

2008

## The Wrong Stuff: America's Aerospace Export Control Crisis

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### Recommended Citation

Michael N. Gold, *The Wrong Stuff: America's Aerospace Export Control Crisis*, 87 Neb. L. Rev. (2008)  
Available at: <https://digitalcommons.unl.edu/nlr/vol87/iss2/7>

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# The Wrong Stuff: America's Aerospace Export Control Crisis

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## I. INTRODUCTION

In Science Fiction, Earth is often threatened by a variety of space-based enemies from evil robots to malevolent Martians. However, in reality, the greatest barrier to America revitalizing its moribund commercial space launch and manufacturing industries is none other than

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\* Michael N. Gold has served as Director and Corporate Counsel of Bigelow Aerospace's Washington, D.C. Area Office since 2003. In this capacity, Mr. Gold has overseen and been responsible for export control compliance and for the company's interactions with most foreign parties. More specifically, Mr. Gold supervised and managed all technical interactions between Bigelow Aerospace and ISC Kosmotras which took place in Dnepropetrovsk, Ukraine, Moscow, and Yasny, Russia, and included two launch campaigns. Mr. Gold is a graduate of the University of Pennsylvania Law School, where he founded and served as the first Coordinating Editor of the Journal of Constitutional Law and won a place on the Moot Court Board. Mr. Gold also holds a B.A. in Political Science from Brandeis University and is a member of the New York and District of Columbia State Bar Associations.

† I would like to dedicate this article to: Robert T. Bigelow whose vision, devotion, and leadership may literally open up the heavens for humanity; our launch partners in Russia and Ukraine without whom Genesis I and II would not be in orbit today; the people and town of Yasny, Russia, who embraced us like family; my wife who tolerated both late nights at work and lengthy absences abroad; my newborn son who we are trying to build a better and more peaceful world for; my two favorite Nebraskans, June Edwards and Robert Tucker, for their friendship and advice; and Tim Wakefield and Ronald D. Moore, who, in two very different fields, have provided entertainment and inspiration that kept me going during some long days and hard nights in Russia.

the United States Government itself, a force that would leave even Klingons weak with fear and dread.

Specifically, the obsolete and poorly enforced International Traffic in Arms Regulations (“ITAR”) have become an albatross around U.S. companies’ necks, stifling innovation and stunting development.<sup>1</sup>

The great irony is that, in stark contrast to U.S. export control’s twin policy goals of maintaining domestic preeminence in the aerospace field and supporting national security, the ITAR is having exactly the opposite effect.<sup>2</sup> Since 1999, when all space-related systems were returned to the United States Munitions List (“USML”), America’s leadership in commercial space capabilities has eroded, while Russian, European, and Asian entities have expanded and deepened their growing dominance.<sup>3</sup>

## II. THE BIGELOW AEROSPACE STORY

For the past ten years, I have had the privilege to be associated in one form or another with Bigelow Aerospace. Founded by the visionary entrepreneur Robert T. Bigelow, the goal of Bigelow Aerospace is to create a new, robust, private sector-driven space industry by dramatically reducing the costs of conducting space-based activities. The exclusive focus of the company is developing next-generation space habitats that utilize “expandable” technology.

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1. CENTER FOR STRATEGIC AND INTERNATIONAL STUDIES, BRIEFING OF THE WORKING GROUP ON THE HEALTH OF THE U.S. SPACE INDUSTRIAL BASE AND THE IMPACT OF EXPORT CONTROLS 10 (2008), [http://www.csis.org/media/csis/events/080219\\_spaceindustrialbasepowerpoint.pdf](http://www.csis.org/media/csis/events/080219_spaceindustrialbasepowerpoint.pdf) (“Finding 10: The U.S. share of the global space markets is steadily declining, and U.S. companies are finding it increasingly difficult to participate in foreign space markets. Finding 11: Export controls are adversely affecting U.S. companies’ ability to compete for foreign space business, particularly in the 2nd and 3rd tier. And it is the 2nd/3rd tier of the industry that is the source of much innovation, and is normally the most engaged in the global market place in the aerospace/defense sector.”) [hereinafter CSIS].
  2. *Id.* at 8 (“Finding 6: The grand strategic intent of the space export controls is not being achieved. . . . In some cases, the space export control policy is running counter to the national space policy.”).
  3. Ryan Zelnio, *The Effects of Export Control on the Space Industry*, THE SPACE REV., January 16, 2006, <http://www.thespaceview.com/article/533/1> (“Prior to the change in export controls in 1999, the US dominated the commercial satellite-manufacturing field with an average market share of 83 percent. Since that time, market share has declined to 50 percent . . . . While this cannot be blamed entirely on changes in export regulation, they have played a significant part in the decline. However, since the change in export policy, no Chinese satellite operator has chosen to purchase any satellite that is subject to US export regulations and have instead selected European and Israeli suppliers with over six satellite orders to date since 1999. This comes out to a loss estimated anywhere from \$1.5 to \$3.0 billion to the US economy. Additionally, China has made a commitment to building up their commercial satellite bus, the DFH-4 by the China Academy of Space Technology. This bus has been successfully marketed to other countries fearing US export policies, including Nigeria and Venezuela.”).

