CHART 1

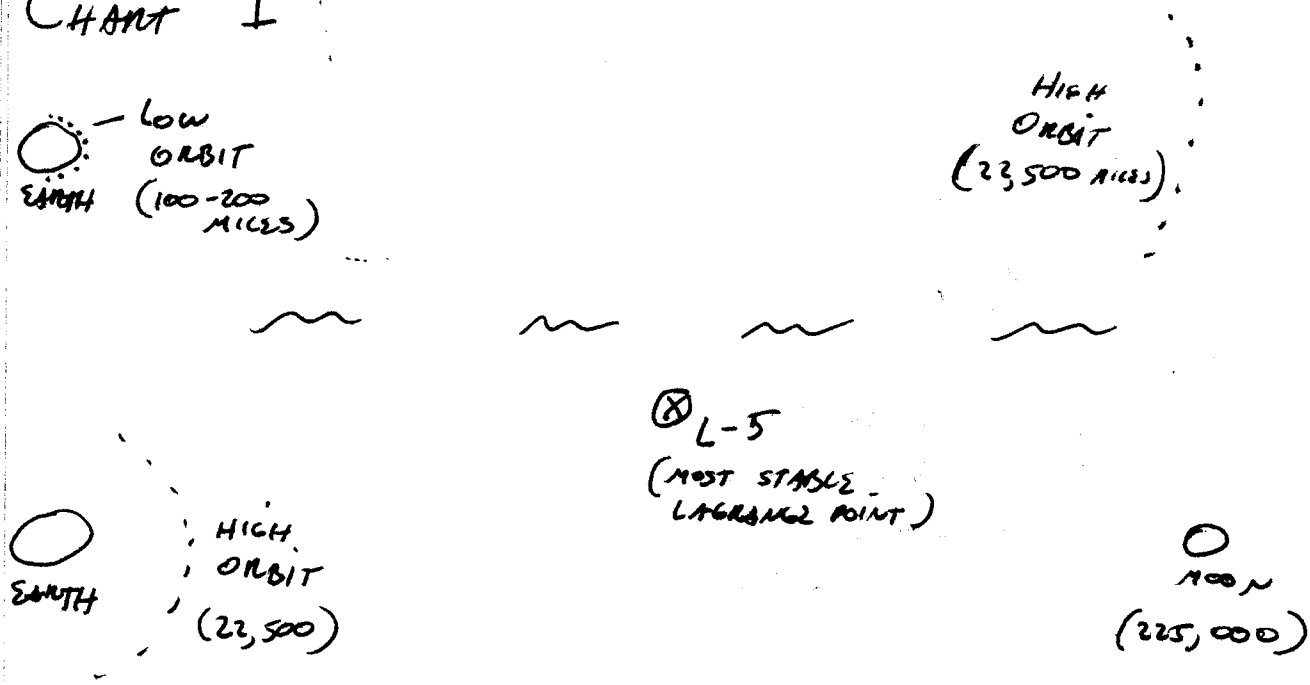

CHART 2

	NASA	AEROSPACE INDUSTRIES	OTV'S	OWNERS[1]
R+D	X	X	X	X
BUILD		X	X	X
LAUNCH	X[2]	X		
TRANSPORT	X[2]		X	
OPERATE	X[2]			X

(1) OWNERS OF SATELLITES, CARGO, & OTHER PLANETARY ENTERPRISES (MOON/ASTEROID MINING, L-5 COLONIES, ETC.)

(2) NON-PRIVATE, PUBLIC POLICY MISSIONS

OTV: AN ARGUMENT FOR THE INDEPENDENT TRADER

by Dennis C. O'Brien

A Report on

Independent Study

Submitted to the

University of California

Hastings College of the Law

June, 1985

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OTV: AN ARGUMENT FOR THE INDEPENDENT TRADER

by Dennis C. O'Brien

Introduction

This research will explore the possibilities of access into outer space in the near future. More specifically, it will look at the laws concerning commercial activity in space, highlighting the obstacles and opportunities they present.

The vehicle for this exploration, both literally and figuratively, is the OTV, or Orbital Transfer Vehicle. The OTV will travel from low orbit, where the Space Shuttle operates, to synchronous orbit and beyond. It was chosen over the ELV's (Expendable Launch Vehicles) for two reasons. First, and perhaps most remarkably, there is no regime of regulation concerning the OTV's as there is the ELV's.

