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Before the

Subcommittee on Strategic Forces

COMMITTEE ON
ARMED SERVICES

UNITED STATES SENATE

HEARING TO RECEIVE TESTIMONY ON MILITARY SPACE PROGRAMS IN REVIEW OF THE DEFENSE AUTHORIZATION REQUEST FOR FISCAL YEAR 2016 AND THE FUTURE YEARS DEFENSE PROGRAM

Wednesday, April 29, 2015

Washington, D.C.

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The subcommittee met, pursuant to notice, at 2:29 p.m. in Room SR-222, Russell Senate Office Building, Hon. Jeff Sessions, chairman of the subcommittee, presiding.

Present: Senators Sessions [presiding], McCain, Inhofe, Fischer, Nelson, Donnelly, King, and Heinrich.

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OPENING STATEMENT OF HON. JEFF SESSIONS, U.S. SENATOR FROM ALABAMA

Senator Sessions: Good afternoon. We will commence.

And we thank you all for being with us. I know, Secretary James, you have had a busy schedule. We thank you for working around that. General Hyten and Ms. Chaplain, nice to see you again.

The subcommittee meets today for its annual posture hearing on military space programs.

And I would like to welcome our witnesses. I thank them for their good service.

And like General Hyten, earlier this year you appeared before the committee to brief us on a number of troubling developments regarding our adversaries' desire to threaten U.S. space capabilities. We cannot discuss that briefing in detail in this open setting. However, as you stated on "60 Minutes" -- a pretty good star. You have become a big star -- this weekend, quote, it is a competition that I wish was not occurring but it is. Close quote.

The Deputy Secretary of Defense stated at a conference here in Washington just last month, quote, our space assets are now at more risk than they have ever been. Close quote.

Just a few weeks ago, Lieutenant General Raymond told listeners at the space symposium in Colorado that, quote, China launched a successful, nondestructive, direct descent

anti-satellite missile, placing satellites in low-earth orbit at risk. Russia, in May, quietly launched an experimental satellite that we are keeping a close eye on. Just a few weeks ago, they launched another one that they have just recently announced. Close quote.

General Raymond also stated, quote, in the not too distant future, every satellite I orbit will be able to be put at risk. Close quote.

So Russia and China have militarized space. There is just no doubt about it. They stand to undermine the space-enabled advantages our country has benefited from for nearly 60 years. Waiting to deter and dissuade continued aggression by Russia and China, or perhaps others, is an option we cannot afford. And I look forward to hearing from our witnesses about how they believe we should be addressing the threat. I also look forward to hearing an assessment of what policies may be needed to be refined to more meaningfully deter and a level of investment that they believe will be necessary to ensure that we can guarantee our freedom of movement, the right to respond to attack, and deny our adversaries the use of hostile space capabilities.

As for space launch, I strongly believe our high priority should be ending our reliance on the Russian engines. Fortunately, I think we are all in agreement that the continued or prolonged use of the RD-180 is not in our

national interest.

That said, the speed with which we can make a transition away from RD-180 is a point of contention. Some have argued that doing so by 2019 is not possible. Others claim they need until at least 2022, if not longer. I believe failing to at least try to meet the 2019 goal would be a mistake, and I am disappointed that we do not seem to have the urgency that we need to achieve that goal.

During the 1960's, we were able to design and launch the rocket that would take us to the moon in under 6 years. But according to our Air Force reports at this time, creating a rocket engine today with modern design and manufacturing techniques would require a minimum of 7 years. The Air Force has said that 2019 is not achievable, and I am concerned about that. It has been more than a year since Russia invaded Crimea.

Congress gave the Air Force $220 million to develop a new engine. Yet, thus far, the Air Force has spent only $14,000 of that money. There are certainly times when slow and deliberate development is appropriate. However, I do not think we need to be proceeding in that fashion now. If relations continue to deteriorate with Russia, access to the RD-180 could easily be in jeopardy. Prolonging our dependence is not acceptable. The need to end our reliance is important.

Senator Donnelly, thank you for your leadership, and I will be glad to hear any opening statements you might have.

STATEMENT OF HON. JOE DONNELLY, U.S. SENATOR FROM INDIANA

Senator Donnelly: Thank you very much, Mr. Chairman.

And I want to start off by saying last night around 9 o'clock, I was sitting with a set of earphones and my iPad and was watching something, and my roommates asked me what movie are you watching. And I said, well, it stars General Hyten and it is space invaders. It was your "60 Minutes" effort. And I want to tell you how informative it was. For the entire Nation, I think it was a wakeup call, and I just wanted to let you know that it has brought a lot more people's attention to this issue.

I want to thank Senator Sessions for today's hearing on this important topic.

I want to also thank our witnesses, Secretary James, Ms. Chaplain, General Hyten, for agreeing to testify today.

We have a number of issues before the committee concerning space, but the most important is assured access to space. The Department of Defense puts up satellites that helped catch Osama bin Laden, tell the President whether a nuclear attack is occurring and then permit him to communicate with his advisors during that attack.

We will soon have SpaceX certified for a subset of the payloads that DOD currently launches by this June. United Launch Alliance, we understand, is stopping production of

the Delta IV rocket, while building a new rocket that will either use a replacement for the Russian RD-180 or use an entirely new methane engine.

There are risks as the company moves to be cost-competitive, but the bottom line is we must not lose sight of our longstanding policy to launch our national security payloads into space when needed.

Again, let me thank everyone for appearing today. I look forward to their testimony.

Senator Sessions: Thank you.

If we can go to our witnesses. Secretary James, we are delighted to have you as Secretary of the Air Force and appreciate your leadership in all these matters. General Hyten, we appreciate your leadership and openness to the Congress. And, Ms. Chaplain, thank you for keeping an eye on all of us and the Air Force.

Secretary James, we are glad to hear from you.

STATEMENT OF HON. DEBORAH L. JAMES, SECRETARY OF THE AIR FORCE

Ms. James: Thank you so much, Mr. Chairman and Ranking Member Donnelly, other members of the committee. It certainly is my pleasure to be here with my colleagues, Ms. Chaplain and my wingman, General "I am not NASA" Hyten, as we now call him in the Pentagon.

[Laughter.]

Ms. James: Mr. Chairman, as you know, I have been Secretary of the Air Force and the Executive Agent for Space for about 16 months now. The Executive Agent for Space is responsible for looking out across the entirety of the space enterprise at strategy, budgets, and threats. The EA, as we call it, is also the chairperson for the Defense Space Council, which is the primary coordination body for the DOD space enterprise.

Now, the Defense Space Council's responsibility is to provide recommendations to the Secretary and the Deputy Secretary of Defense to ensure that the U.S. has the space power needed to achieve our national security objectives. And indeed, the President's 2015 national security strategy reflects this imperative.

Now, to answer the President's challenge, we responded last year with a strategic review of the entire space portfolio, and we really identified three space-related

focus areas where we need to target resources and energy going forward. Specifically, number one, posturing for defense. Two, assured access for space, and three, space situational awareness. Of these three, assured access to space is the area most reliant on our national security launch capability.

