



Transcript: Day 2 – September 10, 2020

KEYNOTE: NASA ADMINISTRATOR JIM BRIDENSTINE

- MODERATOR: **Brian Weeden**, Director of Program Planning, Secure World Foundation
 - **Jim Bridenstine**, NASA Administrator
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BRIAN WEEDEN: It is my great pleasure to introduce the Administrator of NASA, Mr. Jim Bridenstine.

I first met Jim several years ago when he was a freshman member of the US House of Representatives and I was struck not only by his desire to learn about space issues broadly, but also his willingness to work in a nonpartisan and bipartisan fashion, to try and help develop solutions to some of this tough space sustainability challenges.

Since becoming NASA administrator a little more than 2.5 years ago, Jim has played a big role in revitalizing public interest in space and human space exploration, as well as reaching out to international partners in industry to participate in future endeavors such as the Artemis program to return humans to the moon. As I understand it, Jim's going to give a few minutes remarks to talk about a fairly significant announcement that NASA has made this morning.

As an NGO that is interested in space sustainability, we were very open to this discussion today because we think this topic is something that's gonna be one we need to have much more discussions on around the world to talk about the implications of it. So, once Jim's done, he's agreed to take some audience questions.

I will be pulling those from the Q and A. So please give us a minute to clean out some of the existing questions that are there, and then I will then start adding your own questions back in. So with that, Jim, I will turn the floor over to you.

JIM BRIDENSTINE: Well, thank you so much, Brian. I just wanna make sure before I start talking, can you hear me? Okay. Fantastic. So, yeah, it's great to be here with the Secure World Foundation. The work that this institution does, the Secure World Foundation, is critically important. And initiating these dialogues for space sustainability, it is more important now than ever. And every moment that goes by, it's becoming even more important.

What I love about the Secure World Foundation is that you guys were thinking about this stuff years ago, before most people thought it was an issue that needed to be dealt with. And so I just think that what you guys do is fantastic. And I'm grateful for all of your leadership on space sustainability.

And of course, we want to be very responsible and transparent in how we do space at NASA. And working with you and others, you know, I think that I think there's a bright future out there, so I'll start with that.

But yes, we do have a big announcement today, and I tweeted about it just recently, just a few minutes ago. And, that is that--but before I say what the announcement is and I think maybe people have already seen maybe the tweet, maybe they haven't. But bottom line is, we're gonna buy some lunar soil for the purpose of demonstrating that it can be done. We're not interested in building a lander. We're not, to be clear, we are interested in building a lander to go to the moon sustainably, both with the CLPS program, Commercial Lunar Payload Services, and Artemis.

But for this particular contract that we're announcing today, we're interested in buying some lunar soil commercially. So we want a commercial company to go to the moon, extract some lunar soil, and then we as an agency, NASA, can take possession of it. But I want to talk for a second about where this initiated.

We go back to 2015. There was a--there was a bill in the House of Representatives back in 2015. It was done by my good friend, Bill Posey, who represents the Space Coast of Florida. He has the Kennedy Space Center in his district. But that bill was about basically saying that we can, we can extract and utilize the resources from the moon. It was a fascinating bill.

And then the House of Representatives passed what was called the Space Launch Competitiveness Act, the American Space Launch Competitiveness Act. And we took Bill Posey's bill, and we made it an amendment into the American Space Launch Competitiveness Act. And of course I was, you know, very involved. I wanted to make sure that that got into the bill.

And the purpose is, you know, the Outer Space Treaty is critically important, and we are adherence to the Outer Space Treaty. We believe in the Outer Space Treaty. We need it to be successful. But what we want to make sure that we do is that as we follow the Outer Space Treaty we're also, we also enable a normalization process where resources can be utilized.

People are familiar with the Artemis program, we're going to the moon, we're going sustainably. How do we create a sustainable program? Well, we need to utilize the water ice. Hundreds of millions of tons of water ice on the moon. It's air to breathe. That's water to drink. Hydrogen, of course, in the H₂O is rocket fuel. So all of this is available in hundreds of millions of tons on the south pole of the moon. We need to be able to utilize that as a resource.

What we want to make sure we do is that as we interpret the Outer Space Treaty, it says that the moon and other celestial bodies cannot be appropriated for national sovereignty.