Secondly, the technology for the OTV's is available, but has not been tapped. To the extent that this hesitancy results from an uncertain legal regime, the problem needs to be addressed.

The Setting

In any discussion of the laws of outer space, it is helpful to summarize the state of the ever expanding science and technology. In the last decade, the event of greatest commercial significance has been the success of NASA's Space Shuttle. From sputtering beginnings, it impressed the world in 1984 when crews not only deployed sattelites (by then routine) but refueled another and snagged two more that had gone astray on earlier flights.[1] The sight of Joe Allen, one of the smallest persons in the astronaut corps, supporting a sattelite by hand, improvising where machines had failed, stirred the hopes and imagination of many a space observer.

Soon all four shuttles will be flying, with a launch every other week. Each is more efficient than the last, and plans exist for improved and alternative launch vehicles, both here and abroad. In the United States, private ELV's supplement the Shuttle, and may soon compete with it.[2] The Europeans plan to expand the Ariane, perhaps to be crewed.[3] The Japanese are building their own launcher.[4] Many nations build sattelites for others to launch.[5] The

Soviet Union is testing a reusable vehicle, and is on the verge of permanent habitation of space.[6] And the Chinese, as in Arthur C. Clarke's book 2010, may surprise us all.

The future varies in certainty. NASA is committed to building a space station, involving separate modules, each module to be built by a company or combination from the aerospace industry.[7] Dr. Gerard O'Neill's proposal for human colonies in space and Dr. Carl Sagan's call for a joint U.S.-U.S.S.R crewed mission to Mars evidence a scientific and popular interest in even greater endeavors.[8] The institution of human travel in space, commercial or not, is firmly established, and is going to expand, perhaps rapidly.

The Laws: A First Look

Suppose, then, that one knows all of this, and wants to become involved in what he or she believes will be a fascinating, perhaps profitible, enterprise. It becomes necessary to know what laws, if any, govern access to space and activities once there.

The laws concerning access have been changing with the technology, but seem to be settling down. For simplicity's sake, we will deal only with domestic (United States) launchers, though the intrepid entrepreneur should not overlook foreign possibilities. Here, the Department of Transportation (DOT) has recently been made the lead agency

in regulating the ELV's, relying on other agencies for expertise. Their regulations (about to be finalized) aim to insure safe and peaceful use of the technology, but otherwise do not restrict entry either into the field or into space itself.[9] However, the current struggling technology provides its own limitations, and may force any OTV to be launched by the Shuttle.

Use of the Shuttle will not just go to the highest bidder. Since cargo space is limited, NASA has established priorities to determine which missions will fly. Highest priority is for those missions which will use high technology to establish new industries in space, such as drug and microchip manufacture. Lesser priority is given to missions involving secondary applications of existing technology. Least prioirity is given to non-scientific/high technology missions, such as pleasure cruises or depositing ashes in orbit.[10] Of course, as Shuttle flights become more routine, access will be greater, and lower priorities will be given greater attention. (This process may accelerate rapidly; since this research began, NASA has approved burying ashes in space.[11])

The OTV seems to fall berween priorities one and two. Although not a new technology itself, it will facilitate the development of other technologies, and is absolutely necessary for getting Shuttle passengers beyond low orbit. The only question is whether NASA will launch a private OTV

a full seven to ten years before they plan to launch their own.[12] For reasons which will be explored now, the answer seems to be yes.

The Laws: A Closer Look

The analysis begins with the laws which govern activities in space itself. The overall structure is provided by four treaties to which the United States is signotory, known popularly as the Space Treaty, Registration Treaty, Liability Treaty, and Rescue Treaty [13] The first tries to insure the peaceful use of outer space by all those who may wish to enter. The rest are specific rules applying to circumstances arising from such use. This summary is simplistic, but only two observations are essential. First, none of the treaties prohibits the entry of private enterprise into space (a point only recently conceded by the U.S.S.R.).[14] Second, the nation of origin is responsible for its vehicles and/or crew.[15] Thus, the laws of a given nation-state will govern its own citizens in space, so long as within the general framework of the treaties.