The idea of an expandable space habitat was first developed by NASA in the early 1960s,<sup>4</sup> but the giant tire-like structures that were envisioned at the time could never have survived in the harsh environment of space, and the concept was eventually dropped. However, decades later, with the introduction of advanced flexible fabrics such as Kevlar in the 1980s and 1990s, the idea of producing spacecraft that could inflate/expand after reaching orbit was revisited. The benefits of what NASA was then calling an “inflatable habitat” included reduced usage of rocket fairing volume (which saves money), decreased mass (which also reduces costs), increased usable volume (after deployment), and enhanced protection from radiation (a key issue for long duration missions). Due to these advantages, NASA began a program called “TransHab” to develop an inflatable habitat that would be used as a crew quarters for the International Space Station.<sup>5</sup> Despite the promising nature of the technology, the TransHab program was canceled by Congress in 2000 due to political and budgetary concerns.

After the termination of the TransHab program and NASA abandoning an extraordinarily promising technology, Bigelow Aerospace picked up the torch that the government had dropped and dedicated itself to implementing the concept.

Unfortunately, NASA never got very far with the TransHab program, and Bigelow Aerospace was forced to begin almost from scratch. Under Robert Bigelow’s personal direction, by 2002, the company had crafted a bold plan to develop sub-scale pathfinder modules that would demonstrate and validate this new technology in an actual, orbital environment.

To launch these trailblazing spacecraft, Bigelow Aerospace selected ISC Kosmotras, a joint Russian-Ukrainian venture that converts Russian SS-18 missiles (a critical part of the Russian nuclear arsenal) into a commercial space launch vehicle known as the “Dnepr.” Kosmotras’s business is literally a “swords into plowshares” story. The strong capacity of the Dnepr was needed since the Bigelow Aerospace pathfinders, the first of which was dubbed Genesis I, are substantial spacecraft, each more than fourteen feet (4.4 meters) in length with an eight foot (2.4 meters) diameter (post deployment) and a weight of nearly 3,000 lbs.

Previously, Dnepr launches had taken place from Baikonur, Russia’s primary commercial space launch facility located in Kazakhstan. However, for a variety of reasons, the Genesis I launch was shifted to

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4. The work was performed by the Goodyear Aircraft Corporation, and while never launched, some rudimentary and preliminary production models were created. See Inflatable Station Concept, <http://grin.hq.nasa.gov/ABSTRACTS/GPN-2003-00106.html> (last visited July 25, 2008).

5. See National Aeronautics and Space Administration, TransHab Concept, <http://spaceflight.nasa.gov/history/station/transhab/> (last visited July 25, 2008).

an active Russian nuclear missile base near the town of Yasny in the Orenburg region of Russia. Genesis I was the first commercial launch in the history of Yasny, and it was also the first time that the Dnepr would carry a single, large integrated payload. The launch occurred on July 12, 2006, and was a stunning success. The following year, on June 28, 2007, Genesis II was successfully launched, also on a Dnepr from what is now known as the Yasny Space and Missile Complex. Both launches exceeded Bigelow Aerospace's expectations, and the two spacecraft successfully validated Bigelow Aerospace's fundamental engineering concepts. Genesis I and Genesis II both remain in orbit today and continue to produce invaluable data.

However, what Bigelow Aerospace learned during the Genesis I and II programs was that while the technical challenges were difficult, they paled before the bureaucratic and political obstacles posed by the U.S.'s irrational export control regime. Second only to gravity, it was the ITAR that had the best chance of preventing Genesis I and II from leaving the Earth.

