

COMMENTS ON THE COMMERCIALIZATION OF EXPENDABLE LAUNCH VEHICLES

by

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ABSTRACT

The President's national space policy encourages private sector investment and involvement in civil space activities. Last November, the President designated the Department of Transportation as lead agency for the commercialization of expendable launch vehicles. This presents a substantial challenge to the United States Government, since the guidelines and requirements that are set now will have great influence on whether American firms can become a viable competitive industry in the world launch market. There is a dual need to protect public safety and free the private sector launch industry from needless regulatory barriers so that it can grow and prosper.

BACKGROUND

In recent months, there has been considerable public attention focused on commercialization of expendable launch vehicles (ELVs). Actions taken by the President have made it clear that as a nation, we will encourage the emergence and development of a viable private sector launch business. There is a long history of public policy that supports the move to commercially-owned and operated expendable launch vehicles. NASA and DOD have been active in the area of space transportation for twenty-five years; it has been a national policy for almost half that time that private sector space endeavors are to be encouraged by making available government-operated space transportation on a reimbursable basis.

There now appears to be a number of opportunities for commercial space ventures that can be fully managed and operated by the private sector. Most of these are derived from work sponsored by NASA, which has spawned these developments by encouraging and conducting scientific and high technology experiments, and making their findings readily available for spin-off into commercial ventures. This reflects long standing patterns of government-sponsored research and development and subsequent private sector commercialization in many fields. In turn, technological innovation and productivity improvements have led to increased economic growth and a higher standard of living for our country.

Many justifications have been suggested for why the nation needs a commercial expendable launch vehicle industry.

- An ongoing, efficient, private sector ELV industry will provide a versatile national launch capability at little or no cost to the Government.
- An expendable launch vehicle industry is needed to ensure the United States leadership position in this high technology, rapidly changing market, by maintaining our ability to compete directly with Ariane as well as the Russian and Japanese expendable launch vehicle offerings.
- Expendable launch vehicles can be dedicated to a single mission, placing the payload desired into the particular orbit desired at the precise time desired.
- For many applications expendable vehicles are inherently the most economical way to launch. They don't require the safety features of manned flight nor is there an opportunity cost for the time of payload integration.
- Competition provided by an ongoing, efficient private ELV industry could foster new technological developments in space transportation. It has been the government's experience that competition inevitably spawns innovation, creativity and efficiency.
- Some proposed enterprises may prefer to go into partnership with a private firm rather than the United States government to mount their space oriented activities.

On May 16, 1983, President Reagan issued his policy on Commercialization of Expendable Launch Vehicles. ^{1/} This statement further enlarged his National Space Policy which encourages private sector investment and involvement in civil space activities. It states that our government will encourage and facilitate commercialization of an American expendable launch vehicle industry.

The policy indicates that it is in the national interest to commit this country to a two-fold approach to space transportation: a government-owned and operated Shuttle, and a privately-owned and operated ELV capability.

On November 16, the President designated the Department of Transportation as the lead agency for commercializing expendable launch vehicles. In his State of the Union address on January 25, 1984 ^{2/} he noted that:

"The market for space transportation could surpass our capacity to develop it. Companies interested in putting payloads into space must have ready access to private-sector launch services."

"The Department of Transportation will help an expendable launch services industry to get off the ground. We will soon implement a number of executive initiatives, develop proposals

to ease regulatory constraints and, with NASA's help, promote private sector investment in space."

Three days later, in his Saturday radio address of January 28, 3/ the President reaffirmed his commitment to encouraging American industry to move quickly and decisively into space. He said,

"Obstacles to private sector space activities will be removed, and we'll take appropriate steps to spur private enterprise in space.

"We expect space-related investments to grow quickly in future years creating many new jobs and greater prosperity for all Americans. Companies interested in putting payloads into space, for example, should have ready access to private sector launch services.

He directed Transportation Secretary Dole, to

"work to stimulate the private sector investment in commercial, unmanned space boosters. We need a thriving, commercial launch industry. NASA, along with other departments and agencies, will be taking a number of initiatives to promote private sector investment to ensure our lead over current and potential foreign competitors. So, we're going to bring into play America's greatest asset: the vitality of our free enterprise system."

An Executive Order will soon be issued to implement this policy. It will draw heavily on the recommendations of the National Security Council's interagency working group on commercialization of expendable launch vehicles. These include authorization for the Department of Transportation:

- to act as a focal point for expendable launch vehicles contacts with the federal government;
- to promote and encourage expendable launch vehicle operations;
- to lead other agencies in expediting their licensing of launches and ranges;
- to identify federal statutes, treaties, regulations, and policies that may adversely affect expendable launch vehicle commercialization and should be changed; and
- to conduct appropriate planning concerning federal activities related to expendable launch vehicle commercialization.

