

# The impact of the crisis in Ukraine on the effort to reform U.S. space controls



Reform of the export control regime for spacecraft and related articles should enable U.S. manufacturers to compete more freely in international markets. However, writes Edward Goetz, any such benefits could suffer from possible Russian retaliation to sanctions from the West arising from the conflict in Ukraine and may deprive the U.S. of access to essential space-related services and technology.

The impact of U.S. export control reform ('ECR') on spacecraft and related articles will begin to become clear in December of this year when the rewrite of Category XV of the United States Munitions List ('USML') and corresponding additions to the Commerce Control List ('CCL') take effect. While not creating as 'positive' a list as industry had hoped, the revisions should provide spacecraft manufacturers and their suppliers more flexibility in licensing and reduce the bias against incorporating U.S. components and technology in commercial satellites.

Licensing under the Export Administration Regulations ('EAR'), which governs the CCL, is generally less restrictive and more predictable than under the International Traffic and Arms Regulations ('ITAR'). Under the new regulations resulting from ECR, satellite and spacecraft-related commodities, software, and technology will be controlled by a new Export Control Classification Number ('ECCN'), 9A515 (paragraphs .a through

.x). For example, a communications satellite will have an ECCN of 9A515.a because it is a spacecraft not identified in Category XV(a) of the USML. Perhaps more importantly, 'parts', 'components', 'accessories', or 'attachments' 'specially designed' for defence articles controlled by USML Category XV or items controlled by 9A515, but not enumerated or controlled in the USML or elsewhere within ECCN 9A515, will have an ECCN of 9A515.x. The true impact of this regulatory transfer to the CCL will only become apparent as companies parse through the complex analysis for determining what is 'specially designed'.

Furthermore, as Commerce's Bureau of Industry & Security ('BIS') officials have repeatedly and emphatically reminded, ECR does not mean decontrol. Control under the EAR does, however, eliminate some licence requirements, provide more licence exceptions, simplify licence application procedures, and reduce (or eliminate) fees. Moreover, the onerous

ITAR 'see-through' rule no longer applies to the transferred products and technology. Currently, a part controlled by the USML incorporated into a larger end item or system will make that entire system ITAR-controlled regardless of how small or insignificant that one part is to the overall system functionality. After December, the addition of an ITAR-controlled part into an EAR-controlled system will remain under the jurisdiction of the EAR. While the 'see-through' rule remains applicable to use of parts and components covered by the USML, the hope is that fewer, if any, of these less significant satellite parts or components will continue to be controlled under the USML, thereby providing relief from that rule.

While not everything industry wanted, ECR is a step in the right direction for the U.S. space industry.

## Impact of geopolitical turmoil

The current conflict in Ukraine – engendering perhaps the worst crisis between the West and Russia since the



end of the Cold War – has the potential to significantly disrupt U.S. satellite launches just as the liberalisation of U.S. space industry-related exports becomes effective. In response to Russia's annexation of Crimea earlier this year, the United States government imposed sanctions against certain Russian individuals and entities contributing to the instability in Ukraine. Russian retaliation against

the RD-180, this condition could significantly undermine the U.S. government's continued reliance on that rocket engine. United Launch Alliance ('ULA'), the Atlas V launch provider, issued a press release soon after Russia's public comments saying that neither it, nor the Russian builder of the engine, were aware of any restrictions. They also stated that if reports were true, they hoped to have

and its attendant infrastructure. In June, ULA announced it had signed commercial contracts with multiple American companies to conduct technical feasibility analyses, develop high-fidelity plans, and identify schedule, cost, and technical risks for new liquid oxygen/hydrocarbon first-stage propulsion concepts. Both houses of Congress have inserted a 'down payment' for a new engine into their fiscal year 2015 defence appropriations bills, although the Executive Branch has suggested it would prefer to first evaluate several more cost-effective options including public-private partnerships with multiple contract awards. This method is already being used by NASA in developing a human-rated launch vehicle.



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the West's sanctions focused on U.S. reliance on its space launch vehicles and rocket engines.

Specifically, in May, Russia announced it would be ending its collaboration on the International Space Station ('ISS') in 2020; the U.S. had hoped Russia would continue with the programme until 2024. Russia's exit, if it holds, means the U.S. would not be able to use the Soyuz rocket to send astronauts to the ISS after 2020. Although the Soyuz is currently the world's only human-rated launch vehicle, NASA is working with private industry to qualify U.S. rockets for manned spaceflight which it hopes will be ready before 2020. Even so, reminding the world that the United States, long considered the most advanced space-faring nation in the world, did not have a human-capable rocket since the retirement of the Space Shuttle in 2011 was not a story NASA and other U.S. officials enjoyed reading in the ensuing press coverage.

Moscow also announced in May that there would be restrictions tied to future sales of the Russian-built RD-180 liquid-fueled rocket engine. The RD-180 is the first stage engine for the Atlas V, the U.S.'s workhorse launch vehicle for NASA, military and national security payloads. Russia stated it would only continue selling the engine if the U.S. government guaranteed those engines would not be used to launch military payloads. As Russian technical assistance for maintenance of the engines and launch support is a necessary adjunct to successful use of

productive conversations in the coming months to resolve the matter. While this threat could be public posturing by Russia, exposure of the U.S.'s dependency on Russian hardware has been a wake-up call to the U.S. government, especially Congress, which is now considering funding for development of alternatives to the RD-180.

#### **Possible impact of escalation**

The tragic missile attack on Malaysian Airlines Flight MH17 and reports of active Russian intervention on the side of the eastern Ukraine separatists has escalated tensions significantly. These events have led the U.S., Canada and the EU to impose sectoral sanctions on Russia in the financial, energy and defence sectors. Any additional Russian retaliation could have a further impact on satellite owners/operators and satellite manufacturers and their suppliers, not just the space launch industry.