And so we believe in that, we cannot appropriate the moon for national sovereignty. And that is absolutely not what we intend to do. But we do believe that we can extract and utilize the resources from the moon, just like we can extract and utilize tuna from the ocean. We don't own the ocean, but if you apply your hard work and labor and your investment to extracting tuna from the ocean, you can

own the tuna from the ocean, and that becomes a very valuable resource for humanity. Same with energy from the ocean.

And so the question is, you know, is it possible to have property rights for extracted resources without appropriating the moon or other celestial bodies for national sovereignty. And I believe that the answer is overwhelmingly yes. We saw that with the American Space Launch Competitiveness Act. And that was passed in 2015. And this is so important, Brian, because I wanna make sure everybody understands--it was bipartisan. It was Republicans and Democrats alike coming together and saying, you know, we think this is important for the nation and it was signed into law by President Obama. And that was the American space launch Competitiveness Act.

Of course now, you know, as an agency, we have an executive order to utilize the resources of the moon, in this case, the water ice. But the question is, what other resources might be there? And the answer is, we don't know. We're finding out new things about the moon all the time.

Just about a week ago, we discovered that the moon is rusting, which was quite a compelling headline. What do we know about rust? You need oxygen for rust. So where is that oxygen coming from?

And now my NASA scientists are saying that the oxygen that is enabled, you know, the oxides on the moon to rust, that that oxygen is coming from the earth, which is fascinating. Who would have guessed that? So we're learning more about the moon. Of course, you know, there's books written about, you know, could there be massive deposits of platinum group metals and other precious metals? The metals that here on earth we call rare earth metals.

Well, they're not earth metals at all. They're asteroid impacts from billions of years ago. The challenge with the Earth is we've got this very active geology. We've got this very active hydrosphere and atmosphere. Anything that impacted the Earth billions of years ago is not today where it was billions of years ago. And when you find it, it's in very trace amounts.

Well, the moon doesn't have the active geology or atmosphere or hydrosphere, so anything that impacted the moon billions of years ago is today, right where it was back then. So could there be large deposits of these, what we would call rare earth metals here on Earth--but could there be large deposits of these precious metals? And the answer is, we don't know.

But we also know that we're going to find out. And when we do find out, we want to make sure that the process by which those resources are utilized, that there is a strong legal framework grounded in international law that that says, hey, yes, you can go and you can get resources, you can utilize those resources and no, that does not mean that you have appropriated the moon for national sovereignty.

And so this is what the announcement that we have today, this--it's a request for proposal and we're saying to industry we want to buy some lunar regolith. We don't want to go get it ourselves. We want you to go get it, and we want you to transfer it to us with a contract.

And so we are putting forward--and it's not a big amount. We're looking for 50 grams to 500 grams. And we're willing to pay \$15,000 to \$25,000 for those, for those grams. And it's deliverable in place. So we think about, you know, one of my first initiatives, Brian, and, you know this, was the Commercial Lunar Payload Services Program, CLPS.

When I became the NASA administrator, we wanted to get to the moon, and we wanted to get there fast. We wanted to take shots on goal. How do you take shots on goal? Well, we turned to commercial industry, and we say, who can get there and we're gonna pay you to take our payloads to the moon? We now have over a dozen private companies that are on an IDIQ contract to deliver science experiments and hardware to the surface of the moon for NASA.

And what we've done today is we've announced that if you can, if you can grapple some lunar regolith, some lunar soil, if you can harness it then we will buy it from you in place on the moon. And a date in the future, we will go, we will go get that, get that lunar resource.

What we're trying to do is make sure that there is a norm of behavior that says the resources can be extracted and that we're doing it in a way that is in compliance with the Outer Space Treaty. And we're doing it in a way, so as to, you know, people cannot interfere with your effort to extract those resources. And that's another element of what we call the Artemis Accords.

A lot of nations want to partner with the United States of America on the Artemis program. And so we've basically created a preamble to any bilateral agreement between the United States and these other countries for basically, what are the norms of behavior in space. And it's everything from, you know, the registration convention of the Outer Space Treaty to debris to you know, the norm of behavior that's enshrined in the Outer Space Treaty called due regard.

So how do you establish a safe zone on the moon where you can do work and not be interfered with by other parties? So these norms of behavior that eventually become binding international law--this is a trail that needs to be blazed. And I think the United States of America needs to lead here.

And then those norms of behavior ultimately, inform, you know, the international law that will make sure that space is sustainable for the long term. So, Brian, it's a pretty exciting day today. I'll just kind of open it up to questions and thoughts and, and let people share what what's on their mind. And again, thank you for what you do with Secure World Foundation, and not just you, but all of your co-workers and the founders and the donors that make the Secure World Foundation possible.

