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Space Launch Vehicles: Government Activities, Commercial Competition, and Satellite Exports

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Space Launch Vehicles: Government Activities, Commercial Competition, and Satellite Exports

SUMMARY

Launching satellites into orbit, once the exclusive domain of the U.S. and Soviet governments, today is an industry in which companies in the United States, Europe, China, Russia, Ukraine, Japan, and India compete. In the United States, the National Aeronautics and Space Administration (NASA) continues to be responsible for launches of its space shuttle, and the Air Force has responsibility for launches associated with U.S. military and intelligence satellites, but all other launches are conducted by private sector companies. Since the early 1980s, Congress and successive Administrations have taken actions, including passage of several laws, to facilitate the U.S. commercial space launch services business. The Federal Aviation Administration (FAA) regulates the industry.

Forecasts in the 1990s suggesting significant increases in launch demand sparked plans to develop new launch vehicles. NASA and the Department of Defense (DOD) created government-industry partnerships to develop new reusable launch vehicles (RLVs) and "evolved" expendable launch vehicles (EELVs), respectively. The primary goal was to reduce launch costs. (The U.S. space shuttle is the only RLV today. All other launch vehicles are expendable — they can only be used once). Several U.S. private sector companies began developing their own launch vehicles, though some sought government loan guarantees or tax incentives.

Since 1999, projections for launch services demand have declined dramatically, however, complicating private sector efforts to obtain financing. NASA's efforts to develop a new RLV to replace the shuttle faltered. DOD's new EELVs (Atlas 5 and Delta 4) have begun service, but the companies that build them (Lockheed Martin and Boeing) want more DOD funding to defray their costs in the wake of lower commercial demand.

On February 1, 2003, NASA's space shuttle *Columbia* broke apart as it descended from orbit, killing all seven astronauts aboard. NASA hopes the shuttle will return to flight in spring 2005. On January 14, 2004, President Bush announced new exploration goals for NASA (see CRS Report RS21720), which include retiring the shuttle in 2010 after space station construction is complete. NASA would build a new Crew Exploration Vehicle to take astronauts to the Moon, but NASA plans to launch it on an EELV, not a new launch vehicle. NASA's FY2004-2020 projected funding chart includes funding (starting in FY2011) for a new "heavy lift" launch vehicle, but NASA officials say that they do not know yet if they will need such a vehicle

Commercial human space flight took a step forward on June 21, 2004, when Mike Melvill became the first person to reach space (on a suborbital flight) on a privately funded launch vehicle, SpaceShipOne.

Concerns that China benefitted militarily from knowledge gained through commercial satellite launches in the 1990s led to changes in U.S. satellite export policy, and satellite exports to China have not been approved in recent years. The changes to U.S. satellite export policy, especially returning control over such exports to the State Department from the Commerce Department, remain controversial in terms of what some claim has been a negative impact on U.S. satellite manufacturing companies whose clients may choose European suppliers in order to avoid the U.S. export control regulations.

MOST RECENT DEVELOPMENTS

NASA's space shuttle fleet remains grounded following the February 1, 2003 *Columbia* accident (see CRS Report RS21408). The target date for returning the shuttle to flight is March/April 2005. NASA is requesting $4.3 billion for the shuttle in FY2005, out of a total request of $16.2 billion. Congress appropriated $4 billion for the shuttle program in FY2004 (as requested). NASA's FY2005 budget request reflects President Bush's proposal for NASA to embark upon a new exploration initiative to return humans to the Moon in the 2015-2020 time frame, and ultimately go on to Mars and "worlds beyond." Under the plan, NASA would retire the shuttle fleet in 2010, and is terminating the Space Launch Initiative program that was, inter alia, developing new launch vehicle technologies. NASA has not decided if it needs a new launch vehicle to accomplish the President's goals. Senator McCain introduced a FY2005-2009 NASA authorization bill on June 17 (S. 2541).

For FY2005, DOD is requesting $611 million for procurement of Evolved Expendable Launch Vehicles (EELVs), and $27 million for EELV R&D. The House and Senate versions of the FY2005 DOD authorization bill (H.R. 4200/S. 2400), and the Senate version of the FY2005 DOD appropriations bill (S. 2559), reduce the EELV request by $100 million because one launch (SBIRS-High) has been delayed by a year. The House version of the appropriations bill (H.R. 4613) transfers $91 million from EELV into SBIRS-High, stating that the Air Force requested that action. The House Appropriations Committee's report (H.Rept. 108-553) directs DOD to study whether both EELVs are really needed.

On June 21, 2004, Mike Melvill became the first person to reach space (on a suborbital flight) aboard a privately funded launch vehicle, SpaceShipOne.

BACKGROUND AND ANALYSIS

U.S. Launch Vehicle Policy

The National Aeronautics and Space Administration (NASA) and the Department of Defense (DOD) have each developed expendable launch vehicles (ELVs) to satisfy their requirements. NASA also developed the partially reusable space shuttle. U.S. ELVs currently in use include Titan and Atlas (manufactured by Lockheed Martin), Delta (manufactured by Boeing), and Pegasus and Taurus (manufactured by Orbital Sciences Corporation). Delta 4 and Atlas 5 are the most recent additions to the fleet, and were developed through DOD's Evolved Expendable Launch Vehicle (EELV) program.

From "Shuttle-Only" to "Mixed Fleet"

In 1972, President Nixon approved NASA's plan to create the first reusable launch vehicle, called the space shuttle, and directed that it become the nation's primary launch vehicle, replacing all the ELVs except Scout (later discontinued for unrelated reasons). This would have made NASA and DOD dependent on a single launch vehicle, but the resulting high launch rate was expected to reduce the cost per flight significantly. The shuttle was first launched in 1981, and was declared operational in 1982. The phase-out of the ELVs began, but in 1984 the Air Force successfully argued that it needed a "complementary" ELV as a

backup to the shuttle for "assured access to space" and initiated what is now known as the Titan IV program. Production lines for the Delta and Atlas began to close down, and it was expected that only the shuttle, Scouts, and Titan IVs would be in use by the mid-1980s.