### III. ADVENTURES IN EXPORT CONTROL, THE GENESIS I AND II CAMPAIGNS

Apparently, the First Amendment guarantee of Freedom of Speech disappears the minute Americans travel across the Atlantic. In order to share even the most rudimentary information about potential spacecraft, such as mass and general dimensions, aerospace companies must first go through a gauntlet of applications, licenses, and bureaucracy.

Specifically, one must begin by filing a Technical Assistance Agreement ("TAA"). The TAA is a broad general document describing what kind of collaboration will take place, the type of information that will be shared, and who the foreign parties are. Drafting a TAA can take anywhere from a month to half a year (depending upon the complexity of the project) and is submitted to the Department of State's Directorate of Defense Trade Controls ("DDTC"). Depending on their backlog and the nature of the TAA, it usually takes anywhere from three to six months for the DDTC to respond. More often than not, TAAs with Russian entities are approved, but gaining approval is only the beginning of a lengthy and difficult process.

When a TAA involving space hardware and Russia is approved, it inevitably will include numerous pages of "provisos." These provisos are requirements that companies must abide by, such as 24-hour monitoring of all hardware, including the mandatory presence of U.S. Government officers during any "technical" conversations, etc. Additionally, another proviso is to develop a Technology Transfer Control Plan ("TTCP"). Whereas the TAA is a broad, general document outlining a collaboration, the TTCP is a much more specific, detailed

plan describing the exact process for foreign interactions, security protocols, etc. Drafting and gaining approval for a TTCP can take another two to four months. Finally, once a TTCP has been written and accepted, then, assuming everyone involved has not died of natural causes, technical communications can theoretically begin, although more paperwork must be filed to obtain the relevant government monitors for any dialogue per the requirements of the TTCP.

As described above, export control is a paper-intensive bureaucratic laden process that would make the IRS jealous, and in our case, it led to some startling contrasts. For example, during an initial meeting in Moscow with our launch provider, ISC Kosmotras, we were most likely sitting across the table from former members of the Communist Party. However, it was not the Russians, but us, American citizens, who had not one, but two U.S. Government officers attending the meeting and monitoring our every word. Certainly such a scenario is the reverse of most people's perceptions of the two countries, yet it was immediately quite evident that Russian aerospace companies and their personnel are granted much more freedom than their U.S. counterparts to participate in international programs. We, as Americans, hold the U.S. out as the epitome of freedom and openness, yet it is the U.S., not Russia, that muzzles its own citizens and hampers international trade.

Even worse, U.S. firms are actually forced to pay for the privilege of having government officials monitoring their activities, and it is not cheap—monitors cost roughly \$130 per hour for their time (and more for overtime) plus the company must pay for all of their monitors' travel and lodging expenses. As one might imagine, paying for two monitors at \$130 per hour can add up, particularly over the course of a launch campaign which usually lasts three to four months. In 2006, the year of the Genesis I campaign, Bigelow Aerospace paid the Department of State a total of \$223,208.10 just for export control review and monitoring fees. In Soviet Russia, the KGB may have always been watching, but at least they had the good courtesy to spy on you for free.

Of course, the cost, time, and trouble of export control would all be worthwhile if Bigelow Aerospace actually had any militarily sensitive technology that was worth protecting. The problem was that we did not, and hundreds of thousands of dollars, years of effort, and valuable government resources were wasted monitoring systems that are not nearly as sophisticated as what the Russians themselves produce. Herein lies the fundamental flaw with the Department of State's enforcement of the ITAR—commonly available and well understood space-related technologies should not and cannot be treated under the same regime as sensitive space systems with real military applications.

No one is against export control. There are numerous technologies whose release to foreign nationals should require paperwork, scrutiny, and monitoring. However, when no effort is made to distinguish simple, commercially available technology from militarily sensitive hardware, this is where the system breaks down.

I cannot think of a better example of the irrationality and waste of the ITAR than the treatment of a stand that Bigelow Aerospace built to support the Genesis spacecraft. This "stand" made out of standard aluminum, was basically circular in shape and had several legs sticking out around the perimeter. Bottom-line, if you flipped the stand upside down one would be hard pressed to distinguish the stand from any other table located in your grandmother's kitchen. However, since the stand had been "altered" to fit the spacecraft it was considered covered by the ITAR and, therefore, fell under a proviso in our TAA that required 24/7 monitoring by a minimum security staff of two.