BRIAN WEEDEN: Thank you, we really appreciate that. And, yes, we've gotten several questions that have been coming in here. I'm going to start with some of the ones that are more sort of just a, you know, answering a couple of additional facts of what's happening.

So one question says, at this point, you're just purchasing a few, you know, a very small amount. But the question is, do you foresee maybe a second round where you might buy more? And do you have a specific purpose in mind yet for what's being purchased or is it sort of a general starting point?

JIM BRIDENSTINE: So a good question. So remember, we're buying, you know, 50 to 500 grams, which is not very much. But here's the thing. You know, somebody going to the moon under the Commercial Lunar Payload Services program, CLPS, that wants to extract lunar regolith, they're not, they're not limited to extracting 50 to 500 grams. They could extract 1000 grams and make the other grams available to other purchasers, not necessarily NASA. And those other purchasers, of course, could be other countries. Those other purchasers could be private individuals. It could be companies. There's no limit here to who can purchase that lunar regolith. So to start, yes, certainly there will be second, third iterations of this, but I don't want to limit us on this first iteration.

It's also true that what--that it is not necessary--Let's say there's a company you know, Space IL for example, in Israel. A great company, they took a shot on goal. They almost made it to the moon. They were within seconds of landing on the moon, and then they crashed. Well, that company could actually participate in this program because it's international. We're not, we're not saying it has to be an American company. It can be anybody.

Again, what we're trying to do is establish the norms of behavior to create the regulatory certainty so that companies out there will capitalize and move forward on these, on these programs. But yeah, the question you know is, yes. There will be other iterations of this in the future.

Right now, we're trying to prove the concept that resources can be extracted and they can be traded. And not just traded among companies or private individuals, but also among countries and across borders. Private, private individuals in other countries. So I think this is a proof of concept, but there will be other iterations in the future where, where we might say, hey, we're looking to find, you know, this specific, you know, whatever it is.

But I would also say that I think the big future is not necessarily NASA buying. I think the bigger future would be private companies buying access to those resources. I would say the starting point is the water ice. That's where a lot of private companies are gonna want to go and get that water ice and then sell it to us as an agency or other private companies that are, you know, using the moon as a destination for all kinds of different capabilities.

BRIAN WEEDEN: And one of the other questions in here was whether not you would buy regolith from a Chinese or Russian company.

You just answered that by saying, yes, it's open to internationals.

And another question is whether this is being executed as a CLPS task, I think you said they're certainly open to it. But it is not specifically only the CLPS program, correct?

JIM BRIDENSTINE: That's right. So it's not--this is not a specific CLPS program. CLPS, of course, is for American companies. But this is, this is separate from CLPS, but I would imagine that a lot of the CLPS providers are gonna, are going to certainly be interested in this.

BRIAN WEEDEN: So a couple questions here, talking about price. One is, how did you come up with the price? And do you, do you envision that different samples from different locations might carry different prices you're willing to pay or is it at the moment sort of just a flat, whatever you can, you know, one price for all.

JIM BRIDENSTINE: Yeah, so, so that the price is you know, 15,000 to 25,000 US dollars, which is not big at all. Our goal here is not to, is not to necessarily go and buy the regolith. Our goal--we are buying the regolith, but we're doing it really to demonstrate that it can be done. That the resources extracted from the moon, are in fact, owned by the people who invest their sweat and their treasure and their equity into that effort.

And so the goal here is not for NASA to go spend a bunch of money to get a specific resource. The goal here is to normalize the behaviors that enable the commercialization of the moon and to establish regulatory certainty so that individuals and companies can go and capitalize, you know, those efforts and go, and go extract those resources. And again, I think the water ice is the first step. But, you know, there could be companies that are interested in in the precious metals as well.

BRIAN WEEDEN: So, ah, there have been a couple other questions here and they're related to the Artemis Accords from an international perspective. Could you talk about is this directly related to the Artemis Accords? Is this part of this? And have you had conversations with some of the international partners you've been talking to about participating in Artemis about this particular issue and you can, you know, if you can, what are their thoughts on this resource extraction issue?