Everything changed on January 28, 1986, however, when the space shuttle *Challenger* exploded 73 seconds after launch. Apart from the human tragedy, the *Challenger* accident deeply affected U.S. space launch policy, demonstrating the vulnerability of relying too heavily on a single system. Many military and civilian satellites had been designed to be launched on the shuttle, and could not have been transferred to ELVs even if the ELVs were not already being phased out. The remaining ELVs had their own problems in 1986. A Titan exploded in April and a Delta failed in May, which also grounded Atlas because of design similarities. Consequently, the Reagan Administration revised U.S. launch policy from primary dependence on the shuttle to a "mixed fleet" approach where a wide variety of launch vehicles are available. The shuttle is used principally for missions that require crew interaction, while ELVs are used for launching spacecraft. President Reagan also decided that commercial payloads could not be flown on the shuttle unless they were "shuttle-unique" (capable of being launched only by the shuttle or requiring crew interaction) or if there were foreign policy considerations. That action facilitated the emergence of a U.S. commercial space launch industry whose participants had long argued that they could not compete against government-subsidized shuttle launch prices. The White House and Congress had taken steps beginning in 1983 to assist in developing a commercial space launch services business, including President Reagan's 1983 designation of the Department of Transportation as the agency responsible for facilitating and regulating the commercial space launch sector. Passage of the 1984 Commercial Space Launch Act (P.L. 98-575), the Commercial Space Launch Act Amendments of 1988 (P.L. 100-657), and the Commercial Space Act of 1998 (P.L. 105-303) also have helped. But removing the shuttle as a competitor was the major factor in fostering the U.S. launch businesses.

Clinton Administration Policy

On August 5, 1994, President Clinton released a National Space Transportation Policy that gave DOD lead responsibility for improving ELVs and NASA lead responsibility for upgrading the space shuttle and technology development of new reusable launch vehicles. The policy also sets guidelines for the use of foreign launch systems, the use of excess ballistic missile assets for space launch, and encourages an expanded private sector role in space transportation R&D.

George W. Bush Administration Policy

On June 28, 2002, President Bush ordered the National Security Council to chair a review of several U.S. space policies. The review of space transportation policy was due by December 31, 2002, but was initially delayed, and then further delayed by the February 2003 space shuttle *Columbia* accident. A date for that policy's release is not available. However, on January 14, 2004, the President announced a new exploration initiative for NASA that includes retiring the shuttle fleet after construction of the space station is completed in 2010. Under the plan, NASA would send humans back to the Moon by 2015-2020, and eventually to Mars. No decisions have been made on what, if any, new launch vehicles are needed to fulfill those goals.

U.S. Launch Vehicle Programs and Issues

NASA's Space Shuttle Program

The Space Transportation System — the space shuttle — is a partially reusable launch vehicle and is the sole U.S. means for launching humans into orbit. It consists of an airplane-like Orbiter, with two Solid Rocket Boosters (SRBs) on each side, and a large, cylindrical External Tank (ET) that carries fuel for the Orbiter's main engines. The Orbiters and SRBs are reused; the ET is not. NASA has three remaining spaceflight-worthy Orbiters: *Discovery*, *Atlantis*, and *Endeavour*.

A total of 113 launches have taken place since April 1981. Two of those missions ended in tragedy, each killing seven astronauts. In 1986, the space shuttle *Challenger* exploded 73 seconds after launch because of the failure of a seal (an O-ring) between two segments of an SRB. In 2003, the space shuttle *Columbia* disintegrated as it returned to Earth from a 16-day science mission (see CRS Report RS21408). The shuttle fleet is grounded. NASA's current target for "Return to Flight" (RTF) is March/April 2005.

Congress is debating issues stemming from the *Columbia* tragedy, which is discussed in CRS Report RS21408. The *Columbia* Accident Investigation Board released its report on August 26, 2003 (see [http://www.caib.us]). A synopsis is available in CRS Report RS21606. The Board found that the tragedy was caused by technical and organizational failures, and made 29 recommendations to fix the program. Fifteen of the 29 recommendations must be completed before the shuttle returns to flight. NASA Administrator O'Keefe says NASA will comply with CAIB's recommendations. He established a "Return to Flight" (RTF) Task Group chaired by two former astronauts, Tom Stafford and Dick Covey, to oversee NASA's implementation of the CAIB recommendations as they relate to RTF. The Task Group will not address management and culture changes recommended by CAIB. Questions remain about who should oversee implementation of those recommendations, and 27 "observations" made by CAIB. H.R. 3219 (Hall) would establish an independent panel of the National Academies of Science and Engineering to provide that oversight. S. 1821 (Hollings) would establish a permanent National Space Commission, inter alia, to oversee compliance. The Stafford/Covey task group [http:\\www.returntoflight.org] has issued two interim reports, in January and May 2004. The May 2004 report conditionally closed out three of the 15 CAIB recommendations, but also determined that the ability to use the space station as a shelter for shuttle crews is becoming increasingly important as a RTF issue, and notified NASA it has added that capability to its oversight responsibilities. The report also expressed concern about whether the shuttle program has sufficient personnel to complete the RTF activities.

Although 87 successful shuttle launches were conducted between the two tragedies, there were persistent concerns that cuts to the shuttle budget, personnel reductions, and NASA's 1995 decision to turn most shuttle operations over to a "single prime contractor," could impact shuttle safety. (Shuttle appropriations levels for FY1992-FY2002 are in CRS Report RS21411.) The "single prime contractor" is the United Space Alliance (USA), a limited liability company owned 50-50 by Boeing and Lockheed Martin, created to pull together the 86 separate contracts with 56 different companies under which the shuttle program was then operating. NASA signed a $7 billion, six-year Space Flight Operations

Contract (SFOC) with USA on September 26, 1996 with the goal of reducing shuttle operational costs while ensuring safety. On August 2, 2002, NASA exercised the first of two two-year options, extending the contract to September 30, 2004. NASA asserts that SFOC has saved the agency approximately $1 billion per year. Contracts for the External Tank, Solid Rocket Boosters, and Space Shuttle Main Engines have not yet been incorporated into SFOC. NASA manages those contracts, with Lockheed Martin, ATK Thiokol, and Boeing Rocketdyne, respectively.

NASA and USA statistics showing reduced "in-flight anomalies," and several instances where USA grounded the shuttle fleet after discovering potential problems, seemed to indicate that safety was not being eroded. But safety concerns were expressed by review panels, particularly the Aerospace Safety Advisory Panel (ASAP), and an internal NASA review commissioned after a 1999 mission (STS 93) suffered two serious anomalies during launch. Called the Shuttle Independent Assessment Team — see CRS Report RS21419 for excerpts — it concluded that NASA needed to augment the resources available to the shuttle program to ensure safety.