The working group also recommended that all involved agencies review and revise their regulations and procedures, to eliminate unnecessary regulatory obstacles to the development of commercial expendable launch vehicle operations, and to ensure that essential regulatory procedures and requirements are administered as efficiently as possible.

Thus, the Department of Transportation has assumed the role of "new kid on the block" in the space business and has been asked to share with this symposium some observations on commercialization of expendable launch vehicles.

To any observer, the dynamics and the accomplishments of the space business are astounding. The practicalities of developing a viable commercial expendable launch vehicle business, however, are obviously more complicated. Our corporate world has long demonstrated that it is capable of making business decisions that involve extraordinary technical complexities and high financial stakes. This is pioneering in every sense of the word. In order to proceed, they must know what government will do when they are ploughing new ground. It will be the Department of Transportation's role to make sure that the government gets out of the way of the economic development of this industry, that we make the licensing process as simple as it can be, and that we encourage and facilitate the industry.

REGULATORY THICKET

Perhaps the most immediate problem confronting the industry is what Secretary Dole has described as the thicket of regulations and clearances. ^{4/} The present federal licensing process is disorganized, expensive and time consuming. Many regulations that affect space launches came about for purposes unrelated to the development and operation of ELVs.

There has been relatively little experience with licensing privately-owned and commercially-operated space launches in the United States. Recently however, we have had two instances of private sector firms having worked their way through the variety of government reviews and requirements imposed -- Space Services, Inc. and Starstruck Inc. Prior to their entry on the scene, most launches had been government sponsored, and licensing was not an issue. Their experiences have been amply detailed in several public documents ^{6/} and will just be summarized here as reconstructed by the DOT staff, to be illustrative of how difficult the process can be. It should be noted from the start that these two small and innovative companies chose to challenge the conventional approach to space launches by not using established national ranges and by using their own rockets. One launched from a private island, the other is launching from international waters off the coast of California.

Both companies initiated contacts with the government on their own to get approval to conduct test launches. Although it was new ground for all concerned, they found the personnel in the agencies to be extremely cooperative and helpful. Nevertheless, their experience draws attention to what seems to be a formidable process.

As newcomers to the Federal process, Space Services, Inc. (SSI) and Starstruck failed to identify all the Federal players which had responsibility for approving some aspect of their respective launches. Already the number of agencies participating in the approval process, directly or indirectly, exceeds those originally identified by the two companies. The current list of involved Federal agencies includes: The Department of State (Office of Munitions Control), NASA, DOD, Air

Force, NORAD (separate from USAF), Navy, Office of the Secretary of Transportation, FAA, the Coast Guard, Materials Transportation Bureau, Bureau of Motor Carrier Safety, Bureau of Alcohol, Tobacco and Firearms, Federal Communications Commission, as well as state and local officials. It should be noted, that while each of these agencies played a role in the launch approval process, their level of involvement varied widely from simple coordination to actual review and approval.

The number of specific licenses or exemptions required depends on a number of factors, (e.g. whether the launch is in the United States territory or in international waters, whether imported rockets are used, etc.) Key licenses or exemptions include:

- Export License. Space launches are currently treated as an export of a product from earth to space. A launch firm must submit a formal application to the Department of State's Office of Munitions Control (OMC) for a "License for Temporary Export of Unclassified Defense Articles". The State Department reviews the proposed export from the standpoint of national interest, foreign policy and national security. DOD provides the national security review and may perform a cursory technical review as well. NASA reviews the application from the standpoint of assessing risk and technological feasibility. If the launch occurs in international waters, the OMC also asks for an FAA review.

Because of the multiple agency reviews, this single license has taken between six and seven months to obtain. One applicant received its approval a day before the launch. The other received its approval one month before its launch.

- Frequency Application. To operate its communications and telemetry equipment, a launch firm must apply to the FCC for a radio operator's license and frequency assignments. As many as eight to twelve different frequencies could be required, some of which need to be dedicated solely to this event. Temporary use of frequencies appears to involve a simple application to the FCC. The approval process, in this case, has been fairly straight forward and prompt.
- Arms Import License. If any explosive devices are imported, such as was the case for SSI, which used imported rockets to calibrate its radar, a license is required from the Treasury's Bureau of Alcohol, Tobacco and Firearms.
- Transport of Hazardous Materials. Moving the rockets to their launch sites entails the transportation of hazardous materials in a manner other than specifically prescribed by Federal regulations. Launch firms must seek an exemption from the Materials Transportation Bureau (MTB), part of the Department of Transportation, for transporting fuels or other explosive materials required for launch.