Now, national policy codifies assured access as a fundamental tenet of our launch capability and requires that we maintain at least two launch systems. The competitive space environment, coupled with rapid changes in the landscape, present our national security launch capability with significant opportunities, as well as challenges, going forward.

So this afternoon what I would like to do is outline the steps that we have taken to ensure the Nation has assured access to space, including fostering launch competition, as well as ending our reliance on foreign engines. So let me first address launch competition.

No single organization should monopolize launch services, and the good news is for the first time in almost a decade, our Nation has the opportunity very soon to compete launch services and leverage the commercial space launch market to drive down costs and improve our resiliency. This is because SpaceX has emerged as a viable commercial launch provider and the success of NASA's

commercial resupply missions is some evidence of this.

Now, we saw this firsthand during NASA's DSCOVR mission. This was not only the first Air Force-contracted launch by SpaceX, but it also visibly demonstrated the ability of SpaceX and the Air Force to conduct launch operations together. And we do have an additional launch vehicle on order with SpaceX for the STP-2 mission, which is a Falcon Heavy. This working relationship aided both the Air Force and SpaceX as we made significant strides towards certifying SpaceX for critical national security launch payloads.

But as you know, unfortunately, we missed our December 2014 certification goal for SpaceX, and as a result of that -- partially as a result of that, at the request of General Hyten and me, retired General Larry Welch conducted a review for us of the SpaceX certification process and provided some excellent recommendations for improving the process. And in fact, the process, which is memorialized in a cooperative research and development agreement, has been updated to reflect those changes, and it was signed yesterday. So it is done.

So we are confident that we will certify SpaceX Falcon 9 in June of 2015, and this will allow SpaceX to compete for two launches, which are funded in fiscal year 2015, and will posture them also to compete for an additional seven

missions that we project in fiscal year 2016 and 2017.

Now, one more positive step forward is our receipt just this month of SpaceX's statement of intent to certify the Falcon Heavy. Certification of the Falcon Heavy will give SpaceX the capability to lift the majority, if not all, of our projected manifests in the future. And their statement of intent marks the beginning of that certification process.

So make no mistake. Our national security for the United States will be far better off the day that we certify SpaceX, and we are shoulder to shoulder with them to make sure we get this done.

Also, as you know, a little more than a year ago, the Air Force awarded a contract to ULA for a block buy, which allowed us to drive down costs for the fiscal year 2013 through 2017 ULA launch orders as compared to the CAPE independent cost estimate. And ULA has produced a tremendous success record for us through the years and has been the foundation of our assured access to space for the last 10 years. The block buy provides us more affordable pricing to continue that track record as we transition to full competition. And that is what we want.

Specifically, we see the opportunity for the SpaceX Falcon 9 to compete head to head with the ULA Atlas launch system from both a technical capability as well as a price standpoint.

Speaking of the Atlas, as you know, the Russian RD-180 engine constitutes the heart of this system right now. The Russian invasion of the Crimea, as you said, Mr. Chairman, in February 2014 made it abundantly clear to all of us that we have to stop relying on Russian engines. This continued reliance is no longer tenable and we have to find a domestic alternative.

And that is why early last year, right after this invasion, we chartered the Mitchell Study to provide us an assessment of what needed to be done to replace the RD-180 with a domestic alternative. And General Mitchell's team told us that there was no readily available, easy way out of this. There is no easy solution.

Now, I am not a rocket specialist, but I have had the Nation's best rocket specialists -- at least some of them -- looking at this challenge for us, and one of them happens to be sitting right here with me at the table.

Today there is no such thing as a plug-and-play engine. We would either have to modify an existing launch vehicle or develop a new one, but both of these approaches need time and money and both would require a willing launch vehicle partner to use the engine. The Mitchell team told us, for the most part, over time it has taken 6 to 8 years to develop a new engine if you are starting from a cold start, and then another 1 to 2 years on top of that to be able to

integrate it onto a rocket.

Last spring, we took actions to protect our options for launch capability in the near term and to determine an expeditious path forward to transition off the Russian engine. We engaged with industry, ultimately issuing two RFI's. And fortunately, we found that there is not a cold start situation, at least not in some cases, and there are opportunities to reduce the time and costs by leveraging ongoing industry activities. And so we identified several opportunities to leverage privately financed engine and launch vehicle developments. We also established that neither of the front-running launch providers were interested in a new engine because each of them individually was already investing and going after their own different solution.

So we now see a path toward a public-private partnership that will result in a commercially competitive domestic launch capability to replace the RD-180.

So based on our engagement with industry, we have developed a four-step process. Step one, which we started last year, is to mature the technology to reduce the technical risks going forward. And, Mr. Chairman, we have actually obligated about $50 million so far. That is $37 million in fiscal year 2014 money, which was reprogrammed, and about $13 million of the fiscal year 2015 money that you

all made available to us. So about $50 million so far toward this step one of the effort, and we intend to invest an additional, say, $45 million to $50 million we project over about the next 6 months.

Step two is to initiate investment in rocket propulsion systems, which of course is in compliance with the NDAA, and we will award multiple contracts with propulsion system or launch system providers to partner with their ongoing investments in domestic propulsion systems. In fact, just last week, we issued the draft RFP to get going on this. Our path is consistent with the law, as I said, directing the Department to develop a domestic propulsion system by 2019 and to do so competitively. That is the law and we are consistent with this.

But remember, this will give us an engine, and an engine alone will not launch us into space. Transitioning the engine to a fully integrated, tested, and certified capability will take longer than that. This is the consensus of experts across the space enterprise. Therefore, our partnership with industry must also expand beyond the propulsion system to the launch system, and that takes me to step three.

In step three, we will continue our public-private partnership approach by entering into agreements with launch system providers to provide domestically powered launch

capability to the Nation.

And finally, step four. We will compete and award contracts with certified launch providers for launch services during the period 2018 to 2022. These providers will on-ramp the systems developed under the shared investment approach that we are putting out, and of course, they will off-ramp these legacy systems which have been produced by the Russians.

Now, with this approach, we believe that we can partner with American industry to develop a domestic propulsion system and integrate it into a launch system. So we believe we can reintroduce competition as well as transition off the Russian RD-180.

However, here is the wrinkle. Section 1608 of the NDAA sets restrictions on using the RD-180 for national security launches and introduces a risk that we will not be able to achieve our objective of being able to fully competitively contract beginning in 2018. Consequently, we are recommending an adjustment to the language which, if approved, would allow the use of engines ordered but not fully paid for prior to the invasion of the Crimea. If adopted, this proposal would allow us the flexibility to keep the cost competitive Atlas in play until we have this fully developed domestic alternative.

I will turn now briefly to our remaining two focus

areas that I mentioned in the beginning, posturing for defense and improving situational awareness.

What I mean by posturing for defense, in view of all the threats that you talked about, Mr. Chairman, is I mean we need to think differently about space. In short, we must prepare for a conflict that might one day extend into space. And we must begin by investing in our training, our doctrine, our tactics. This is all about posturing differently.

And accordingly, the Strategic Command has inaugurated a new joint space doctrine and tactics forum, and I certainly am instructing the Air Force, as well as the EA for Space team, to support this effort fully.