NASA added some personnel and funding, but both remained constrained. Efforts to upgrade the shuttle to improve safety and combat obsolescence were cut after individual projects proved more expensive and/or technically challenging than expected. In the February 2002 budget request for FY2003, NASA Administrator O'Keefe reduced funding for upgrades in the FY2002-2006 time period by 34% — from $1.836 billion to $1.220 billion. In November 2002, however, Mr. O'Keefe submitted a FY2003 budget amendment shifting more funds into the shuttle program ($470 million for FY2003-2007) and announcing that NASA would continue to use the shuttle longer than planned — until at least 2015, and perhaps 2020 and beyond, instead of replacing it in 2012. NASA created a new line in its FY2004 budget for a "Shuttle Service Life Extension Program" (SLEP) that incorporated funding previously identified for shuttle upgrades. At the same time, Mr. O'Keefe restructured the Space Launch Initiative, which had been developing technologies to build a replacement for the shuttle (see below), to focus on building an Orbital Space Plane (OSP) to take crews to and from the space station.

Less than three months later, however, the *Columbia* tragedy forced NASA to reassess its space transportation strategy. Final action on the FY2003 budget was pending at the time of the tragedy. The amended FY2003 shuttle request was $3.2 billion. Congress approved that level, and added $50 million for the *Columbia* investigation and other accident-related expenses, and exempted the shuttle program from an across-the-board rescission applied to most other government programs. Congress added another $50 million for FY2003 for investigation and remediation activities in the FY2004 Legislative Branch Appropriations Act (P.L. 108-83). (NASA's FY2004 budget justification documents show $3.786 billion as the expected FY2003 funding level because it is expressed in "full cost accounting," which includes certain costs that previously were accounted for separately, and does not include the second $50 million supplemental.) Congress appropriated $3.968 billion for the shuttle program in FY2004, as requested. The FY2005 request is $4.3 billion.

Plans for the future of the shuttle fleet changed again on January 14, 2004, when President Bush announced that the shuttle system would be retired after construction of the space station is completed in 2010. The announcement was part of a new exploration initiative announced by the President (see CRS Report RS21720). NASA plans to terminate

the SLEP program. Some upgrade activities will continue under other budget line items. Congress is debating the President's new plan, including its impact on the shuttle and on U.S. human access to space. Some Members want to terminate the shuttle earlier than 2010 because they feel it is too risky and/or that the funds should be spent on accelerating the President's vision of returning humans to the Moon. Others want to retain the shuttle at least until a new spacecraft is available to take astronauts to and from the space station. Under NASA's current plan, such a spacecraft would not be ready at least until 2014. Between 2010 and 2014, U.S. astronauts would have to rely on Russia for access to the space station. This issue is discussed in more detail in CRS Issue Brief IB93017.

NASA's Efforts to Develop New Reusable Launch Vehicles (RLVs)

U.S. expendable and reusable launch systems remain expensive and less efficient and reliable than desired. DOD and NASA initiated several efforts in the late 1980s and early 1990s to develop new systems, but each was terminated in turn because Congress or the agencies themselves were not convinced that the required investment had sufficient priority. In response to the 1994 Clinton policy, two programs were initiated: DOD's Evolved Expendable Launch Vehicle (EELV) program (see below) and NASA's Reusable Launch Vehicle (RLV) program. Proponents believe that RLV technology can dramatically lower the cost of accessing space. NASA's efforts to develop a "2nd generation" RLV to replace the shuttle (which is the 1st generation RLV) have not fared well, however.

X-33 and X-34. From 1995 to 2000, NASA's approach was based on establishing new forms of cooperation with industry by sharing the costs of developing technology with the intent that industry take over development, operation, and financing of the operational vehicle. Two "X" (for "experimental") flight test programs were begun: X-33 and X-34. X-33 was a joint program with Lockheed Martin to build a subscale prototype of a large RLV based on single-stage-to-orbit (SSTO) technology. The SSTO concept involves a rocket that can attain orbit with only one stage (instead of two or more as is common today) carrying people or cargo. X-34 was a small RLV "testbed" to demonstrate reusable two-stage-to-orbit technologies, which was being built under a traditional contract with Orbital Sciences Corporation. (Initially, X-34 also was a government-industry cooperative effort with Orbital and Rockwell International, but those companies withdrew from the cooperative agreement. NASA then signed a contract with Orbital for a scaled-back program.) NASA terminated X-33 and X-34 in March 2001. NASA spent approximately $1.2 billion on X-33, and Lockheed Martin said that it spent $356 million of its own funding. Technical problems with the X-33, particularly its new "aerospike" engines and construction of its composite hydrogen fuel tanks, led to delays in test flights from 2000 to 2003. NASA concluded that the cost to complete the program was too high compared to the benefits. X-34 was terminated for similar reasons. NASA spent $205 million on X-34.

Space Launch Initiative (SLI). NASA restructured its RLV program in 2000 (as part of its FY2001 budget request) and initiated the Space Launch Initiative (SLI). NASA dramatically restructured the SLI program in 2002, and now is terminating it.

Originally, the SLI plan was for NASA to work with the private sector and universities to develop new technologies to allow a decision in 2006 on what new RLV to develop. The goal was to develop RLV technology that would be "10 times safer and crew survivability 100 times greater, all at one-tenth the cost of today's space launch systems." NASA initially

specified that it expected the private sector to pay some of the development costs, but later conceded that market conditions made that unlikely. SLI was budgeted at $4.8 billion from FY2001-2006. The failure of the X-33 and X-34 programs, and of the National AeroSpace Plane (NASP) program before them, made some observers skeptical about NASA's ability to develop a 2nd generation RLV. NASA Administrator O'Keefe and the Bush Administration agreed. In a budget amendment submitted to Congress in November 2002, the SLI program was significantly changed. Mr. O'Keefe was quoted as calling the SLI goal "a bumper sticker." The budget amendment documentation said a new RLV lacked economic justification and that although the SLI program estimated the cost of a new RLV at $10 billion (not including the funding spent on SLI), a new estimate by the SLI program office was $20 billion, and four independent estimates sponsored by NASA suggested $30-35 billion. Therefore, the Bush Administration shifted funding away from developing a 2nd generation RLV. Although the name SLI continued, the program was restructured into two components: building an Orbital Space Plane (OSP) to take crews to and from the space station, and developing "Next Generation Launch Technology" (NGLT), with a decision in 2009 on what new launch vehicle to build. OSP was not a launch vehicle, but a spacecraft designed to take crews to and from the space station. NGLT comprised the funding that remained for the 2nd generation RLV program plus funding allocated for "3rd generation" technologies (a then-existing line item in the NASA budget). Following President Bush's announced of new goals for NASA in January 2004, NASA announced that it would terminate SLI, and shift remaining SLI funding into activities that support the new exploration initiative. A projected NASA funding chart for the years FY2004-2020 assumes spending $13-16 billion for a new "heavy lift" launch vehicle beginning in FY2011 to support returning astronauts to the Moon, but NASA says its does not yet know if a new vehicle will be needed.