JIM BRIDENSTINE: So the answer is yes, we've talked to a lot of international partners about the extraction and utilization of resources. When we think about Artemis, what we're trying to do is go sustainably to the moon. Well, we can't go sustainably to the moon unless we're utilizing the resources of the moon. Just like we can't go sustainably to Mars unless we're utilizing the resources of Mars. So this has its foundation in a sustainable return to the moon and a sustainable movement to Mars. So we need to be able to prove that we can utilize those resources, and really, that's kind of the focus of this.

BRIAN WEEDEN: Got it. And along the discussions with partners, there's a question here about, you know, Luxembourg and the UAE have both made some significant public comments about the importance of in situ resource utilization, sort of extraction thing.

Have you talked with them at all about involvement in this, or is that still part of the ongoing, you know, private discussions?

JIM BRIDENSTINE: Yeah, absolutely. And we do that really threw the Artemis Accords. That was, of course, the previous question. You know, when we talk about the Artemis Accords and creating safe zones on the moon so that, you know, you can extract resources without being interfered with by other nations. You know, those are the kind of areas where we've had these discussions. But I will tell you, they've been very public about it.

Luxembourg and UAE are, you know, very interested in lunar resources. I will tell you there are other countries, I don't want to dine them out right now, they need to dine themselves out. But there are

other countries that are also exceptionally interested in this, and we want to support that effort. I don't want to get in front of them and what their interests are.

But really, I think everybody understands that for a sustainable return to the moon--the challenge with Apollo is that it ended. And it ended because it was so expensive, that none of the systems were reusable. They weren't sustainable. And of course, everything that went to the moon, you had to take it with you.

The question is, how do we use the resources that are there to live and work for long periods of time? And that's a big part of what we're trying to achieve here. And our international partners are very aware of that. And we talk about it and they're very, they're very good with it. I haven't heard really any pushback on that.

BRIAN WEEDEN: Question here on whether you've talked to Congress about this, and if so, what, what their reaction is and where's the money coming from there? Is there a specific allocation or pot of money that this is coming from?

JIM BRIDENSTINE: Yeah. So this will come from Human Exploration and Operations inside of NASA. Some of the team at NASA, legislative affairs team has talked with staffers on the Hill on the appropriate committees. I have not engaged any members specifically on this issue at this point.

I will also tell you, though, that remember, this--this was originated in a bipartisan bill passed by Congress in 2015 and signed by President Obama. And of course, now it's embraced by President Trump with the Artemis program, the Artemis Accords, the utilization of resources for-- so this is not, this is not a partisan or political issue.

Well, I mean, you could say it's political for sure, in the sense that people want to see us go to the moon and go this time to stay. But it's not partisan and as you know, my--so for the last, you know, 2.5 years at NASA I've been working overtime to make sure that NASA is something that everybody can agree on. And we're getting great support from the president and great support from members of Congress on both sides of the aisle.

BRIAN WEEDEN: So top rated question here has to deal with sort of the accessibility of this. So you mentioned the tuna analogy, the fishing analogy, where the barrier to entry is pretty low, right? Any country that kind of wants to go do that, can go do so. But the ability to access the moon and thus you know, kind of extract resources very different. It's only a handful of countries that really have the ability to do that.

So what do you say about the concerns about the US sort of extracting the best or the largest deposits before anybody else has a chance to get there? How does that line up with what we think of as sort of the equitable access principle when it comes to space activities?

JIM BRIDENSTINE: So a couple of things, number one, I don't think that the resources there are going to be as limited as maybe has been suggested in that question. I think there could be a lot of resources

there. But I don't know. Neither does anybody. Just looking at the probabilities, given that the earth and the moon fly through the same space. And, the earth has this, you know, atmosphere that eats up anything that runs into it. The moon does not. So there could be a lot of resources there. So I don't know that the resources there are limited.

It is absolutely true that it's extremely expensive to go to the moon. But it's also, you know, going to get tuna, you know, it's not a cheap endeavor either. You gotta buy a boat and you have to have the right equipment. And you've got to know--you gotta invest in people. And so any time you go there is, you know, this kind of effort to go extract resources throughout history, it's always funded by somebody. Absolutely true that you know this, this could be nation states that do it, but it could also be private companies that can do it.

And so let's say you're, let's say you're an individual in a small country that doesn't have the ability to do this. But there's, there's no reason you couldn't you know, work hard, you know, get your resources and then invest in another company somewhere else in the world that does have the ability to do it.

So the goal is the democratization of this access in a way that it's not dependent on a nation state. It's literally democratized to the point where you know anybody can participate at whatever level you're able to participate.