One can only imagine the implications of the Russians obtaining such sophisticated technology as could be garnered from our stand. If sold to the Iranians, within weeks or months you could have members of the Revolutionary Guard drinking coffee or even tea with the help of this new "table" technology.

It took myself and my deputy two applications (general correspondence letters) over the course of several months to get the monitoring proviso waived for our stand.

Again, it is not that Bigelow Aerospace or anyone else in the entrepreneurial space field is against export control, but what we are against is wasting time and resources guarding metal coffee tables. Reforming the existing export control regime would actually help the government's efforts to prevent the proliferation of sensitive technologies. If government personnel were able to spend more time on technologies that need protection and less on widely available commercial hardware, everyone would benefit.

Export control is another area where the Russians and Ukrainians have us beat. They too have sensitive technologies and military secrets that they protect and do not disclose. However, the difference between their approach and the U.S. system is that when it comes to technologies that are decades old, well understood, and/or commercially available, they are free to discuss such hardware without any limitations whatsoever. This common sense approach is emblematic of the Russian aerospace sector. There is an old story in the aerospace community that NASA spent millions developing a high-tech "space pen" that could function in orbit despite the lack of gravity, whereas the Russians just used a pencil. Although this bit of space lore is more myth than reality, it does accurately portray the dramatically different ethos between the Russian and American space industries and

their divergent approaches to export control. The Russians take a practical approach, grounded in modern reality, whereas the U.S. position is based more on an obsolete ideology than pragmatism, reflecting a fantasy world of absolute American technological hegemony that has not existed for decades.

#### IV. REAPING WHAT WE SOW, THE DANGEROUS RESULTS OF AN IRRATIONAL POLICY

In almost any real sense, America has lost the space race to the Russians. America once held an international monopoly for commercial space launch. Now, we have managed to go from being No. 1 to having only one commercial space launch in 2006.<sup>6</sup> Our domestic launch companies have become so lazy and bloated that only the U.S. Government can afford their services. If the government was to stop purchasing U.S. rockets or open its contracts up to foreign competition, the American launch industry as we know it would most likely cease to exist.<sup>7</sup>

In stark contrast, the Russian Aerospace sector is booming. Russian rockets accounted for twelve commercial launches in 2007—more than half of all commercial launches in the year, and double that of their closest competitor, the European Ariane system, that was responsible for six commercial launches in 2007.<sup>8</sup> Moreover, once the Space Shuttle is retired in 2010 (assuming no major failures occur prior to 2010 forcing the Shuttle to be taken out of service even earlier), Russia and China will become the only two nations capable of launching people into space.

How much America's backward export control regime has influenced the U.S.'s downward spiral in commercial space launch is arguable, although it would be impossible to contend that it has not been a contributing factor to today's dismal situation.<sup>9</sup> However, where the harm done by the ITAR is probably most keenly felt is in the U.S. satellite manufacturing industry. Since all space hardware was moved to the ITAR/the USML in 1999, the once dominant American commsat manufacturing sector has seen its share of the global market drop from a dominant eighty three percent to a soft fifty percent.<sup>10</sup> European competitors such as Alcatel Alenia (which explicitly advertises an "ITAR-Free" satellite) have doubled their market share while

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6. Federal Aviation Administration, Historical Launch Data, [http://www.faa.gov/about/office\\_org\\_headquarters\\_offices/ast\\_launch\\_data/historical\\_launch/](http://www.faa.gov/about/office_org_headquarters_offices/ast_launch_data/historical_launch/) (last visited July 25, 2008).

7. CSIS, *supra* note 1, at 7 ("Finding 3: The U.S. space industrial base is largely dependent on the U.S. defense/national security budget.").

8. FUTRON, MONTHLY LAUNCH REPORT (Jan. 2008) (on file with author).

9. See Zelnio, *supra* note 3.

10. *Id.*

U.S. entities,<sup>11</sup> and particularly small and medium sized businesses, are withdrawing from international contracts.<sup>12</sup> In the meantime, China, one of the primary countries that the ITAR was intended to keep advanced space technology away from, has of course continued to purchase state-of-the art hardware from European and Israeli suppliers, costing U.S. companies as much as \$3 billion in Chinese-related business alone.<sup>13</sup> In short, if the objectives of the 1998 export control reforms expanding the ITAR were to cripple domestic U.S. capacity, lose billions of dollars, and bolster European competition, all without impacting Chinese capabilities, then we should rest assured that the mission has been accomplished.