DOD's Evolved Expendable Launch Vehicle (EELV) Program

DOD began what is now known as the EELV program in FY1995 (P.L. 103-335) with a $30 million appropriation. EELV was first formally identified in DOD's FY1996 budget. Two EELVs were developed in joint government-private sector programs: Boeing's Delta IV and Lockheed Martin's Atlas V. Both vehicles have successfully entered service. The goal of the EELV program was to reduce launch costs by 25%, but that goal may not be met.

In 1996, the Air Force had selected Lockheed Martin and McDonnell Douglas (later bought by Boeing) for development contracts worth $60 million. Originally, one of those companies would have been selected in 1998 to develop the EELV. In November 1997, responding to indicators at the time that the commercial space launch market would be larger than expected, DOD announced that it would help fund development of both Atlas V and Delta IV. In October 1998, DOD awarded Boeing $1.88 billion for the Delta IV ($500 million for further development plus $1.38 billion for 19 launches), and awarded Lockheed Martin $1.15 billion for the Atlas V ($500 million for further development plus $650 million for 9 launches). The companies were expected to pay the rest of the development costs themselves. (Boeing officials state that Boeing invested $2.5 billion in design, development, and infrastructure for the Delta 4, of which the company has written off $2 billion.)

In 2000, however, new market forecasts showed a reduction in expected commercial demand, and DOD began reevaluating its EELV strategy. It renegotiated the contracts with both companies, shifting two of the launches previously awarded to Lockheed Martin to

Boeing instead, and relieving Lockheed Martin (reportedly at the company's request) of the requirement to build a launch pad at Vandenberg AFB, CA. The companies then approached DOD to obtain additional government funding because of the downturn in the commercial market. This is called "assured access to space" in the sense of assuring that both companies remain in the EELV business so DOD has redundancy in capability should one of the launch vehicles experience difficulties. The FY2004 DOD authorization act (P.L. 108-136) codified "assured access" as U.S. policy, stating that two space launch vehicles (or two families of them) are to be sustained. It does not specify Atlas 5 and Delta 4, but there appears to be no other alternative, since the space shuttle, once it resumes flight, will be used only for space station-related launches and is scheduled to be terminated around 2010.

In May 2003, Boeing revealed that it was under investigation by the Justice Department about whether it illegally obtained proprietary information about Lockheed Martin's EELV program in the 1996-1999 time frame. On July 24, DOD suspended three Boeing business units from eligibility for new government contracts, shifted seven existing launch contracts from Boeing to Lockheed Martin, and disqualified Boeing from bidding for three new launch contracts. Exceptions to the suspension are allowed if "compelling national need" can be demonstrated, and the government has awarded several contracts to those Boeing units despite the suspension, including one new launch contract. Lockheed Martin will build the launch pad (actually upgrading an existing Atlas 3 pad) for the Atlas 5 that was previously planned at Vandenberg. Boeing subsequently withdrew the Delta 4 from competition for commercial contracts and is focusing entirely on the government market.

DOD notified Congress that the EELV program breached the "Nunn-McCurdy" limit of 25% cost growth, which requires DOD to cancel or restructure the program, or certify that it is essential to national security. In April 2004, DOD made that certification. The FY2005 request is $611 million for procurement, and $25 million for R&D. In the FY2005 DOD authorization bill (H.R. 4200/S. 2400), the House and Senate each cut the procurement request by $100 million because one of the launches (SBIRS-High) was delayed by a year. In the FY2005 DOD appropriation bill (H.R. 4613/S. 2559), the Senate cut $100 million as in the authorization bill. The House appropriations bill transferred $91 million from EELV into SBIRS-High, stating that the Air Force requested that action. In its accompanying report (H.Rept. 108-553), the House Appropriations Committee directed DOD to study whether both families of EELVs are really needed. The committee argued that "assured access" might be better ensured by adequately funding only one vehicle, instead of inadequately funding two, and raised other issues.

Private Sector Launch RLV Development Efforts

Several entrepreneurial U.S. companies have been attempting to develop RLVs through private financing. Many have encountered difficulties in obtaining financing from the financial markets, and some have sought government loan guarantees or tax credits. Some (e.g. Kistler Aerospace and Universal Space Lines) have received limited direct government funding through various contracts. Another company, SpaceX, asserts that it will dramatically reduce the cost of reaching orbit with its partially reusable Falcon launch vehicle. The first launch, of a small DOD communications satellite, is scheduled for 2004.

A number of companies are focusing on building suborbital rockets instead of those that can reach orbit, anticipating that space tourism will be a substantial market. Twenty

seven teams from seven countries are participating in the "X-Prize" contest [http://www.xprize.com], which will award $10 million to the first privately-financed company to launch a vehicle capable of carrying three people (one person must actually be aboard) to an altitude of 100 kilometers (62.5 miles), return safely to Earth, and repeat it within two weeks using the same vehicle. On June 21, 2004, Mike Melvill became the first person to reach space (on a suborbital flight) on a vehicle, SpaceShipOne, built entirely with private funds. It was designed by Burt Rutan and financed by Microsoft co-founder Paul Allen. Although the flight was successful in that Mr. Melvill surpassed 100 kilometers and returned safely, several anomalies occurred during the flight. The vehicle's designer, Burt Rutan, subsequently stated that he would not attempt to repeat the flight until those problems were understood and fixed. H.R. 3752 would regulate commercial human space flight. Inter alia, it directs the Secretary of Transportation to issue regulations setting requirements for the crew and passengers ("space flight participants") of such flights, but permits licenses to be issued for such flights prior to finalization of those regulations.