Second, we have either redirected or increased our planned budget expenditures in both fiscal year 2016 and over the FYDP. Over the FYDP, it is about $5 billion in both classified and unclassified areas. And most of that investment will go toward improving our space security at the enterprise level.

We are also incorporating security requirements in all of our space capabilities going forward. We have a number of ongoing AOA's to address this, and by the way, these AOA's have taken way longer than anticipated, which is a frustration to me. I have had direct discussions with the Deputy Secretary of Defense about this. It is hugely

frustrating to him as well. And he is in agreement that we need to increase the pace here and get on with these analyses soonest.

Then finally, our situational awareness. This, of course, underpins everything that we do in space. I think you all are aware we have the two GSAP satellite vehicles launched in July of 2014, and they are progressing quite well with their on-orbit RDT&E. This program is going to provide us with unprecedented awareness of the activities of satellites in geosynchronous and geostationary orbits. And furthermore, we think we are quite well on track for the Space Fence introduction in 2019. That is assuming that we get our budget request in fiscal year 2016. And Space Fence will allow us to track many more smaller objects in low-earth orbit.

Before I conclude, Mr. Chairman, I just want to make clear that a lot of what we have been talking about here is technology, but technology alone will not put our Nation on a sure footing in space. A sure footing for our Nation ultimately depends on our people. And I just want to take a moment and say thank you to the tens of thousands of airmen and the joint force across the world that is making this happen for us today.

Thank you very much.

[The prepared statement of Ms. James follows:]

Senator Sessions: General Hyten, do you have remarks?

STATEMENT OF GENERAL JOHN E. HYTEN, USAF, COMMANDER, AIR FORCE SPACE COMMAND

General Hyten: Yes. Chairman Sessions, Ranking Member Donnelly, members of the subcommittee, it is a pleasure to be here today to represent the 38,000 men and women of Air Force Space Command serving our Nation today at 134 locations around the world. It is also my privilege to be here with my Secretary, Secretary James, and Ms. Chaplain.

So I concur with the remarks of the Secretary, and I am just going to make a few brief comments to emphasize a couple points.

First of all, I believe everyone here has been fortunate enough to witness our Nation's evolution in space power. While our combatant and theater commanders have fully realized how fundamental space-based effects have become to every military operation in the world, our potential adversaries have been watching and working to challenge these very capabilities. So we must, therefore, be prepared to defend ourselves. We must be ready to respond to any threat, and we are doing just that.

You will see increased emphasis on this need in the budget request we have recently submitted. You will see priorities placed on command and control at the Joint Space Operations Center, the JSpOC, in California. You will see us working hard to increase our overall mission assurance by

emphasizing resilience, reconstitution and defensive operations across many of our future programs.

We are proposing using operational responsive space, ORS principles and authorities for two pressing needs in our current budget request. The weather satellite follow-on and the space-based space surveillance system, SBSS follow-on. Secretary James, acting in her role as the EA for Space, recently approved pressing ahead with the weather satellite follow-on program using ORS principles, and we hope to bring in a plan for SBSS follow-on soon.

I believe we can move quickly with these programs and deliver the needed capability sooner using ORS, and so you will see the ORS Office also supported in our budget request this year.

These initiatives, however, will be impossible unless we maintain, as the Secretary said, our assured access to space. With today's national reliance on space capabilities, assured access has gone from important to imperative. It is my command's prime directive.

So as the Secretary said, we support the introduction of competition as soon as possible. We are on the verge of that right now, and we must maintain a healthy space launch industrial base. And it is absolutely critical we move as fast as we can to get off reliance on the Russian RD-180.

The launch industry has fundamentally changed over the

last decade. The Air Force no longer owns the rockets that we fly. We purchase access to space as a service. Industry is now investing large amounts of private capital in developing new engines and rockets, and we are collaborating closely with them to determine how best to invest in public-private partnerships in U.S.-made rocket propulsion systems. This is a difficult business. No American company has ever built a hydrocarbon engine with the thrust and power necessary to meet our requirements. It will be a significant challenge, but we think, with the efforts and ingenuity of our Government and industry teams, it is possible to develop an American engine by 2019.

However, this engine still has to be made into a rocket, and even if that rocket looks a lot like our Atlas V, we still need to integrate that new engine, test it, certify it, and that is going to take another year or 2 after we get the engine developed.

Therefore, for that reason, I support the recent DOD request to Congress to allow ULA to complete the 2012 purchase agreement they made for additional RD-180's which will allow them to compete in the next competitive phase until the new rocket is ready.

But in addition to the launch, we have had some other difficult decisions reflected in our budget request. One was concerning our legacy weather satellites, specifically

whether to maintain the launched DMSP flight 20, our last DMSP satellite. Last year, we completed an analysis of alternatives that informed us we no longer needed DMSP flight 20.

This year, however, some circumstances changed. The decision by our European allies not to replace an aging satellite over the Indian ocean, new pressures from both the weather community as well as the National Geospatial Agency, NGA, this combined with the opportunity to include DMSP flight 20 as the ninth competitive launch opportunity in phase 1A caused Secretary James to make the decision to request the Congress we be allowed to store and launch DMSP 20 as soon as practical. We know that that is going to cost hundreds of millions of dollars. Nonetheless, that launch will allow us to plug some gaps and give us time to figure out the final USNL and architecture for weather.

So there are no easy decisions these days with respect to the defense budget, and I support the tough decisions the Department has made. And I thank you, Mr. Chairman. I thank you, Senator Donnelly, as well as the members of the subcommittee, for the support you have given us, and I look forward to your questions.

Thank you very much.

[The prepared statement of General Hyten follows:]

Senator Sessions: Thank you.

Ms. Chaplain?

STATEMENT OF CHRISTINA T. CHAPLAIN, DIRECTOR, ACQUISITION AND SOURCING MANAGEMENT, GOVERNMENT ACCOUNTABILITY OFFICE

Ms. Chaplain: Chairman Sessions, Ranking Member Donnelly, and members of the subcommittee, I believe a lot has been said today about the challenges in space and how the Air Force is addressing it, so I am going to skip over some of my statement and just highlight a few of the acquisition challenges that we are facing today that I do not want us to lose sight of as we talk about some of the issues relating to the RD-180 and space situational awareness.

First, despite the actions to position the program for success, the first GPS satellite is over 2 years behind schedule and the ground system needed to operate the satellite is 4 years behind its contract schedule. The satellite was delayed chiefly due to technical and manufacturing problems with the navigation payload, and DOD believes these problems have been overcome. The ground system, which is to deliver long-awaited anti-jamming capabilities, has been delayed by an array of issues, including a struggle to incorporate information assurance requirements, which we are hearing today is so important, systems engineering shortcomings, and management and oversight issues. Contract costs have more than doubled on

this system. And because of the delays, DOD plans to launch GPS III satellites to replenish the constellation before the new ground system is ready and it may need to find and pay for a workaround solution to using these satellites. So even though there have been many improvements on satellite acquisitions in recent years that I have been testifying on, as you can see, we are still struggling in some key efforts today.