#### **RD-180**

For example, should Moscow cut off all new sales of the RD-180, ULA would be left with only enough engines on hand to support Atlas V missions into 2016. As noted, the U.S. does not currently have an engine to replace the RD-180. Development, testing, and certification of a next-generation engine will take, by many estimates, several years and cost more than a billion dollars. Additionally, there would be significant cost in adapting the engine to the Atlas V or in developing a new launch vehicle

Even if the United States were to develop a new engine and adapt it to an existing or new launch vehicle, any newly developed engine would lack the successful heritage the RD-180 enjoys, creating doubt in the minds of satellite owners. The Russian engine has a 100% success record (50/50) on Atlas vehicles. Regardless of the customer (public or private), launch vehicles and their components with proven track records are always preferable to new systems, or systems with only a limited number of launches. There is an adage in the satellite industry that the only known predator to a spacecraft is its launch vehicle. Launch failures have tremendous financial consequences to industry and have the ability to significantly set back government programmes.

Currently, SpaceX presents the most promising development alternative. While the company's launch vehicle could mitigate a loss of the RD-180 to some degree, it is likely the extreme case demand would outstrip SpaceX's capacity. The SpaceX launch manifest currently has over 40 planned missions. The Air Force is working to certify SpaceX's Falcon-9 rocket for national security satellites, so at some point in the near future SpaceX may be able to launch the same sensitive spacecraft as the Atlas V. Orbital Sciences Corporation's new Antares rocket, which launches from Wallops Island, VA, performs cargo resupply to the ISS and may also provide additional flexibility; however, it also is dependent on a Russian main stage engine that has been adapted specifically for that launch vehicle.

Stocks of this engine, the NK-33, are limited and were included with the RD-180 in Russia's announcement limiting the use of (and support to) future engines.

### International Space Station access

For manned spaceflight, Russian leverage is even more direct and immediate. It can simply deny access to the ISS at any time by placing the Soyuz off limits to U.S. astronauts. The current ISS crew has two Americans, one German, and three Russians. After the Americans return, they could be replaced by non-U.S. crew.

The implications for America's space programme could be far-reaching. U.S. law has restricted American cooperation with China on all space projects, to include the ISS, in which the Chinese have long wanted to participate. This exclusion has caused China to fund an ambitious space programme for itself, and there are already indications of a shift from the current U.S.-centric space environment to one more focused on China. A Chinese space station is expected to begin construction in 2020 and senior Chinese and European officials have been discussing cooperation on manned exploration programmes. The European Space Agency has even said it is willing to provide the Chinese with information on ISS experiments and data gathered on the station concerning the health effects on astronauts who spend long periods in orbit. Russian withdrawal from international space cooperation could hasten this shift towards cooperating with the Chinese despite the national security concerns.

### Denial of Western access to Russian launch vehicles

Should Russia restrict or eliminate use of its rocket engines and technology, satellite owners/operators and

spacecraft manufacturers and their suppliers would likely suffer. The current backlog of satellites and other loads awaiting launch would grow, depriving civilian and military owners use of the space-destined assets. During 2011-2012, for example, there were 38 commercial launches. Russia accounted for 17 and the Sea Launch system, which uses a Russian main engine, an additional five. Further, the Soyuz rocket is now used by Arianespace for medium-size payloads at its French Guiana spaceport to complement its heavy-lift Ariane-5. Once again, SpaceX and Orbital could soften the blow, but with the same constraints discussed earlier.

Inmarsat, a leading provider of global mobile satellite communications services, is already facing a launch delay due to recent failures of the Russian Proton launch vehicle. Further escalation of reciprocal sanctions between Russia and the West would likely further jeopardise, as executives have acknowledged, Inmarsat's ability to complete its new constellation of satellites. Regardless of Russia's actions, the geopolitical tensions will likely cause countries beyond the U.S. to reduce or eliminate dependence on Russian technology. Canada, for example, is now looking for an alternate launch provider for its M3MSat, a surveillance satellite that was to launch aboard a Soyuz rocket on 19 June this year.

Again, this disruption in the space launch industry brings the focus back to China. Although it remains U.S. policy to deny the export or re-export of spacecraft containing any ITAR-controlled or 9x515 item, as well as any foreign-built items made with U.S. technology to China, the Chinese Long March rocket family is a robust and successful programme. Although China only launched four commercial satellites in 2011-2012, it launched 34 non-commercial spacecraft during the

same period with only one failure in August 2011. 2013 saw 14 total missions with one failure.

### Conclusion

While ECR has brought a level of liberalisation in the export control regime for spacecraft and related articles, its immediate benefits are clouded by the actions taken in response to the on-going conflict in Ukraine. It is difficult to predict the ultimate impact (or duration) of the Western sanctions and any Russian retaliation. In the short term, the competitive boost intended by removing commercial satellites from the USML is at risk of being undermined because of U.S. dependence on Russia in the area of space launch. On the other hand, the removal of Russian launch vehicles from the commercial market could force the U.S. to rethink its current ban on the launch from China of U.S. satellites and foreign-built satellites with U.S. components.

Nonetheless, the U.S., EU, and Russia have so far taken care not to jump off the precipice and cause immediate economic pain to their respective space industries. Launches from the Baikonur Cosmodrome are still scheduled and Russia will continue to sell RD-180s, albeit with possible restrictions. Both Russia and the West understand the symbiotic business relationship that exists between satellite builders and Russia's launch industry, regardless of political rhetoric. As is the case with other industries and foreign investment in Russia, until the crisis in Ukraine is resolved, no one knows how long this situation will last, or what the final economic cost will be.

This article first appeared in the July/August 2014 issue of *WorldECR*, the journal of export controls and sanctions.

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