U.S. Commercial Launch Services Industry

Congressional Interest

Congress is debating issues involving the domestic launch services industry, many of which were debated in previous Congresses. Some are focused on satellite export issues (discussed below). Another is the question of what the government should do to stimulate development of new launch vehicles by the private sector, particularly in a market that is stagnant or declining. That debate focuses on whether tax incentives or loan guarantees should be created for companies attempting to develop lower cost launch vehicles. Tax incentive advocates argue that loan guarantee programs allow the government to pick winners and losers; loan guarantee advocates argue that tax incentives are insufficient to promote necessary investment in capital intensive projects. Congress created (Title IX, FY2003 DOD appropriations Act, P.L. 107-248) a loan guarantee program for companies developing commercial, reusable, in-orbit space transportation system, but such systems are not launch vehicles (they move satellites from one orbit to another) and are not discussed further here. In the 108th Congress, H.R. 2358 would create tax incentives. H.R. 644 would make spaceports eligible for tax exempt bonds. S. 1260 would extend until 2009 (from 2004) the period through which the government will indemnify commercial space launch companies from certain third-party claims, and require the Secretary of Transportation to study whether suborbital launch vehicles require separate regulation. H.R. 3752 would extend the government indemnification until 2007, establish a regulatory regime for the commercial human space flight — "space tourism" — industry (discussed above), and allow the FAA to issue experimental launch permits.

One difficulty facing existing and nascent launch service providers is dramatically changed market forecasts. In the mid- to late-1990s when many of the entrepreneurial companies began their efforts, a very large market was predicted for placing satellites into low Earth orbit (LEO), particularly for satellite systems to provide mobile satellite telephony services. Many of the companies targeted the LEO market, but it has shrunk markedly in the intervening years. Three satellite mobile phone companies (Iridium, ICO, and Globalstar), and a company that offered data services using LEO satellites (Orbcomm), all declared

bankruptcy. Iridium, ICO, and Globalstar were later brought out of bankruptcy, and Orbcomm was purchased at auction, but many investors remain skeptical about the prospects for such systems. Another factor is that technological advances permit longer satellite lifetimes and enlarged capacity, reducing the need for new satellites. Launch forecasts published by FAA (available at [http://ast.faa.gov]) reflect the changing market conditions.

Foreign Launch Competition

Europe, China, Russia, Ukraine, India, and Japan offer commercial launch services in competition with U.S. companies. Most satellites are manufactured by U.S. companies or include U.S. components and hence require export licenses, giving the United States considerable influence over how other countries participate in the commercial launch services market. The United States negotiated bilateral trade agreements with China, Russia, and Ukraine on "rules of the road" for participating in the market to ensure they did not offer unfair competition because of their non-market economies. Launch quotas were set in each of the agreements. However, President Clinton terminated the quotas for Russia and Ukraine in 2000, and the agreement with China expired at the end of 2001.

Europe. The European Space Agency (ESA) developed the Ariane family of launch vehicles. The first test launch of an Ariane was in 1979; operational launches began in 1982. ESA continued to develop new variants of Ariane. Ariane 5 is the only version now in use. ESA also is developing a smaller launch vehicle, Vega, whose first launch is expected in 2005. Operational launches are conducted by the French company Arianespace. Arianespace conducts its launches from Kourou, French Guiana, on the northern coast of South America. Arianespace also markets Russia's Soyuz launch vehicle and ESA is planning to build a launch site for Soyuz at Kourou.

In 1985, a U.S. company (Transpace Carriers Inc.) filed an unfair trade practices complaint against Arianespace, asserting that European governments were unfairly subsidizing Ariane. The Office of the U.S. Trade Representative (USTR) investigated and found that Europe was not behaving differently from the United States in pricing commercial launch services (then offered primarily on the government-owned space shuttle). The incident raised questions about what "rules of the road" to follow in pricing launch services. In the fall of 1990, USTR and Europe began talks to establish such rules of the road and assess how to respond to the entry of non-market economies into the launch services business. The only formal negotiating session was held in February 1991.

Each side is concerned about how much the respective governments subsidize commercial launch operations, but another controversial topic (not formally part of the talks) was whether Arianespace should be able to bid for launches of U.S. government satellites, which now must be launched on U.S. launch vehicles as a matter of U.S. policy. Arianespace wants that restriction lifted. France and other European governments do not have written policies requiring the use of Ariane for their government satellites. However, the member governments of ESA originally agreed to pay a surcharge of as much as 15-20% if they chose Ariane. The surcharge led some cost-conscious European governments to buy launch services from other (notably U.S.) suppliers. In the fall of 1995, ESA's member governments reached agreement with Arianespace to reduce the surcharge to encourage use of Ariane. (ESA itself gives preference to using Ariane, but is not legally constrained from using other launch vehicles.) Arianespace is currently encountering significant financial

difficulties both because of the constrained market, and because of the failure of a new, more capable variant of the Ariane 5 in 2002. In May 2003, the ESA Council of Ministers adopted a European Guaranteed Access to Space (EGAS) program that would provide 960 million euros for Arianespace to return the more capable version of the Ariane 5 to flight, and acquire Ariane 5 launch vehicles through 2009, while the commercial launch market is down.

China. The People's Republic of China offers several versions of its Long March launch vehicles commercially. China poses special issues not only because of its non-market economy, but because of technology transfer and political concerns. Launch services are offered through China Great Wall Industry Corp. (CGWIC). Because the United States currently will not issue export licenses for satellites or satellite components destined for China (see below), the Chinese commercial space launch program is dormant.

U.S.-China Bilateral Trade Agreements for Launch Services. In 1989, China and the United States signed a six-year bilateral trade agreement restricting the number of Chinese commercial space launches to ensure China, with its nonmarket economy, did not unfairly compete with U.S. companies. A new seven-year agreement was reached in 1995, and amended in 1997. The agreement expired on December 31, 2001. While the agreements were in force, they established quotas on how many commercial satellites China could launch each year, and included pricing provisions to try to ensure that China did not unfairly compete with U.S. commercial launch service providers because of its non-market economy.

U.S. Satellite Exports to China: 1988-1997. In September 1988, the U.S. government agreed to grant three export licenses for satellites manufactured by Hughes to be launched by CGWIC. The Reagan Administration granted the licenses on the conditions that China sign three international treaties related to liability for satellite launches and other subjects; agree to price its launch services "on a par" with Western companies; and establish a government-to-government level regime for protecting technology from possible misuse or diversion. China met the conditions and the two countries signed a six-year agreement in January 1989. The now-defunct Coordinating Committee on Multilateral Export Controls (COCOM) approved the licenses that March.