It is inevitable that the political process will address space commercialization. The most recent event in this process is the naming of a commission by President Reagan to study opportunities for private enterprise in space.[16] The political response will range from complete government divestiture and no regulation of private

companies to total government control with little or no private involvement. The two areas of United States law which will most strongly influence this response are antitrust and regulated industries.

As a model to help analyse these areas, consider this, the First Law of Space Enterprise: No company may be both planetary and inter-planetary. Low orbits are considered planetary, stable (i.e., Lagrange) and synchronous orbits are other planets. Thus, for example, Lockheed could operate on Earth, on the station, the Moon, asteoids, etc., but could not transport between the station and synchronous orbit, etc. Exception would be made for single-shot vehicles (e.g., Atlas-Centaur or an integrated upper stage putting a sattelite into high orbit).

Antitrust

This rule likely would promote the policies behind the antitrust laws better than an extension of the status quo.[17] In the latter scenario, NASA and/or DOT maintain a firm control over any new space ventures, including the OTV. The established aerospace companies, already firmly entrenched in the space station, likewise get the contracts for the OTV, aided by established business contacts and, hopefully, proven track records. Each new project would favor those who gained experience in the last. Although NASA would visibly be the first to return to geosynchronous orbit and the Moon, the established companies would come in

right behind and control any economically feasible development.

This scenario presents many dangers. Although in the short-term the operation might be more efficient than independent OTV's, long-term development probably would be slower. Such is true of any monopoly, and is the reason why efficiency is not a sufficient defense to an antitrust charge.[18] The long-term would find a government-sponsored oligopoly, with each company or combine restraining the entry of outsiders. Each would be vertically integrated, having a network of supply sources on the ground and exclusive rights to transfer materials into orbit. The resulting oligopoly would strongly influence the pace and direction of subsequent development. Space enterprise would be limited not only by NASA's politically sensitive budget, but also by the economic efficiencies of the oligopoly.

These efficiencies probably will favor slow development. The spur to innovate that competition provides would be lost. Space still would be denied the advantages of the market. Unchecked, these tendencies would produce what Justice Douglas called "a nation of clerks " extended into the heavens. Space would not be a new frontier of bold ventures, but rather a very controlled environment where nothing was tried if it threatened the oligopolistic profit structure

The proposed law produces a scenario where NASA permits

outsiders to engage in economically profitable space ventures, even if they involve "new" activities, such as the OTV, where NASA traditionally has operated exclusively. Members of the oligopoly are forbidden under the antitrust laws (enforced either by private suit or Justice Department action) from inter-planetary transportation. The likely result would be entry of several new companies which would compete to be the more efficient trans-orbital carriers. (The same antitrust laws would keep any of them from dominating the new market.) The diversity of shippers and their customers would bring real market preassures into space commerce, thus reducing costs. Ultimately, perhaps shortly, independent OTV's become more efficient than their government/oligopoly counterparts

Since entry into space would be less restrictive, the creative and explorational drives of the population would have greater expression. As the market became more viable, private parties would lead ventures to high orbit, the Moon, and beyond. The commercial structure would make non-profit or break-even projects more feasible. Economic pluralism would be established, and, with inevitable colonization, political pluralism, free from coercive economics and budgetary restraints.

Regulated Industries

In analysing the OTV as a regulated industry, two points are important at the outset. First, almost every

industry is regulated, even if only for safety. Thus even an apparent purely private venture probably will operate within some broad regulatory regime. Second, although NASA's current contract system is not conducive to opening up the space market, the agency must continue to be a prime operator in the space arena.

The reasons for NASA's importance provide an initial structure for analysing the potential legal regime. In the first place, no one can dispute that NASA represents the finest combination of humans and their technology in recorded history. Any regime must seek to preserve such a resource as indispensible to the exploration and development of outer space. Likewise, the massive investment made in aerospace by the private sector ought to be disturbed as little as possible. It is fortunate that a decision now to make the OTV independent will do little to disrupt the industry. Conversely, once the planetary/inter-planetary distinction is lost, any attempt to impose it likely will cause economic dislocation and inefficient re-organization.