Second, the poor synchronization between the ground system and the GPS satellites and user equipment is not unique. For example, SBIRS missile warning satellites are in orbit, but their ground system software is not complete yet. In addition, for several years, we reported that there were significant gaps between the launch of the Navy's MUOS communications satellites and a key set of user terminals known as JTRS. In addition, the satellite is now working through problems with the advanced waveform needed to work with JTRS.

Third, to its credit, DOD is carefully weighing the costs and benefits of new approaches to missions such as missile warning and protected communications, but if decisions are not made soon -- and you have heard some frustration expressed about that today -- it may well have to continue with the programs of record. Continuing with legacy programs may not be a bad choice, given the problems

with technology development, design, and production have largely been overcome and DOD has obtained substantial savings with block buys. But decisions on the future should not be business as usual just because consensus on a way forward has not been reached. Moreover, whatever path DOD chooses to take, success will depend on putting programs on a sound foundation for acquisition success. My written statement highlights the steps that can be taken in this regard, and I am happy to answer any questions you have today on that.

[The prepared statement of Ms. Chaplain follows:]

Senator Sessions: Well, thank you and we appreciate GAO's continued help in helping us evaluate and fulfill our oversight role.

Secretary James, first with regard to the RD-180 and the prospects we have there, what is the administration's legislative proposal and what is it trying to solve? What is the solution that you are proposing?

Ms. James: Mr. Chairman, the problem that we are trying to solve is we fear the law of unintended consequences may occur if we do not change the language a little bit. We fear that we might not get to a fully competitive environment as early as we otherwise could.

So if I may, let me just run you through some of the math.

Our proposal, by the way, is to permit what would amount to some additional engines which were ordered prior to the invasion of the Crimea. So they were contracted for but not fully paid for. So that is the proposal.

Senator Sessions: I would just say that Congress put language in last year that would authorize what we assumed to be a certain number of engines that had been purchased. It turns out those engines were not fully purchased. So legal counsel has raised questions about that. So I think it is appropriate for us now to decide what we should do, and there are questions being raised about whether we should

go forward with the number that at least I thought was approved in the legislation last year.

So go ahead with where you are there. I did not want to interrupt you, but I wanted to lay that predicate.

Ms. James: Right.

So if you would permit me, Mr. Chairman, just to run through some of the math.

So the way the law is drafted at present, my understanding is there are five RD-180 engines to compete for national security launches. Five. However, we could have as many as 34 launch competitions in this weight category that would benefit from the price competition. That is 34: 9 competitive launches during the period 2015 to 2017, and 25 competitive launches during the fiscal year 2018 to 2022 period.

Now, our legislative proposal, if agreed to, would increase the number of engines from 5 to 18 available for competition. Again, all of these would have been ordered prior to the Russian invasion of Crimea but not fully paid for. So that would be, if it is agreed to, 18 engines made available to compete for the possibility of 34 launches.

This proposal would give ULA the opportunity to compete for launches until a replacement for the RD-180 is available, which again the optimistic idea for the new engine itself -- we are shooting for development in 2019,

but integrated and tested and certified would take longer. The estimate there is 2021 or so.

Without the legislative proposal, Air Force -- this is what our fear is and this is the Catch-22 -- would not have real and full competition until a replacement for the Atlas V is available. Now, if we do not have the Atlas, SpaceX would likely win every competition because the only other opportunity out there, the Delta IV, is simply not price competitive.

Now, remember, by law, because we must maintain two independent launch vehicles, the Air Force could end up in a situation allocating some launches to Delta and pay whatever the premium price turns out to be and other launches over here to SpaceX. So it is a bit of a Catch-22, and we feel like this legislative proposal would much improve the situation.

Senator Sessions: Well, we authorized a considerable amount of money last year, $220 billion, and I think that was appropriated. And little of that has been spent, General Hyten, and so there is concern that we have not been moving as fast as Congress expected us to move or the Air Force to move. What are your responses to that?

General Hyten: Sir, I always think we ought to be going faster. That is just the nature of my personality. I think we ought to be going faster.

But when you look back at the history the Secretary James went through just a minute ago and you look at what we have spent and what we are about to spend, I think we are in a very good position to get a new engine by 2019.

What we have done is we have started step one of the process, and we have basically carved out $100 million for technology risk reduction and technical maturation, and we have spent about $50 million of that so far and we will spend the rest of that this year.

The rest of that is really for this new partnership, this public-private partnership that we have to develop with industry because industry is building the rockets not the United States Air Force anymore, and so we have to partner with all our partners in industry to make sure that we have the ability to deliver capability into space, which requires an engine and a rocket.

Senator Sessions: Well, I think that the bipartisan support is, if not rock solid, strong support for moving to competitive launches outside the DOD. And it does present some risk, but I think that is the consensus of Congress and I believe Defense Department consensus also. But we do need to have competition and we do need to stay on time.

General Hyten: Yes, sir.

Senator Sessions: Senator Donnelly?

Senator Donnelly: Thank you, Mr. Chairman.

General Hyten, how concerned are you about the risk to our assured access to space?

General Hyten: Assured access is the prime directive of my command because as amazing as satellites are, if you cannot get them into space, they are pretty much worthless. They stand on the ground and satellites do not work very well on the ground.

Senator Donnelly: How would you assess that risk factor right now and as you look moving forward?

General Hyten: The risk factor is significant, but I will tell you that the risk factor 10 years ago was even more significant because 10 years ago I was very concerned that we were going to even have a launch industry in this country because the launch industry was about to collapse. There was no really private funding going into it. We were having to pay enormous amounts of money to keep the launch industry alive. That is why the costs just went out of control. So when I look at the industry today and I see the health of SpaceX and Blue Origin and ULA and Orbital ATK, it is just a much healthier industry today than it was. We just have to figure out an effective way to do business with that industry to make sure we have assured access to space.

Senator Donnelly: Secretary James, I would ask you to also talk about assured access to space, your concern about the risk involved.

Ms. James: I would certainly concur with every item that General Hyten just listed, and of course, the members have already I think had one classified briefing. We may do some of that later on today as well depending on schedules. But the threats are real and the United States -- we have to keep on top of it. We have to be investing and testing appropriately to stay up with it.

Senator Donnelly: Let me ask you another question. The EU's decision not to launch a replacement for Mediosat-7 is causing some concern about our ability to collect certain types of weather data over the CENTCOM region. How do you plan to fill this gap?

Ms. James: We have requested of Congress the authority to go ahead and actually launch the DMSP-20. So that is part of the solution. We were looking to the European allies to cover some of these gaps for us, and indeed, that is why last year we said we were not going to launch that satellite. However, within months of that, the European allies reversed themselves. They are not going to replace that satellite now, which brings us back to having gaps. And indeed, the NGA and our own Air Force weather teams very, very much want to see that satellite launched.

Senator Donnelly: Thanks. And I realize I should have said Mediosat.

General Hyten, the Air Force estimated a price tag of

more than $1 billion to put up our own EOIR capability to meet cloud characterization needs. We have other information that puts the cost actually closer to $200 million for a 15-year mission. Would you know why we are hearing such a wide difference on this?