On June 5, 1989, after the Tiananmen Square uprising, President George H. W. Bush suspended all military exports to China. At the time, exports of communications satellites were governed by the State Department's Munitions List. The satellites counted as military exports and the licenses were suspended. Then Congress passed language in the FY1990 Commerce, Justice, State and Judiciary appropriations (P.L. 101-162) and the 1990-91 Foreign Relations Authorization Act (P.L. 101-246, Section 902) prohibiting the export of U.S.-built satellites to China unless the President reported to Congress that (1) China had achieved certain political and human rights reforms, or (2) it was in the national interest of the United States. In December 1989, President Bush notified Congress that export of the satellites was in the national interest and the licenses were reinstated. The satellites were launched by China in 1990-1992.

A different issue arose in 1990. China signed a contract to launch an Arabsat Consortium satellite for $25 million, much less than what many considered "on a par" with Western companies. The main competitor, Arianespace, turned to both the French and U.S. governments to prohibit export of the satellite. No formal action was taken by the United

States. In 1991, the Arabsat Consortium terminated the contract with the Chinese and signed an agreement with Arianespace, so the case became moot, but the issue of what constituted "on a par" remained. China argued that because its costs are so low, it could offer lower prices and still adhere to international norms as to what costs are included in setting the price. Yet another issue arose in 1991 — linkage of satellite export licenses with U.S. concern over China's ballistic missile proliferation policies. On April 30, 1991, the Bush Administration approved final export licenses for two satellites and for U.S. components of another, but to emphasize its concern about Chinese missile proliferation, disapproved export of U.S. components for a communications satellite China itself was building. On June 16, 1991, the White House announced that it would not approve any further export licenses for commercial satellite launches. On July 17, the State Department identified CGWIC as one of two Chinese entities engaged in missile technology proliferation activities that require the imposition of trade sanctions under the Arms Export Control Act, including denial of license applications for export items covered by the Missile Technology Control Regime (MTCR). Although the MTCR does not cover satellites (only satellite launch vehicles, which are close cousins of ballistic missiles), the identification of CGWIC as a cause of concern complicated China's marketing plans. China agreed to adhere to the MTCR, and the sanctions were lifted on February 21, 1992. In May 1992, INTELSAT agreed to launch at least one satellite on a Chinese launch vehicle. On September 11, 1992, the State Department notified Congress that it was waiving legislative restrictions on U.S. exports for six satellite projects with China. Many observers saw the move as a conciliatory gesture in the wake of the U.S. decision to sell F-16s to Taiwan.

On August 25, 1993, however, the U.S. government again imposed sanctions against China for ballistic missile proliferation activities, and the State Department said that satellite exports would not be permitted. The State Department announced October 4, 1994 it would lift the sanctions after China pledged to abide by the MTCR. During this period, tensions were acute between those viewing the sanctions as harmful to U.S. business interests and those seeking to prevent sensitive technology from reaching China and/or to punish China for MTCR infractions. The debate centered on whether the satellites should be governed by the State Department (Munitions List) or the Commerce Department (Commerce Control List). Some responsibility for export of commercial communications satellites was transferred from the State Department to the Commerce Department in 1992; in October 1996 primary responsibility was transferred to Commerce.

In January 1995, the launch of the Hughes-built APStar-2 satellite failed in-flight. Falling debris killed 6 and injured 23 on the ground. On February 6, 1996, President Clinton approved the export of four satellites to China for launch, despite concerns about China exporting nuclear weapons-related equipment to Pakistan. On February 14, 1996, a Long March 3B rocket carrying the INTELSAT 708 communications satellite built by Loral malfunctioned seconds after liftoff, impacting the ground and spreading debris and toxic fumes over the launch site and a nearby village. The Chinese reported 6 dead and 57 injured, but other reports suggested a higher figure. After this second Chinese launch failure involving fatalities, some customers, including INTELSAT, canceled contracts.

In May 1997, USTR stated that it believed China violated the pricing provisions of the bilateral agreement for the launching of Agila 2 for the Philippines. Chinese officials disagreed. On September 10, 1997, the *Washington Times* published a story that Chinese and

Russian entities (including CGWIC) were selling missile technology to Iran. China denied the allegations.

Satellite Exports to China: 1998-2000 (Including the "Loral/Hughes" Issue, the Cox Committee Report, and Lockheed Martin). On February 18, 1998, the President notified Congress that it was in the national interest to export Loral's Chinasat 8 satellite to China. On April 4, 1998, the *New York Times* reported that a 1997 classified DOD report alleged that Space Systems/Loral (part of Loral Space & Communications) and Hughes Electronics' satellite manufacturing division (then a subsidiary of General Motors; now Boeing Satellite Systems) provided technical information to China that improved the reliability of Chinese nuclear missiles. The assistance was provided in the wake of the February 1996 INTELSAT 708 launch failure (see above). The INTELSAT satellite was built by Loral, which participated in an inquiry into the accident at the request of insurance companies seeking assurances that the Chinese had correctly diagnosed and solved the cause of the failure. Loral formed a review committee that included representatives of other satellite companies, including Hughes. According to Loral, the review committee did not itself investigate the accident, but listened to Chinese officials explain their investigation and then wrote a report. Loral conceded that a copy of the report was given to the Chinese before it was provided to the State Department, in violation of Loral's internal policies. Loral says it notified the State Department when it learned that the Chinese had been given a copy. According to media sources, DOD's 1997 report says that the companies provided technical information in violation of Loral's export license. The companies insist they did not violate the licenses. The Justice Department investigated, and expanded the probe to include Hughes' response to the 1995 APStar-2 failure. A grand jury reportedly was empaneled in 1999. The government reached a civil settlement with Loral on January 9, 2002 where Loral agreed to pay a $14 million civil fine, and spend $6 million on strengthening its export compliance program. On December 26, 2002, the State Department charged Hughes Electronics and Boeing Satellite Systems with 123 export violations. The companies settled with the government on March 5, 2003, accepting a civil penalty of $20 million in cash, and $12 million in credits for money already spent ($4 million), or that will be spent ($8 million), on export program enhancements.

Many hearings on the "Loral/Hughes" issue were held by various House and Senate committees. In addition, the House established the Select Committee on U.S. National Security and Military/Commercial Concerns with the People's Republic of China, chaired by Representative Cox. The Cox committee concluded that Hughes and Loral deliberately transferred technical information and know-how to China during the course of accident investigations. The committee investigated other cases of China acquiring other U.S. technical information and made 38 recommendations (see CRS Report RL30231).