A second reason for NASA's importance is its function as an economic stabilizer. By providing an alternative to the private OTV's, NASA will insure that the independents themselves don't evolve an exhorbitant oligopolistic price structure. A parallel function is served today by ComSat, a joint venture combining private capital with direct government control of rates and access.[19] Comsat

demonstrates that in a viable market (communication sattelites) with limited access (here, due to the required investment and high technology) a government-directed actor will keep prices from rising to the maximum profit margin.

NASA also would serve as a market supporter. It has already done that by providing the technology necessary for OTV's: launch vehicles, hardware, and a public/private communications system. By doing so NASA has absorbed much of the fully distributed cost (research and development, capital expenditures) of space exploration, which will allow private industry to operate at near incremental cost (use of facilities, the OTV itself). Should the private effort in space seem near collapse, yet still deemed worth saving, NASA could absorb more of the distributed costs, e g., launch charges, shared overhead. Additionally, NASA's new projects (a return to the Moon?) would provide the support structure and incentive for an expanding private OTV market.

Perhaps the most important reason for maintaining NASA as a prime force is the need for a public actor to ensure implementation of public policy in space. The paragraphs above detailed how NASA would serve the public desire for a commercial space transportation network. Other public concerns include defense, exploration, and subsidy of specific projects. The OTV's could not remain independent if they were charged with prime responsibility for implementing public policy. (Note that the OTV's still

would have some public responsibilities due to the treaties, most notably to attempt rescue of other humans in space.)

Other areas of regulation in the economy also offer instructive parallels for the OTV regime. The National Transportation Act was passed to save the nation's railroads, truckers, and water carriers from the effect of destructive competition with each other. Congress found the railroads to be an important resource, with "inherent advantages," and acted to keep truckers, with their lower capital costs, from charging lower rates on parallel routes. Barge traffic was similarly protected. In each case the government acted, with minimal regulation, to protect a desired technology within a separable market.[20] Similar reasons exist for protecting the separate OTV market, as detailed above. Note how the integrated launchers (Atlas-Centaur, inertial upper stages carried by the Shuttle) act as the "railroads," the OTV's as "truckers," in the proposed regime. Their respective inherent advantages are preserved while they compete to become the more efficient carriers.

The railroads themselves provide an analogy. They are prohibitted from owning commodities they might transport (lumber, cars, etc.). There was fear of rate preferences or other anti-competitive practices. This supports the argument that the aerospace suppliers should not become entrenched as OTV owners and/or operators.

The banking industry provides another analogy. Banks are prohibitted from getting involved in enterprises that are more than "incidental" to their core operations (e.g., a bank could not buy Montgomery Ward, as did Mobil Oil).[21] The fear is that banks, controlling both lending capital and interest rates, would overly influence if not control the economy. Money should be left in the investment pool, rather than directed into bank management's personal projects.

So too can the OTV's be protected. By limiting the OTV companies only to incidental ground enterprises, the legal regime will encourage using any profits to develop space further, rather than bailing out some ground operation. The prime example of potential abuse would be the airlines; being so competitive, any large ones which flew OTV's would shift income so as to maintain inefficient operations and stifle competition. Theoretically, OTV owners also could drain all profits and spend them frivolously, but the current corporate tax laws favor pumping the money back into the company (60% duduction of gross income if not paid as dividends). Additionally, OTV operators could be given the same leeway as banks, an allowance that 10% of their business could be beyond even incidentally related, so long as within the operator's managerial expertise.

Conclusion

NASA has worked extraordinarily well in furthering human involvement in space. However, reliance on the space agency's contract system of involving private enterprise likely will lead to domination by the aerospace industry of any future development. The advantages of competition would never materialize; the pace of development would depend on an oligopolistic profit structure and an unpredictable NASA budget.

A legal regime which allowed for independent OTV's in a segregated market would tap the capital and dynamics of the private market place. By separating inter-planetary companies from planetary ones, the regime encourages re-investing space profits in further space development while protecting the market from anticompetitive forces. The resulting commercial structure will make non-profit or marginal profit operations more feasible, while helping generate economic and political pluralism in space. NASA would remain a prime actor to ensure that public policies concerning space were carried out.

OTV's should be granted the status of independent traders. If it is not done now, forces will entrench, and an opportunity will be lost forever.