General Hyten: Senator, I think you are hearing such a wide difference because we are not exactly sure of the best means to meet that requirement. So there is a number of very exquisite options that people are pushing forward. Those are the billion dollar options, and then there are options that come in the $100 million-$200 million range that do not provide that exquisite capability but could provide good enough capability to allow us to operate. So we as a Department have to make a decision on the requirements that we need for those kind of capabilities before we can jump in and make the final decision about where we need to invest, which is also one of the reasons why we want to continue DMSP-20 while we figure this out.

Senator Donnelly: So when we hear the billion dollars, that would be the Cadillac estimate.

General Hyten: That would be the Cadillac estimate.

Senator Donnelly: Let me ask you, General, also if we are concerned about ensuring we have assured access to space for all of our national security payloads, which obviously we are, should we not look at the drive to build a new

American rocket propulsion system by 2019 as a hedge?

General Hyten: Yes, sir, we should. And the draft RFP to do just that went out last Friday. In it is the actual language that Congress passed last year that said we want that engine by 2019. We will hear from industry over the next month. We will put the final RFP on the street at the end of May. We have a 30-day response to get started. We are going to use other transaction authorities rather than the full-blown traditional Federal acquisition authorities. Those other transactional authorities will allow us to create a public-private partnership where we have to negotiate with industry to figure out how much Government funding do we need and how much industry funding do we need as we go into the future. That is our plan. But I agree we should pursue that as a hedge.

Senator Donnelly: Madam Secretary, I do not want to put words in your mouth, but I believe you stated before it is not possible to produce an engine by 2019. The Delta IV was developed in 4 to 5 years. With an accelerated schedule, do you think it is possible to hit 2019 or 2020 at the outside?

Ms. James: For the engine, I think it is possible to hit 2019 to have an engine developed, but you must also integrate the rocket on the engine and test the whole system and certify. And that is projected to take anywhere from 1

to 2 years additional. So to have a new domestic capability to get us into space will take longer than 2019.

Senator Donnelly: Thank you.

Thank you, Mr. Chairman.

Senator Sessions: Chairman McCain?

Chairman McCain: Thank you, Mr. Chairman. I thank the witnesses.

Ms. Chaplain, according to your recent GAO estimates, GPS III, our next generation GPS satellite, development program is currently $471 million, 11 percent over initial costs, and the first GPS III satellite is not scheduled to launch until January 2016, a 21-month delay. How concerned are you with the current developmental challenges?

Ms. Chaplain: We have been concerned for a while about the developmental challenges. The Air Force believes it has overcome the technical and manufacturing issues that have faced the navigation payload unit, and now the satellite is in testing. So at least, hopefully, we are over the hump of the technical and manufacturing challenges that we have been facing the past couple years. There is still risk ahead because, again, that satellite is in testing, and other satellites are being manufactured. So if some issues come up during testing, you are going to have to go back and work the satellites that are in production.

Chairman McCain: How confident are you that the Air

Force has the programs under control?

Ms. Chaplain: I believe the satellite production itself is on a better path. What we are highly worried about is the ground system. That has seen a lot of development problems across the board, and a lot of them have to do with trying to meet tougher information assurance requirements, but there are some that have to do with management and oversight and contractor capabilities that we are worried about. And we understand the Air Force has put a lot of corrective actions in place, but given that we are very far behind on that program, we do not have confidence yet in the way forward. We are still looking at that program and should be reporting on it more formally in the summer.

Chairman McCain: Madam Secretary, do you disagree with the GAO assessment, and if indeed there is a $471 million, 11 percent, overrun, who has been held responsible for that?

Ms. James: I would only amend one item that Ms. Chaplain said. I believe you said the Air Force is confident we are on track, or words to that effect. I do not want to express that confidence because I am not sure that we are on track yet. There is an important test that is going to be taking place between June and September.

Chairman McCain: Has anybody been held responsible, like somebody fired, somebody identified?

Ms. James: There have been about $160 million in fee that the contractor has lost as a result so far of this, and we are assessing other individuals to see if there are other levels of accountability.

Chairman McCain: I am sure, Madam Secretary, you saw "In murky Pentagon deal with Russia, big profit for a tiny Florida firm." You have seen that article I hope?

Ms. James: I am not sure I know which article you mean, Mr. Chairman, but please continue.

Chairman McCain: I would hope that it would have come to your attention because it alleges that there are profits being made by a middleman. There is an outfit called Amross. The deal allowed Amross to receive about $80 million in profit markups in overhead expenses on RD-180 engines. There was an audit that characterized the $80 million in added costs as unallowable, excessive pass-through charges. This was a Reuters that says that U.S. Russian middleman stands to make $93 million on the contract with Amross, a company that is overseen by associates of Vladimir Putin. Do you know anything about that?

Ms. James: I am remembering there were two articles, now that you are describing this. So one had to do with the sanctions and the other had to do with the audit.

So on the sanctions, the Department of Justice, the Department of Commerce looked at it, and as far as I know,

we are in okay shape there. So there is not any longer an issue according to those agencies of Government.

With respect to the audit, our own Air Force contract --

Chairman McCain: Why is it no longer an issue?

Ms. James: It was handled by those agencies of Government. So we took our instruction from those elements.

Chairman McCain: That it is acceptable to have an outfit run by cronies of Vladimir Putin and a middleman that makes $80 million in markups. That is all explained away?

Ms. James: I am sure that is not what they said, Mr. Chairman, but I would have to refer you to them for that judgment.

Chairman McCain: Well, when there are public articles such as this, I would think that you would be prepared to rebut them. So we will be giving you some written questions.

Given Russian behavior, do you think it is in our best interest to subsidize the Russian military industrial base, Madam Secretary?

Ms. James: No.

Chairman McCain: But your plan is that we will not be able to replace the engine until 2019. Is that correct?

Ms. James: Our plan is consistent with the law to get off reliance of the Russian engine, yes.

Chairman McCain: So we will be depending on the Russian engines until 2019?

Ms. James: We will be using them in our portfolio, yes, and perhaps beyond that.

Chairman McCain: Do you think that is acceptable to the American taxpayer, that you will be subsidizing an outfit which has the cronies of Vladimir Putin, who is committing aggression as we speak?

Ms. James: It is regrettable, but the assured access to space is even more important in my opinion.

Chairman McCain: Well, it is not acceptable in my opinion, and we will be trying to do something on the defense authorization bill to fix what is obviously a disgraceful situation. Vladimir Putin and his cronies are now making hundreds of millions of dollars, and we are unable to do anything about it for the next 4 years. That is not an acceptable situation, and we will not quit on this issue.

I thank you, Mr. Chairman.

Senator Sessions: Senator Nelson?

Senator Nelson: Senator McCain and I were the ones a year ago that raised the issue because of the aggressiveness of Vladimir Putin, and the question was how quickly can we get rid of our dependence on this Russian engine RD-180. And what I have heard today, Senator McCain, is that they

have an orderly plan, and the problem is it is what it is because the Atlas V, which is one of the main workhorses, has to rely on the RD-180, the Russian engine. The other workhorse is the Delta IV Heavy, which is much more expensive, and now a new entrant, a competitor, SpaceX, and a future competitor, Blue Origin, developing a new engine that will go in a replacement for the Atlas called the Vulcan. But those things are going to take some time to get them developed.

