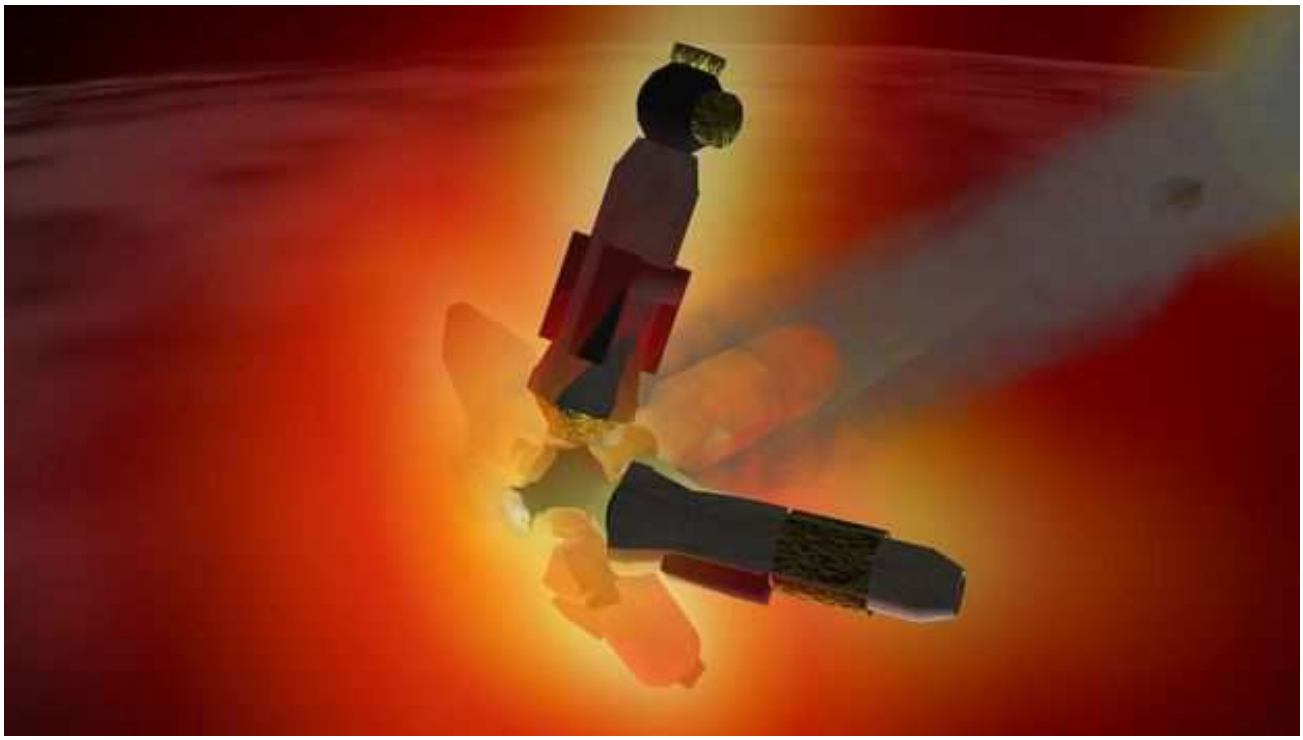

Image copyrightGETTY IMAGESImage captionA computer-simulated image of Mir's descent and break-up as it entered the Earth's atmosphere in 2001

Many times a year the supply module that goes to the International Space Station burns up in this region incinerating the station's waste

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No one is in any danger because of this controlled re-entry into our atmosphere. The region is not fished because oceanic currents avoid the area and do not bring nutrients to it, making marine life scarce.

One future visitor to this desolate place will be the International Space Station.

Current plans are for it to be decommissioned in the next decade and it will have to be carefully brought down in the oceanic pole of inaccessibility. With a mass of 450 tonnes - four times that of the Mir space station - it will make a spectacular sight.

Sometimes however, it's not possible to bring a satellite or space station down in the South Pacific if ground controllers have lost contact with it.

Such a thing happened with the 36-tonne Salyut 7 space station in 1991 which came down in South America or the American Skylab that struck Australia in 1979. No one on the

ground was injured, or indeed as far as we know, ever has been by a piece of falling spacecraft debris.