Footnotes

1. Generally, "Mission Bolsters Commercial Viability," Craig Covault, Aviation Week and Space Technology, Sept.10, 1984, p.95. The Allen rescue mission occurred during STS-19/51A, launched 11-8-84.

2. See, e.g., the Supplemental Information provided in proposed Department of Transportation regulations for private launch vehicles, 14 CFR Ch.III (reserved) (OST Docket Number 42885; Notice 85-3) published in the Federal Register, Vol.50, No.37, Feb.25, 1985.

3. "French Fix Hermes Mini-Shuttle Size," Aviation Week and Space Technology, June 11, 1984, p.18.

4. Referred to now as J-2. A crewed version could be operable in the mid/late-1990's, about the same time as the Europeans.

5. For an advanced example, see "Germany, Italy Propose Space Station," Jeffrey M. Lenorovitz, Aviation Week and Space Technology, Feb.20, 1984, p.55.

6. "Shuttle in the Soviet Sky," Frank Yacenda, Countdown, Vol.3, No.4, p.10 (April 1985). Also, "Soviets Emphasize Station Booster Efforts," Aviation Week and Space Technology, Jan.23, 1984, p.26.

7. "NASA Preparing 412 Space Station Contracts," Craig Covault, Aviation Week and Space Technology, Sept.17, 1984, p.16

8. Dr. Gerard O'Neill, currently president of Geostar Corp. and a member of the new space commission (infra), represents just one of many goups/societies working toward space colonization. Dr. Carl Sagan, creator of the Cosmos series, recently has urged a joint U.S./U.S.S.R. great mission as a way of encouraging co-operation and easing tensions between the superpowers.

9. "Specifically, the regulatory regime for launch activities must provide firm assurances that such activities not only pose no unreasonable risk to the public but that routine launch activities can in factbe conducted safely. Moreover, a specialized component of the licencing process must focus specific attention on international treaty obligations and the foreign policy and national security dimensions of proposed launch activities. Finally, the government must oversee launch activities in a manner that provides the industry with the certainty crucial to

effective planning and preparation and the flexibility necessary to allow continued growth and innovation." Proposed DOT regulations, 14 CFR Ch. III (reserved)(OST Docket Number 42885;Notice 85-3), published in the Federal Register, Vol.50, No.37, Feb.25, 1985.

10. NASA regulations as explained at Hastings Law School, San Francisco, Cal., February, 1985, by legal counsel from the NASA-Ames Research Center in northern California.

11. "Buy Now, Fly Later: Space Burials," San Francisco Chronicle, March 14, 1985. See also "$1 Million Fare For 3-Day Orbit," San Francisco Chronicle, May 9, 1985, p.34.

12. "NASA's Master Plan," Thomas O'Toole, Omni, Vol.7, No.3, Dec.1984, p.70.

13. (A) Space Treaty: Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies. Signed January 27, 1967.

(B) Registration Treaty: requires all nations to register any vehicle launched into space with an international agency.

(C) Liability Treaty: Treaty for Liability for Damage Caused by Objects Launched into Outer Space. Ultimately, nations are liable, so they must themselves require private operators to be sufficiently insured.

(D) Rescue Treaty: Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects launched into Outer Space.

14. Comments of Dr. Jack Glazer, chief legal counsel for NASA-Ames Research Center, presentation at Hastings Law School, February 1985.

15. "Regulating Corporate Activities in Outer Space," Freeman and Inadomi of University of California, Davis. Article soon to be published. Advanced sheets available at NASA-Hastings research project, San Francisco. To call the present summary simplistic is an understatement; the Freeman/Inadomi article is the most thorough summary to date of the current legal regime, and saved this author much work. However, it did not explore the antitrust laws or compare regulated industries. The present short summary serves mainly as a basis for research into these.

16. "Reagan Picks Space Goal Panel - Long-Term Civilian Projects," San Francisco Chronicle, March 30, 1985, p.6.

17. United States antitrust law is derived from federal

statutes which base their authority on the Commerce Clause of the Constitution. The earliest relevant statute is the Sherman Antitrust Act of 1890, which states, "[e]very contract, combination in the form of trust or otherwise, or conspiracy, in restraint of trade or commerce among the several states, or with foreign nations, is declared to be illegal. . . . Every person who shall monopolize, or attempt to monopolize, or combine or conspire with any other person or persons, to monopolize any part of the trade or commerce among the several States, or with foreign nations, shall be deemed guilty of a felony . . . ." 15 U.S.C. 1-2 (Sherman Act 1-2).