The FY2000 DOD authorization act (P.L. 106-65) included language implementing many of the Cox committee recommendations. In brief, the Department of Justice must notify appropriate congressional committees when it is investigating alleged export violations in connection with commercial satellites or items on the munitions list if the violation is likely to cause significant harm or damage to national security with exceptions to protect national security or ongoing criminal investigations; companies must be provided with timely notice of the status of their export applications; enhanced participation by the intelligence community in export decisions is required; adequate resources must be provided for the offices at DOD and the State Department that approve export licenses; individuals

providing security at overseas launch sites do not have to be DOD employees, but must report to a DOD launch monitor; and DOD must promulgate regulations concerning the qualifications and training for DOD space launch monitors and take other actions regarding those monitors and the records they maintain.

In February 1999, the Clinton Administration denied Hughes permission to export two satellites to China for launch. Export permission for those satellites (called APMTs) had been granted in 1997, but Hughes changed the spacecraft design, necessitating new export approval. That application was denied. On May 10, 2000, the White House made its first certification to Congress under the new process detailed in the FY1999 DOD authorization bill, approving the export to China of satellite fuels and separation systems for the Iridium program. On August 18, 2000, the State Department stated it would continue the suspension of a technical assistance agreement for Loral regarding launch of the Chinasat 8 satellite because the concerns that initiated the suspension in December 1998 had not been rectified. In January 2001, *Space News* reported that the Chinasat 8 export application was returned to Loral without action.

In April 2000, it became known that Lockheed Martin also was under investigation, in this case for performing a technical assessment, without an export license, of a Chinese "kick motor" used to place a satellite into its final orbit. On June 14, 2000, the State Department announced it had reached agreement with Lockheed Martin involving $13 million in penalties — $8 million that the company will pay over a four-year period and $5 million that was suspended and that the company can draw upon to fund a series of remedial compliance measures specified in the consent agreement.

Satellite Exports to China: 2001-Present. In July 2001, Senators Helms, Thompson, Shelby, and Kyl wrote to President Bush reportedly asking the President not to grant waivers for the export of satellites to China. As noted earlier, such waivers are required under the FY1990-91 Foreign Relations Authorization Act (P.L. 101-246). At the time, attention was focused on two European companies (Astrium and Alenia Spazio) that had built satellites for two multinational satellite organizations (INTELSAT and EUTELSAT, respectively) that were scheduled for launch by China. The satellites contain U.S. components. In August 2001, INTELSAT canceled its contract with Astrium for the APR-3 satellite, citing several factors, including the delay in obtaining U.S. export approval. EUTELSAT switched the launch of its satellite to Europe's Ariane. Other satellites being manufactured by U.S. companies, however, such as Chinasat 8 and another being built by Loral (Apstar-5, for APT Satellite Co.), or containing U.S. components may require waivers in the future (see CRS Report 98-485 for a list of pending satellite exports). The FY2002 Commerce, Justice, State Appropriations Act (P.L. 107-77), and the FY2003 Consolidated Appropriations Resolution (P.L. 108-7) require 15 days notice to Congress before processing licenses for exporting satellites to China.

Russia. U.S. policy prohibited U.S.-built satellites from being exported to the Soviet Union. Following the collapse of the Soviet Union, President George H. W. Bush said he would not oppose Russia launching an International Maritime Satellite Organization (Inmarsat) satellite and the United States would negotiate with Russia over "rules of the road" for future commercial launches. Discussions in the fall of 1992 led to agreement in principle in May 1993; the agreement was signed on September 2, 1993, after Russia agreed to abide by the terms of the MTCR (see below). On January 30, 1996, the countries amended

the agreement. Prior to Russia's first launch of a U.S.-built satellite, a Technology Safeguard Agreement among the United States, Russia, and Kazakstan (where the launch site is located) was signed in January 1999. A similar agreement for launches from Russia's Plesetsk, Svobodny, and Kapustin Yar launch sites was signed in January 2000.

The 1993 agreement was signed only after Russia agreed to comply with the MTCR in a case involving a Russian company, Glavkosmos, that planned to sell rocket engine technology to the Indian Space Research Organization (ISRO). The United States declared it violated the MTCR and imposed two-year sanctions against Glavkosmos and ISRO. In June 1993, the United States threatened to impose sanctions against Russian companies that did business with Glavkosmos. The two countries finally agreed that Russia would cease transferring rocket engine technology (the engines themselves were not at issue) to India.

As noted, on September 10, 1997, the *Washington Times* published a story that Russian and Chinese entities, including the Russian Space Agency, were selling missile technology to Iran. In July 1998, Russia announced that it had identified nine entities that might be engaged in illegal export activities. The United States imposed sanctions against seven of them on July 28 and three more entities on January 12, 1999. The State Department said the United States would not increase the quota on geostationary launches that Russia could conduct under the 1996 agreement unless Russian entities ceased cooperating with Iran's ballistic missile program (see CRS Report 98-299). The launches are conducted primarily by a U.S.-Russian joint venture composed of Lockheed Martin and Russia's Khrunichev and Energia, companies that were not among those sanctioned. Lockheed Martin was anxious to have the quota raised to 20 and eventually eliminated. On July 13, 1999, the White House agreed to raise the quota to 20. The agreement that set the quotas was due to expire on December 31, 2000, but the White House eliminated the quota on December 1 (*Wall Street Journal*, December 1, 2000, p. A4).

Ukraine. Ukraine offers commercial launch services, chiefly as part of the Sea Launch joint venture among Boeing, Ukraine's Yuzhnoye, Russia's Energomash, and Norway's Kvaerner. The Sea Launch vehicle consists of a Ukranian two-stage Zenit rocket with a Russian third stage. The vehicle is launched from a mobile ocean oil rig built by Kvaerner. The rig is stationed in Long Beach, CA, where the launch vehicle and spacecraft are mated, and then towed into the ocean where the launch takes place. The United States and Ukraine signed a bilateral trade agreement in February 1996, that would have expired in 2001, but President Clinton terminated it on June 6, 2000, in recognition of "Ukraine's steadfast commitment to international nonproliferation norms." The first successful commercial launch was in October 1999. In 1998, Boeing agreed to pay $10 million for not abiding by export regulations in its dealings with Russia and Ukraine. Separately, Ukraine signed an agreement with the U.S. company Globalstar to launch its satellites on Zenit from Baikonur. The one attempt failed in September 1998, destroying 12 Globalstar satellites. Sea Launch announced plans in October 2003 to offer launches from Baikonur using Zenit beginning in 2005; the effort is called Land Launch.