As I have heard the testimony here, you all are -- you need 18 engines, the Russian engines, all of which have been ordered and some 6 or so you already have possession between now and 2018 when you would think the replacement for the Atlas would be -- well, the replacement engine would be ready. But in the meantime, you have got the alternative of SpaceX for some of the lighter loads on the Falcon 9. Is that a fair summary of where we are?

General Hyten: Yes, Senator, that is a fair summary of where we are.

If I could just share a personal observation on that engine. And it dates way back before Crimea. As an American, I love the space business. I love the rocket business. And I have watched the Atlas V since it was designed and built and flown for the first time, and it is the most beautiful rocket I have ever seen. But every time

it clears the freaking launch pad and I see the Russian engine on the bottom of it, it has torqued me off since the first day it flew.

And we have needed to get off that engine for a decade-plus, but we have not committed the resources until last year when the Congress gave us the resources to do that. Now Congress has given us the resources, but the launch industry has fundamentally changed too. And so we have to make sure that we partner with that industry to make sure that we do not make this mistake again because every time we have gone down that, we keep falling back on the Russian engine and say, okay, we will do that. We have been down this path before. We have to partner with the rocket manufacturers and we have to make sure we have a good partnership to get off that Russian engine.

Senator Nelson: And to Senator McCain's credit, I might say that when I offered the amendment, he chimed in and supported it, and it is too bad that we had not done that before last year. But it was front and center last year because of what Putin had done in Crimea.

Now, if we get this technical glitch taken care of of ordered but not fully paid for, so then you will have 18 RD-180's. That will get you to where you need to be.

So how many competitors do we have? Then we are going to have SpaceX. We are going to have ULA in the meantime.

They are competing against each other. And then you have got a new player coming in with a new engine, a methane engine, that will be a new variant of the Atlas. Is that correct?

General Hyten: Yes, sir, that is correct.

Senator Nelson: Is there another competitor in there?

General Hyten: There may be another competitor. The one we do not know is Orbital ATK. Orbital ATK has built the Antares rocket. They had an accident last year that set them back. Nonetheless, they still have a vision for being an element of this marketplace in the future. So there is the Orbital ATK. There is the ULA partnership with Blue Origin for the methane engine. ULA also has a backup plan with Aerojet Rocketdyne for a kerosene engine that would be the replacement of the RD-180 if a methane engine does not work. You have the Delta IV that is still out there, although very expensive, and then SpaceX with their Falcon 9. That is the industry today.

Senator Nelson: Let me ask you a technical question. Why are you all considering funding upper stage rocket engine development with funds that this committee help put in to eliminate the reliance on the Russian-made RD-180?

General Hyten: Senator, we have not made a decision exactly where all that money is going, but the one thing that I will say is that we do not just need an engine. We

need a launch capability. That launch capability has to be the first-stage engine, the second-stage engine, the rocket for the first stage and the rocket for the second stage. We have to have that full capability. If any piece of that is missing, you do not have assured access to space. So as we look at it, you have to make sure that the second stage is going to match the first stage.

Right now the plan that ULA has uses the existing Centaur first stage, but their view of the future is they want a bigger second stage so they can get off the Delta IV altogether and be in a business model where they have a single rocket for that marketplace.

Senator Nelson: So in this new creation, the Vulcan -- you could have a Jeff Bezos methane engine in a Delta core first stage with an Atlas second stage, and that is now called the Vulcan.

General Hyten: It could be the Vulcan, but that Delta first stage will be fundamentally different than the Delta stage today because it will not be hydrogen. It will be methane. So the volumes will be slightly different. It is going to look more like the Delta IV just because the methane volume is going to have to be larger. So it will look more like the Delta IV, but the plumbing will be completely different.

Senator Nelson: Can I just ask one 5-second question?

Senator Sessions: You want a 5-second question. Go to it.

Senator Nelson: Your cooperation that -- and I thank you and I thank you for your public service. Your cooperation with the FAA and NASA -- how is this helping you as you move into this competition?

General Hyten: So NASA made the decision before we did to leverage the commercial sector. We were on the traditional path. When Administrator Bolden came to NASA, he made a decision early on that he was going to go commercial. So they have already driven out a lot of the business models that they have to do to work with the commercial sector.

The Secretary sits on the council with Administrator Bolden and Director Sapp from the National Reconnaissance Office. They share best practices, how we should do business in the future. That partnership between the three Federal space agencies is hugely beneficial in figuring out how to do this business, which is a very complicated new way of doing business.

Chairman McCain: Mr. Chairman, since the Senator from Florida kept mentioning my name, the fact is that there is a tiny Florida-based -- which you would be interested in -- company that is acting as a middleman and marking up the price by millions of dollars per engine.

And also, the Air Force was given $220 million to develop a new engine, and so far have spent $14,000. That is not comforting to this chairman.

Senator Nelson: And every time I mentioned your name, it was very positively.

Chairman McCain: That is really helpful in Arizona.

[Laughter.]

Senator Sessions: Senator Heinrich, thank you.

Senator Heinrich: Thank you.

I want to thank all of you on this committee who finally made this change in the previous Congress. I mean, I think it was long overdue. I want to thank you for your leadership because this is a new course that I feel much more confident about long-term.

At the same time, as an engineer, I know we cannot change courses overnight, and we cannot hold ourselves at risk by not having access to space in the intermediate time. So given the lemons that all of you have received over time, I think you are making lemonade, and I feel much better about what the future holds for us.

And I want to shift gears a little bit to a couple of other issues along these lines that fall in your bailiwick. And one of them, Secretary James, just to go back to the "60 Minutes" interview on a bigger sort of policy basis, one of the things you talked about was the fact that there is

really no code of conduct for space. And I think it is probably time we visited that issue because things are getting crowded up there. There is a lot of stuff going on that is questionable. There is a lot of debris. Space situational awareness takes an enormous amount of our effort and resources now.

So I just wanted to ask you in your opinion do you think we need a code of conduct for space. What would that look like? And how would we go about building the momentum to make something like that a reality?

Ms. James: So I think we ought to certainly in my personal opinion have such a code. Indeed, any sort of agreements or codes and whatnot -- the State Department has the lead for that sort of thing, and we partner with them. We talk to them all the time.

As the DOD, we always put forth three basic principles that we would like to see reflected in any kind of a code of conduct. We have to maintain our right to self-defense at all times. We have to have whatever the agreement be be verifiable, and we want to always promote the responsible use of space, which to me number there is do not create debris. Debris is harmful to all space-faring nations. So those are the big three that we always talk about. And that is my personal opinion. I would like to see a code of conduct.

Senator Heinrich: Have there been any conversations with State or the White House about pursuing a course of action on this front?

Ms. James: We have had such conversations, yes.

Senator Heinrich: I am glad to hear that. If I can be helpful, please let me know because I think it is something that is overdue, and it is going to be a real mess if we do not start to get ahead of this because it is just getting more and more crowded.