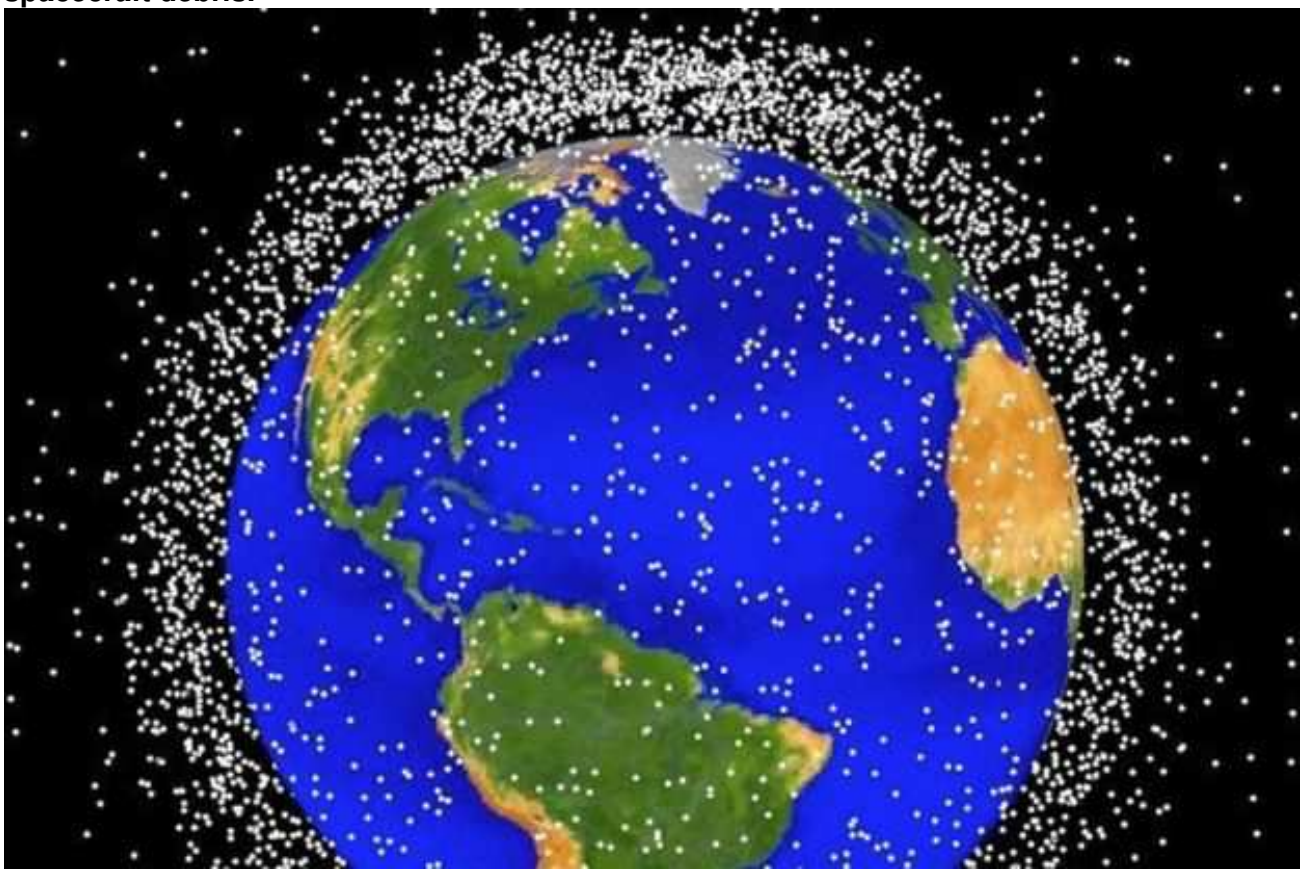

Image copyrightNASAImage captionThe Earth is surrounded by thousands of pieces of space junk (dots not to scale)

We will face that problem again next year.

Between January and April the Chinese Tiangong-1 will come back to Earth. It was launched in 2011 as China's first space station. The following year it was visited by China's first female astronaut, Liu Yang.

Tiangong-1's orbit is decaying as it heads towards re-entry. But Chinese engineers have lost control of it and cannot fire its thrusters to bring it down in the South Pacific.

Instead it will come down somewhere between 42.8 degrees north and south. That's between the latitude of northern Spain and southern Australia, and we won't be able to be more precise than that until just a few hours before it burns up.

Tiangong-1 is one space station that probably won't join its companions in the remote South Pacific.
Dr David Whitehouse was the BBC's science correspondent from 1988 until 2006, and is a former science editor at the BBC News website.

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From: "Chris Cowan" cowanc1028@earthlink.net

BLOOD BOUNDARIES: SHOULD TRANSFUSIONS BE MATCHED BY SEX?

A new study raises questions about potential dangers

By Karen Weintraub on October 17, 2017
https://www.scientificamerican.com/article/blood-boundaries-should-transfusions-be-matched-by-sex/?WT.mc_id=send-to-friend

Credit: Getty Images

Each time health care workers grab a pint of blood for an emergency transfusion, they make sure the donor and recipient have compatible blood types. But they do not pay attention to the donor's sex. A new study raises questions as to whether that should change.

In the first large study to look at how blood transfusions from previously pregnant women affect recipients' health, researchers discovered men under 50 were 1.5 times more likely to die in the three years following a transfusion if they received a red blood cell transfusion from a woman donor who had ever been pregnant. This amounts to a 2 percent increase in overall mortality each year. Female recipients, however, did not appear to face an elevated risk. The study of more than 42,000 transfusion patients in the Netherlands was published Tuesday in JAMA The Journal of the American Medical Association.