India. India conducted its first successful orbital space launch in 1980. Its ASLV and PSLV launch vehicles can place relatively small satellites in low Earth orbit. India conducted its first commercial launch (of German and South Korean satellites) using the ASLV to low Earth orbit in May 1999. India is developing a larger vehicle (GSLV) capable of reaching geostationary orbit. Two test launches have been completed. The GSLV uses

Russian cryogenic engines that were the subject of a dispute between the United States and Russia (discussed earlier).

Japan. Japan successfully conducted the first launch of its H-2 launch vehicle in 1994, the first all-Japanese rocket capable of putting satellites in geostationary orbit. Previous rockets used for this purpose were based on U.S. technology and a 1969 U.S.-Japan agreement prohibited Japan from launching for third parties without U.S. consent. With the H-2, Japan was freed from that constraint. H-2 was not cost effective, and encountered technical problems that led the Japanese government to abandon it in 1999. A new version, H2A, successfully completed its first launch in August 2001. In 2002, the Japanese government announced that it will privatize production of the H2A by 2005. Mitsubishi Heavy Industries has taken over development and marketing. H-2A launches are conducted from Tanegashima, on an island south of Tokyo. In June 1997, the Japanese government reached agreement with the fishing industry to allow more launches from Tanegashima. Fishermen must evacuate the area near the launch site during launches. The agreement extends from 90 to 190 the number of days per year that launches may be conducted, and permits up to eight launches a year instead of two.

Satellite Exports: Agency Jurisdiction and Other Issues

Between 1992 and 1996, the George H. W. Bush and Clinton Administrations transferred responsibility for decisions regarding export of commercial satellites from the State Department to the Commerce Department. A January 1997 GAO report (GAO/NSIAD-97-24) examines that decision. In response to concerns about the launch of satellites by China (discussed above), Congress directed in the FY1999 DOD authorization bill (P.L. 105-261) that export control responsibility be returned to the State Department effective March 15, 1999. Which agency should control these exports remains controversial.

In the 108th Congress, H.R. 1950 (the FY2004 State Department Authorization Act) as reported from the House International Relations Committee (HIRC, H.Rept. 108-105, Pt. 1) would have left the decision on agency jurisdiction to the President if the export is to a NATO country or major non-NATO ally, while exports to China would remain under State Department jurisdiction. The House Armed Services Committee rejected that language in its markup of H.R. 1950 (H.Rept. 108-105, Pt. 3). As passed by the House, H.R. 1950 does not include that language.

Some of the controversy reflects concerns of the aerospace and space insurance industries that the new regulations are being implemented too broadly and vigorously. DOD officials and others have cited potential harm to the U.S. defense industrial base if U.S. exports are stifled, too. One concern is the length of time needed to obtain State Department approval. Section 309 of the FY2000 State Department authorization act (incorporated into the FY2000 Consolidated Appropriations Act, P.L. 106-113) directed the Secretary of State to establish an export regime with expedited approval for exports to NATO allies and major non-NATO allies. The new rules took effect July 1, 2000. In May 2000, the State Department reportedly notified France that it would not apply strict technology export control on satellites to be launched by Ariane (*Space News*, May 29, 2000, p. 1). The Security Assistance Act (P.L. 106-280) reduced from 30 days to15 days the time Congress has to review decisions on exporting commercial communications satellites to Russia,

Ukraine, and Kazakhstan, making the time period the same as for NATO allies, but H.R. 1950, as passed by the House, would change that time period back to 30 days.

The Satellite Industry Association (SIA) released figures in May 2001 showing U.S. satellite manufacturers losing market share to foreign companies. SIA and others attributed that loss in part to the shift in jurisdiction to State, which they assert creates uncertainty for satellite customers over when and whether export licenses will be approved. For 2001, however, U.S. companies won 19 of the 22 commercial satellite manufacturing contracts world-wide (*Space News*, January 21, 2002). U.S. companies won three of the four new satellites ordered world-wide in 2002 (*Space News*, January 13, 2003). For 2003, the U.S. share was 9 of the 16 new satellite orders (*Space News*, March 22, 2004). A floor amendment to H.R. 1950 to exempt transfers of marketing information for commercial communication satellites from export license requirements for potential sales to NATO countries, Japan, Australia, and New Zealand was defeated. Similar language is included in S. 2144.

LEGISLATION

H.R. 1950 (Hyde)/S. 2144 (Lugar)

State Department/Foreign Affairs Authorization Act. H.R. 1950 reported from House International Relations Committee (H.Rept. 108-105, Parts 1 and 2); from House Armed Services Committee (Part 3); and Energy and Commerce Committee (Part 4); passed House July 16, 2003. S. 1161 reported from Senate Foreign Relations Committee May 29, 2003 (S.Rept. 108-56); incorporated into S. 925, Division B during Senate debate July 9, 2003; new bill, S. 2144, reported from Senate Foreign Relations Committee March 18, 2004 (S.Rept. 108-248).

H.R. 3752 (Rohrabacher)

Commercial Space Launch Amendments Act of 2004. Reported from Committee on Science March 1 (H.Rept. 108-429); passed House March 4.

H.R. 4200 (Hunter) S. 2400 (Warner)

FY2005 DOD authorization bill. H.R. 4200 reported from House Armed Services Committee May 14, 2004 (H.Rept. 108-491). Passed House May 20. S. 2400 reported from Senate Armed Services Committee May 11, 2004 (S.Rept. 108-260); passed Senate June 23.

H.R. 4613 (Lewis)/S. 2559 (Stevens)

FY2005 DOD appropriations bill. Reported from House Appropriations Committee June 18, 2004 (H.Rept. 108-553); passed House June 22. Reported from Senate Appropriations Committee June 24 (S.Rept. 108-284); passed Senate June 24.

S. 1260 (McCain)

Commercial Space Transportation Act of 2003. Reported from Senate Commerce Committee July 24, 2003 (S.Rept. 108-111).

S. 2541 (McCain)

FY2005-2009 NASA authorization bill. Introduced June 17, 2004; referred to Commerce, Science, and Transportation Committee.