General Hyten, I have, for a very long time, thought that we needed an entity dedicated to responsive space capabilities, that that is essential for our national security. And as you know, DOD initiated ORS to provide short-term tactical capabilities, as well as identify and implement long-term solutions to developing low-cost satellites. And the ORS office was to assess warfighter needs in four specific areas, space situational surveillance, satellite communications, multi-radio frequency signals, and imaging, and come up with some feasible solutions.

One of the things that makes ORS unique in this business is its special acquisition authorities for rapid prototyping. In your view is Space and Missiles Systems Center making robust use of these special authorities? Either of you.

General Hyten: Yes, Senator. We are making a huge push this year to take full advantage of the operational responsive space authorities that are in the law. We have two requirements that look like they meet the description that you just made for ORS right along the lines.

One is the space-based space surveillance system follow-on. The ORS office is already building a Pathfinder towards the next generation. It just seems logical to us to take that work they are doing on the Pathfinder and follow right along with the operational capability to do that. It is operationally responsive space. The authorities should allow us to go faster and come up with a capability to do that for a cheaper price as well. And I think we can do it faster and cheaper.

Also, the Secretary just made a decision to pursue the weather satellite follow-on, which is basically overhead imagining, and use the ORS authorities to doing that. And she just had a meeting last week.

Ms. James: And I just wanted to jump in and also say that we have got $6.5 million in fiscal year 2016 to sustain the office in fiscal year 2016, and there is nothing in our 5-year plan. By the next time you see our next 5-year plan, that will be rectified because we do believe in it. We are going to be using it.

Senator Heinrich: I appreciate both your answers, and

I also appreciate you basically intuitively getting to my next question. Since I am out of time, we will catch you on the next round. Thank you.

Senator Sessions: Senator King?

Senator King: Thank you, Mr. Chair.

I want to go back to the RD-180 question and be sure I understand it. As I understand it, without the change -- the law says you cannot take any more RD-180's except those that were paid for before Crimea. What you are suggesting is that you want to be able to take the RD-180's that were ordered before Crimea, and that is a difference of something like 10 rocket motors. And if we do not do that, then we have one of two alternatives. We lose access to space during some period of years, 3, 4, 5 years, or ironically, we end up with a monopoly by SpaceX because ULA will not have motors and will not have a rocket. So is that accurate, Ms. James?

Ms. James: That is very close. You see it is sort of a Catch-22 situation. We must always have two by law, two launch providers. There is that Delta out there which is also associated with the ULA, but that is quite expensive.

Senator King: You can have no Russian motors. You can have competition, and you can have access to space. But you cannot have all three.

Ms. James: It is a hard problem. It is a hard

problem.

Senator King: I understand that. And the suggestion you make to me makes sense. Otherwise, we are really severely constricting either competition or access.

Ms. James: And of course, our job is we have got to have the access. So if it came down to those choices, we would have to go the noncompetitive route, which we do not want to do, which is why we are coming to you.

Senator King: Which is contrary to 5 or 7 or 8 years of work here to get us to that point.

Ms. James: Exactly.

Senator King: Okay. Now, I think I understand it.

But I want to push you a little bit on the 2019. I think you said 2019 -- that is when we will have a rocket motor, maybe, hopefully, possibly, and then a couple more years later. Is that number of 18 RD-180's realistic to get us where we are going to have a new motor and a new rocket, and are you being realistic? I got to tell you I will be surprised if you make it -- if the industry makes it by 2019. I mean, that is the blink of an eye in terms of development of major systems. And Senator Inhofe presented a chart to us a few months ago that the average time to develop a new aircraft for the Air Force is now 23 years. So are we serious? I think you have got to be conservative on this estimate because you do not want to come back here

and run into a buzz saw in 3 years saying, gee, we did not make it. We need another 10 180's. You see where I am going with this?

Ms. James: Yes.

Senator King: Give yourself a little slack. How long will the 18 rocket motors take us?

Ms. James: So let me start and then General Hyten can jump in, Senator.

So if we get our legislative proposal passed, that would give us a total of 18 of these engines that would be available for competitions, and we reckon there are 34 of those competitions. So 18 to be able to compete for 34 competitions, which seems reasonable.

Senator King: How many launches do we do a year? In other words, how far does that go? How long does that take us?

Ms. James: The launches that I just described would be through 2022. So that is what we project at the moment.

Why do you not take it over now, General Hyten?

Senator King: So that is what I needed to hear. In other words, you have built some conservatism in your estimate.

General Hyten: There is some conservatism. So we said the 18 will give us a competition from 2018 to 2022. We hope that the new rocket is available in 2021, maybe 2022.

So we are covered. But we will transition off the RD-180 as soon as that rocket is available. We have asked for that little flexibility there in 2021 and 2022.

Senator King: I just want to make sure you are asking for enough flexibility.

General Hyten: Yes.

Senator Sessions: Let me correct. It is 14, not 18. Is that correct?

General Hyten: 14 additional. Actually the math is a little bit crazy. There are five that they already have on tap. We need to get to 18 for the competition. Depending on which ULA executive you are speaking to, that means they need 13 or 14 in order to get there from here to get to the total. But we know the total is 18 that they need in order to compete in the competition. So it is the five that they already have, plus these additionals that they have under contract right now.

Senator King: Mr. Chairman, I have some other questions. Are we going to go to an executive session at some point?

Senator Sessions: I think so unless my colleagues do not want to.

Senator King: I have got some questions that I would like to ask in a classified when the time comes. Thank you.

Senator Sessions: Well, operationally responsive space

I think is something Senator Nelson supported over the years. I have. We have got a bipartisan feeling about that. It seems to me we lost some momentum over the years. But you are saying that you are beginning to move forward effectively with that now.

The whole idea, as I understood it, was that if we have problems with our satellites, we have the ability to rapidly launch if not the most sophisticated satellites, adequate satellites to maintain the necessary defense capabilities that we depend on every day. I think it really makes sense.

Ms. James: So the short answer, Senator, is yes, we are. So we just last week approved the next project, which will be a very important component of the future of weather satellites. So that is the very next one. And then we are also looking at something called the SBSS, space-based situational surveillance, as the follow-on project. We have not quite figure that one out yet. We are working it, but the weather is going to be the next big project. So, yes, we are on it and we are going to be funding it.

Senator Sessions: Now, with regard to the Indian Ocean and our European allies, I have been critical of them in the sense of their failure to participate effectively financially in the defense of the Western democracies. They spend nearly half of GDP of what we do. They are under 2, and we are 3.8 now.

We do not want to go into detail. But how is that we just automatically -- they say they are not going to fund this satellite, and we automatically say we will?

Ms. James: I think the state of play is that they have a current satellite, which we are utilizing, of course, they are utilizing. But it is approaching the end of its life. So if you go back a year, at that point their position was they were going to replace it. So we felt like we would have that ongoing reliance on that satellite. But then they changed their minds, and now they are not going to replace it. And it will soon be at the end of life, which brings us back to we have a gap. We have to take care of ourselves.

Senator Sessions: Do we not cooperate? We assist them with the capabilities. We will use any of our capabilities to defend Europe if they need defense. It seems like to me they should -- we will talk about that later. That is another matter.

Now, with regard to these extra launches, I thought that when we passed the bill last year, we were providing for what you are asking for this year. And I think most people did. I may be wrong about that. I am not sure.