Not only does the ITAR as currently implemented have a significant negative impact on the nation's commercial and economic interests, but it also fails in its primary goal to bolster national security.<sup>14</sup> By diminishing or outright eliminating America's space hardware manufacturing capabilities, Department of Defense contractors become more and more dependent on foreign systems and components. This is why many national security experts are now advocating ITAR reform.<sup>15</sup> Ironically, America's own export control regime has become a significant threat to American security. If the stakes were not so high, it would almost be laughable.

## V. CONCLUSION: SIMPLE, COMMON SENSE REFORMS

Despite the importance and critical value of export control reform, no sweeping legislation or Congressional action is necessary. Most, if not all, of the vital issues can be addressed internally via unilateral action by the Executive Branch. Below are several suggestions that are all within the purview of the DDTC.

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11. "By far the greatest benefactor to US export policies has been Alcatel Alenia Space, a joint venture formed in 2005 by combining the space businesses of Alcatel and Finmeccanica. In the early 2000s, Alcatel announced that they would create an "ITAR-free" spacecraft. By 2004, Alcatel had been able to double their market share from around 10% in 1998 to over 20% in 2004." Zelnio, *supra* note 3.
  12. CSIS, *supra* note 1, at 10 ("Finding 11: Export controls are adversely affecting U.S. companies' ability to compete for foreign space business, particularly in the 2nd and 3rd tier.")
  13. See Zelnio, *supra* note 3.
  14. CSIS, *supra* note 1, at 8 ("Finding 4: There are rapidly emerging foreign space capabilities and the U.S. does not control their proliferation. . . . Finding 6: The current export control policy has not prevented the rise of foreign space capabilities and in some cases has encouraged it (ITAR-free space products).")
  15. See e.g., Colin Clark, *U.S. Eyes Removing Some Satellite Components from Munitions List*, SPACE NEWS, April 7, 2008, <http://www.space.com/business/technology/080407-busmon-satellite-remove.html>; Eligar Sadeh, *Viewpoint: Bureaucratic Politics and the Case of Satellite Export Controls*, 5 ASTROPOLITICS: THE INT'L J. OF SPACE POL. & POL'Y 289 (2007).

- *Take the Time to Distinguish Benign, Commercially Available Technologies from Potentially Militarily Sensitive Hardware:* All space hardware is not created equal. At first blush, the DDTC treats all space systems as if they were exactly the same, and this is a huge mistake. If a piece of space hardware, such as a solar array, is widely and commercially available, it should not be on the USML and should not be covered by the ITAR. At the very least, provisos requiring 24/7 monitoring, TTCs, etc. should be dropped. In Bigelow Aerospace's case, the International Space Station itself is essentially under the auspices of the Commerce Control List,<sup>16</sup> which is why placing our less sophisticated, mostly off-the-shelf technology under the ITAR is simply irrational.
- *Enforce Hard Deadlines:* At a minimum, some sort of deadlines need to be enforced so that companies can depend on receiving a response to their licensing requests in a regular and timely fashion.
- *Create a More Transparent and Responsive Licensing Process:* Currently, the licensing procedure at the DDTC (as opposed to the much more open and responsive Defense Technology Security Administration or "DTSA" Space Directorate) can be a bit of a black box. More detail in regard to applications' timing and status needs to be made available, and knowledgeable ombudsmen should be employed to respond to applicants' questions and concerns.
- *Lower or Eliminate Fees:* Private sector companies, particularly small businesses, that are already spending tens of millions of dollars to innovate new technologies should not have to also pay hundreds of thousands of dollars to the government for monitoring services (this cost is in addition to the expense of employing whole offices of legal and support staff that companies have to hire to deal exclusively with export control). Such costs prevent many companies from participating in international projects and stifles innovation. Fees should be based on a company's actual profit and capped at a much lower level if not eliminated entirely.

Reforms based on these simple, common sense recommendations would go far toward creating a more rational and productive export control regime. If effective and expeditious reforms are implemented soon, perhaps American preeminence in commercial space could someday become more than Science Fiction.

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16. 15 C.F.R. §§ 734, 740, 742, 772, 774 (2008).