The American Red Cross and the researchers themselves were quick to say the study is not definitive enough to change the current practice of matching red blood cell donors to recipients. But if this explosive finding is confirmed with future studies, it could transform the way blood is matched—and it would suggest millions of transfusion patients worldwide have died prematurely. "If this turns out to be the truth, it's both biologically interesting and extremely clinically relevant," says Gustaf Edgren, an expert who was not involved in the study but co-wrote an editorial about it. "We certainly need to find out what's going on." Edgren, an associate professor of epidemiology at the Karolinska Institute and a hematologist at Karolinska University Hospital in Stockholm, says his own research suggests the donor's sex makes no difference to the transfused patient. "Our data is really not compatible with this finding," he says.

But the new study is the fourth work—including a pilot study by the same authors—to find differences in the survival rates of blood transfusion recipients associated with sex

mismatches. And the findings hint that potential problems extend beyond the question of whether female donors have ever been pregnant. One of the studies suggested women were at a disadvantage when they received male blood, and that the opposite was true as well.

Moreover, the three teams were from different countries, used different data sets and all had slightly different findings. The direction of each of their results, however, was the same: biological sex matters, says Henrik Bjursten, a professor in the department of cardiothoracic surgery, anesthesia and intensive care at Lund University/Skane University Hospital in Stockholm. Bjursten, who helped lead the study that found male-to-female transfusions were also problematic, was not an author on the latest JAMA work.

To definitively prove there is a problem, Bjursten says scientists would have to find a plausible biological mechanism to explain these differences—and then run two randomized controlled trials designed to look at whether the donor's sex and pregnancy history affect the recipient. Still, the Dutch study raises enough red flags that he would like to see transfused red blood cells matched male-male and female-female now, even before a connection can be confirmed. "My personal opinion is yes…I would want to have it sex-matched," Bjursten says, adding it would not be difficult to implement such a change. "There are millions of lives at risk here. Do we want to take the risk or do we want to go the safe route and try to avoid the harm?"

Bjursten's own research found risk to both male and female cardiac surgery patients who received blood from someone of the opposite sex. It suggests gender-mixed transfusions may, on average, take about a year off a patient's life. With 100 million transfusions per year worldwide, if 10 million to 40 million of those cause harm, he says, "the numbers start adding up."

It may be difficult to arrive at a solid conclusion about whether sex matters in red blood cell donations. The ethics of running a randomized trial, in which some patients receive sex-mismatched blood products, may also be questionable now that so many doubts have been raised, Bjursten notes. But finding definitive answers without such trials will be tough. Existing data sets, like the one used by the Dutch group, often have holes. "It's not clear that currently available databases will ever be able to answer this," says Ritchard Cable, a scientific director with the American Red Cross, who co-wrote the editorial with Edgren and is hoping to compile a reliable database. Researchers in France are also planning a follow-up study, says Maxime Desmarets, a public health physician and epidemiologist at the University of Franche-Comt in France, whose own research suggests no gender difference in blood transfusions.

Desmarets and Cable, along with the American Red Cross, say current research does not justify a change in the way red blood cell donors are matched with patients. The study "needs confirmation as conflicting studies also exist," Mary O'Neill, interim chief medical officer of the American Red Cross, said in a prepared statement. "As further research is required, we do not anticipate a change to the standard blood donation criteria or current conservative transfusion practices at this time. The Red Cross will closely examine subsequent studies on this subject to ensure the ongoing safety and availability of the blood supply."

Scientists speculate women who have been pregnant could have some immune factor in their red blood cells that causes more rejection among younger male recipients. The main

theory is that perhaps women who had sons developed antibodies to proteins in the Y chromosome of male DNA, as an immune reaction to their pregnancies. But that is a hypothesis the new study could not test, because the researchers did not have information about the sex of the women's offspring. It is also possible the male and female immune systems are fundamentally different in some way or the men are reacting to sex differences in RNA found in the women's blood, Bjursten says.

Until a smaller study on sex mismatches by the same Dutch team six years ago, no one had thought to look at the pregnancy history of red blood cell donors, says Rutger Middelburg, an epidemiologist with Sanquin Research in the Netherlands, who helped lead that pilot work and the study published Tuesday. The differences in mortality are difficult to detect unless researchers know what to look for, Middelburg wrote via e-mail. "Even now, we find that in our data set simply looking at all patients can dilute the effect to the level where it becomes undetectable," he added. "We had to specifically look at the right patient group." He does not know why the team saw a survival difference only in younger men.

It is conceivable, he says, that younger men might have different diseases triggering their need for a transfusion than older men, which might make them more vulnerable to problems incorporating women's red blood cells.

The data was not perfect, Middelburg says. The team examined records of patients who had received transfusions years earlier, and the researchers did not know the pregnancy status of all the women donors. The researchers disqualified data from patients who received blood from both men and women—and because men can donate blood more often than women, the pool was already skewed male, he notes. Women who had been pregnant at any point accounted for just 6 percent of the donors the team studied, although the association was still statistically valid. "We are very confident of our results," Middelburg says.

He is continuing his research, and now hopes to get additional funding. "My priorities would be [to] look into more detailed pregnancy histories and causes of death," he says, "but much other relevant research could still be done with sufficient resources."