BRIAN WEEDEN: Thanks, that makes a good--a really good point. Also, the commercialization thing that helps a little bit there, right, and that there would be soon commercial launch services to get a payload to the moon, which could help lower that. A couple more questions here in the minutes we have remaining. One of those has to do about standards of behavior.

The question is whether--how NASA or say the US government is going to enforce some of the international principles and standards with regard to this.

For example, planetary protection for how a commercial company might go ahead and gather this. I mean, NASA is not a regulatory agency. So I guess that sort of leads into how the US government might supervise this sort of an activity, collection activity.

JIM BRIDENSTINE: Yeah, that's, so that's another very important question. And of course, this wouldn't be possible if, you know, NASA has worked pretty hard in updating our, you know, COSPAR kind of guidelines, our planetary protection guidelines. We wanna--you know, we obviously wanna be very protective of the environments where we go.

The big thing is, especially when you think about Mars, there very well could be life on Mars. We don't know. But, you know, we have found complex organic compounds. We have found that the methane cycles match the seasons of Mars. You know, we have found potentially liquid water. So all of these things conspire to say the probability of finding life goes up.

Now, that's why planetary protection is so important because we don't want to go to another planet and accidentally plant life and then believe that, you know, we discovered it. So we've got to make sure that we, that we are adhering to the COSPAR guidelines. And, of course, in many ways, you know we

have to lead as a nation on those guidelines. A lot of other countries might not follow the same guidelines. We've got to make sure that we're leading to make sure that they're following the same guidelines.

So I think you know, it's important to recognize that. But those behaviors that we want to see standardized that makes space sustainable, those behaviors have to have a forcing function. Like what compels a nation to want to behave correctly? What compels a private company to want to behave correctly? And the answer is, I really think this is where American soft power matters the most. It's where NASA matters the most. Because NASA has these big projects that everybody wants to be a part of.

Whether it's, you know, taking a robot to Mars, whether it's sending astronauts to the moon, whether it's eventually taking astronauts to Mars, nations around the world want to be part of NASA programs, and that's why we created the Artemis Accords. It is the forcing function to compel behaviors that enable space to be sustainable. And if you want to be with us when we go to the moon, if you want to be a private company that can have NASA as a customer. If you want to be with us when we go to Mars, then there are certain behaviors that you have to adhere to. And so, yes, NASA is not a regulatory agency. But it is also true that we have soft power capabilities that can compel norms of behavior that enable space to be sustainable for the long term. And that's never been more important than it is right now.

BRIAN WEEDEN: Well, we're gonna wrap up here. Ah, one last question that is sort of related to this and ties into what we were talking about yesterday and that's a question on orbital debris. Do you see this, perhaps as maybe a model for how we might deal with orbital debris and orbital removal in the future?

I know NASA has not made a decision on whether to do that, but do you think this might possibly--this whole issue of, you know, putting up a government, like a bounty or a price to pay could possibly relate to orbital debris in the future?

JIM BRIDENSTINE: So absolutely. Again I mean, I think there's all kinds of soft power tools that we could have available to us to compel nations to do the right thing. The question is we have to make the incentive structure such that, it is in your interest to behave appropriately and that right now that incentive structure is, it's not as strong as it should be as it relates to the creation and or mitigation of debris.

And so yes, you know, certainly we can say if you want to be with NASA on these programs, we need to see these behaviors. I think there's lots of room for that activity, and I think the international community would love to see NASA lead on that. But the mitigation is one thing. Then there's the situational awareness, the space traffic management and then the remediation. So all of these are going to be part of the entire, you know, mix of capabilities that result in space being sustainable. So we've got to get better situational awareness.

We need to make sure--and that's a whole other speech--but we've got to get that out of out of, you know--that is not a Department of Defense capability for the world. Right now, they're doing it for all commercial players in the entire world for free. We need to take the unclassified data from the Department of Defense, give it to commercial providers, give it to the Department of Commerce, make it available to the world for free. And then incentivize additional data, more data, better data to improve space situational awareness.

Eventually, we're gonna have to have a regulatory regime that can compel behaviors for space traffic management. And then, of course, the big challenge that everybody is aware of is how do you get rid of the debris that's gonna be there, you know, for generations to come? Well, we're gonna have to somehow incentivize remediation. And so all of that goes into the mix of making space sustainable, especially in in Earth orbit. Earth orbit is the big challenge right now when it comes to those activities.