So now, if the ULA group purchases the RD-180's and they lose the competition -- I mean, they are not guaranteed that they are going to win. Is that correct? They have to compete.

Ms. James: They have to compete.

Senator Sessions: I know you want to be methodical, but Senator McCain is a valuable leader because he is always pushing us to reach a higher level. And speed is important. So I understand the need to be careful, but aside from other transaction authorities, which are fairly typical, what rapid acquisition authorities does the Air Force have at its disposal for urgently acquiring capabilities? And what of those acquisition authorities are you using in the development of the engine replacement, and do you need more?

Ms. James: Well, Senator, I would say there is always a balance between speed and trying to gather enough facts and think things through. So we do feel a sense of urgency, and we have tried to hit that balance.

Now, you have just said other transaction authorities. That is going to allow us, we hope, to award these RFP's. We just put the draft out. The real one, the final one will go out in another month or so, and because we are using OTA's rather than traditional acquisition authorities, we hope to be able to award these RFP contracts between September and December of this year. Now, that is a lot faster than the normal acquisition process would allow for. And again, that is only step two of a four-step process. We have got this set up such that we are moving as rapidly as we know how, and I am not sure, short of a sole-source

directed arrangement, how we might be able to move faster. This is quite fast in comparison to the norm.

Senator Sessions: Senator Donnelly?

Senator Donnelly: Thank you, Mr. Chairman.

While I have been listening to the discussion about the Russians, what assurance do you have that they would actually deliver those engines to you? General or Secretary?

Ms. James: I will say that the track record is there, but I think to your point, they could always change. And if it were to change, if they were to cut us off, let us just say, tomorrow, we would fall back on we have a certain number already in our inventory. We could ramp up the Delta solution, which again is expensive, but assured access to space is critical. We are just around the corner to having SpaceX certified. So we would leverage all of these things if we were suddenly cut off.

Senator Donnelly: Okay, because my concern is that I understand the track record, but the track record of conduct in the last year or 2 has been completely disconnected from any track record before that time. And so that was my concern is that we have a backup plan, a worst case scenario, if they just decide, look, we are just going to cut you off instead and see how you do. Yes, I see my friend and colleague, Angus King, rubbing his fingers

together, and I understand that portion of it as well, the cash. But not everything that is being done is rational these days in the decisions they are making.

Would it make your life more difficult if they cut it off, or do we have a clear path that this is choppy, but we can do it?

General Hyten: We have a backup plan. That backup plan is much more expensive than the primary plan because the Delta IV is 30 to 50 percent more expensive than the Atlas. SpaceX will be able to compete, but the current Falcon 9 only competes for the bottom third approximately of our manifest. So that top two-thirds will be flying on a very expensive rocket, which means -- and that is not in our budget submission right now.

Senator Donnelly: Right. I understand that it will be more expensive, but are we in a position to not miss launch dates if this occurs?

General Hyten: We are in good shape because we have an inventory of 2 years of RD-180's. So we can continue to fly the Atlas V for the next 2 years as we work to adjust and move satellites onto the Delta IV and the Falcon 9. So whether it is going to be a perfect transition or not depends on when it actually would fall, but we do have a backup plan that is executable, but we do not have the money in the budget to do that.

Senator Donnelly: Because I think the best hedge you have against them just saying we are not going to supply them anymore is having a viable backup plan that they understand they are not critically necessary if they decide to stop. It does not affect our performance in any way, shape, or form.

General Hyten: We will maintain assured access to space, and I am sure that the Congress -- it may be an overstatement on my part, but I am sure the Congress in that situation would figure out how to make sure we maintain assured access.

Senator Donnelly: That is not an overstatement.

Thank you, sir.

Senator Sessions: We will have a closed session in 217 in the Capitol. I understand we may be having votes, but that would be a more convenient location in any case.

Senator Nelson?

Senator Nelson: Okay, and I am looking forward to going into the closed session.

Let me just say that I think the sign language that Senator King gave you is probably the answer because the Russian economy is hurting so bad. And this is a valued part of their society -- rocket engines and rocket scientists. And they want to say in business. And so more than likely, after the Crimea invasion when we put the

clamps on with the economic sanctions, and all of a sudden one of the deputy prime ministers, who has a portfolio for space, starts making some critical comments about us getting to space on a trampoline, but yet you did not see anything change. They are still producing the RD-180's and so forth. And so that is a reality.

But you raised a very legitimate question, Senator. What is the backup in case Putin goes completely off his rocker and therefore were to cancel it?

So down the line -- just one final question in the open session. Down the line, you have got a lot of competition that could play into this. You have got ULA with their new Vulcan, with Bezos methane engines. You have got SpaceX and a SpaceX Heavy, Falcon Heavy. You have got Orbital ATK. You also might have a Jeff Bezos rocket with his methane engines. And in the meantime, we have got the traditional ULA with the RD-180's. Is there another potential competitor in there?

General Hyten: Not in the United States. The only other technology would be allies, and we are really focused inside the United States right now. But it does not mean that there might be some partnership that an American company would come up with our allies. But you just described the state of play in the American industry very well.

Senator Nelson: Is there a proposal for replacing the RD-180 with an engine other than Bezos' methane engine?

General Hyten: Yes. The proposal is the Aerojet Rocketdyne Air 1. ULA has made public statements that they are pursuing that as a backup. Their primary path is the Jeff Bezos Blue Origin BE-4, but the backup plan is the Aerojet Rocketdyne Air 1 that has a kerosene engine. I imagine that we will see some of that in the response to the RFP's that are out there right now.

Senator Nelson: And finally for the record, this is very interesting what you said. It was about the NASA competition, as they are now going to commercial rockets to get to and from the Space Station both cargo and humans, that was an instigator for you all to get more into competition.

General Hyten: Well, it helped change the industry. So we were working with NASA all along, Senator. We have a very good relationship with NASA. We understand what they are doing. But the interesting thing that happened when they went down that path is the industry changed. And so if you look at the last 5 years, under Administrator Bolden and where the industry was when he got there and where the industry is today, he has helped or NASA has helped change the industry.

Now, if the industry is this, then we have to figure

out how to work with that industry. Unfortunately, we cannot create a new industry. As much as many people would like to and say we would like to have our own industry, we would like to have our own rockets, the industry is this. That is where we have to live.

Senator Nelson: Thank you.

Senator Sessions: Thank you.

Senator King?

Senator King: No further questions, Senator. Thank you.

Senator Sessions: Well, thank you. We thank you all for this testimony. We will have a closed discussion a little later.

Secretary James, these are important issues. You can expect the Air Force to continue to be pressed from Congress to achieve everything we can achieve.

General Hyten, thank you for your leadership. Your reputation is solid, and I think you have respect. We are glad to have someone with your experience in this area.

Ms. Chaplain, thank you for your continued oversight of this, helping us have an independent view of what is going on.

And Secretary James, I think this article referred to by Senator McCain is an important article, and we will be expecting, you know, prompt and full answers when they are

submitted.

Thank you all, and we are adjourned. We will go directly there. We will go directly to 217 to the Capitol.

[Whereupon, at 3:49 p.m., the hearing was adjourned.]