Once an exemption to a specific procedure is obtained, it continues in force until the rocket design and/or procedures change.

As part of its exemption process, MTB issues a notice of the proposed action in the Federal Register for a 30-day public comment period. MTB then coordinates the proposed exemption with affected DOT agencies. This is likely to include the Bureau of Motor Carrier Safety if shipment will be by truck, and the Coast Guard if marine craft are involved. Any affected organization may add a requirement which is then included in the exemption approval.

- Airspace Restrictions. If the launch is to be from the U.S. or its territories, it is subject directly to FAA regulations 6/ concerning the operation of rockets in American airspace. FAA's primary concern in reviewing space launch applications is the protection of public and aviation safety. FAA has direct authority to provide or deny airspace clearance and requires that it be provided with the technical details of the launch vehicle, its trajectory, and overall safety/destruct features for its review. It must assure that the launch vehicle is generally capable of the performance characteristics ascribed to it, determine how much airspace must be cleared to protect aviation safety; and assure that the launch and operation of the vehicle will not endanger members of the general public.

From these examples, it should be clear that if there is to be a commercial ELV industry, we must make it easy for firms to deal with the Government. Once assured that national security, foreign policy, environmental concerns and public safety are protected (and these must always be the concerns of the Federal government), then the next objective is to make sure the industry's economic ability to develop is not hindered by needless regulation. One aspect of this will be to provide certainty and predictability in the licensing process.

Another problem is a tendency of Federal agencies to display an overabundance of caution. The experiences of Starstruck and SSI indicate that agencies have become involved in checking many facets of the request that go beyond their jurisdiction, resulting in considerable overlapping of technical data reviews by the Government. Part of the problem is that the industry is new, and the government has not clarified what information will be essential, nor does the industry know what to provide. One set of information requirements must be established, that will serve the needs of all the agencies involved.

Two other improvements are worthy of note: it would be very useful for the industry to have one point of contact when dealing with the government, and the processing time for license applications must be expedited. Thus the challenge, and one of the primary functions of the Department of Transportation, will be to streamline the regulatory process and minimize the cost and complexity to acquire a license to launch an expendable vehicle.

OTHER ASPECTS OF COMMERCIALIZATION

The Department has encountered a broad spectrum of opinion about the prospects for a viable commercial ELV industry. Several companies have under development new launch vehicles. With varying success, they have elicited interest, and, in some cases, substantial financial backing. The Government is phasing out contract purchases of the Delta, the Atlas and Titan over the next few years, but NASA is under negotiations to provide a market for the latter two vehicles on a commercial basis.

Under commercialization, the market will dictate different sets of incentives and rewards than have been traditional in the space business. Companies will have their own money (or their financier's) at risk. They will have to establish new marketing networks. They must not only concern themselves with competing with the Shuttle and its impressive capabilities, but also with international competition from the Europeans' Ariane, Soviet Proton and Japanese launch vehicles. With payloads valued in the millions, reliability of the launch vehicle will remain as the most important criterion. Being commercial ventures, however, business will go to firms who can reduce their costs and/or supply a broad range of launching services, minimizing the headaches confronting their clients.

Quick, dependable access to space at low cost is critical to the rapid development of commercial space applications and maintaining American leadership in this area. As with all modes of transportation, the shipper should have a variety of options, and select the carrier who can deliver the payload required to the place required, at the time required, at minimum cost and at minimum risk. Our goal, at DOT, is to promote, encourage and facilitate the successful commercial ELV industry that will help bring this about.

REFERENCES

- 1/ National Security Decision Directive: "Commercialization of Expendable Launch Vehicles," May 16, 1983. (Classified For Official Use Only).
- 2/ President's State of the Union Address, January 25, 1984.
- 3/ Reagan, Ronald. "Radio Address by the President to the Nation," January 28, 1984.
- 4/ Dole, Elizabeth Hanford. "Remarks to the Sixty-third Annual Meeting of the Transportation Research Board," January 18, 1984. Washington, DC
- 5/ See Hannah, David Jr. Testimony Before the Subcommittee on Space Science and Applications, May 4, 1983. Ninety-eighth Congress, First Session, or

Nesgos, Peter D., "National Law and Commercial Activities in Outer Space. Specific Aspects of U.S. Law Applicable to Space Industrialization with Particular Emphasis on the Commercialization of Launch Vehicle Transportation," Chapter 4, September 1983
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- 6/ Aeronautics and Space. Code of Federal Regulations, Title 14, Part 101.