The other relevent statute is the Clayton Act of 1914 as amendedby the Celler-Kefauver Anti-Merger Act of 1950. The Act forbids the acquisition of stack or other assets, or making agreements with others, where "the effect . . . may be substantially to lessen competition, or tend to create a monopoly."

18. For an excellent summary of the policies considered in the creation of ComSat and the legislative response, see Harvey J. Levin, "Organization and Control of Sattelite Communications," 113 U.Pa.L.Rev. 315-57 (1965), excerpted in Antitrust and Regulatory Alternatives, Schwartz and Flynn, Foundation Press, 1977, p.836.

19. "Possible economies cannot be used as a defense to illegality. Congress was aware that some mergers which lessen competition may also result in economies but it struck the balance in favor of protecting competition." Federal Trade Commission v. Proctor & Gamble, 386 U.S. 568, 87 S.Ct. 1224, 18 L.Ed.2d 303 (1967) Justice Douglas goes on to cite the vertical integration and market analysis in Brown Shoe Co. v. United States, 370 U.S 294, 32 S.Ct, 1502 8 L.Ed.2d 510 (1962), written by Chief Justice Warren.

20. "It is hereby declared to be the national transportation policy of the Congress to provide for fair and impaartial regulation of all modes of transportation subject to the provisions of this Act, so administered as to recognize and preserve the inherent advantages of each; to promote safe, adequate, economical, and efficient service and foster sound economic conditions in transportation and among the several carriers; . . .all to the end of developing, coordinating, and preserving a national transportation system by water, highway, and rail, as well as other means, adequate to meet the needs of the commerce of the United States, of the Postal Service, and of the national defense." Preamble to the Interstate Commerce Act, 54 Stat. 899, 49 U.S.C.A. Ch.1, historical note. Notice that the phrase "as well as other means" can include the OTV's, and might authorize

implementing a new regulatory regime without further Congressional action

21. Bank Holding Company Act of 1956, amended in 1970, 12 U.S.C. 1841-1849.

Afterward

This paper is the end product of a year of independent study. Originally I had intended to research the possibility of United Nations involvement in space, allowed under the Space Treaty. But the more I read, the more I became convinced that private ownership not only was more feasible, but also promoted many public policy concerns.

I became committed when NASA's Dr. Glazer suggested in February of this year the possible antitrust aspects of space development. He had in mind a joint venture of business-government-university, organized under small business laws. I decided to investigate open-ended private involvement within a general regulatory scheme. I suggest that economic forces will favor, if not demand, the latter.

This research would have been impossible without the NASA-Hastings Research Project. Along with Dr. Glazer and Dr. George Sloup, legal counsels for the NASA-Ames research center, the Project provides a foundation of information and expertise crucial for the next quantum leap of human involvement in space.

In addition, I must acknowledge the concept of the independent trader, which I first read in The Foundation science fiction trilogy by Isaac Asimov. It was my first exposure, many years ago, to the relationship between government, economics, and technology. Hopefully the new independent traders will have as meaningful effect on

encouraging the exploration and development of space as did his.

Like most authors, I am disatisfied with the report in its current form. Time and circumstance have forced me to submit a first "final" draft. There are certain particular shortcomings that stand out, e.g., I simply cannot find the citation for the Justice Douglas "nation of clerks" quote. However, most other shaky citations involve easily ascertainable facts. Hopefully the reader's personal knowledge will help verify the assertions.

Additionally, almost every sentence in the report is a subject for future research. What is the definable market? How extensive is the oligopoly? Will the new regulations require Congressional action? Does the proposal really serve public policy concerns? The reader can seek some assurance in the knowledge that this subject likely will involve me for much of my life, and future reports should be forthcoming.

This research is motivated by my personal interest in space. The reader should not view this as a source of prejudice, but as evidence of the growing number of individuals interested in space flight. More than anything, it is this interest which cries out for fair access to space, and asks to be accomodated.

NASA

National Aeronautics and
Space Administration

Washington, D.C.
20546

AUG 19 1985

Reply to Attn of: I

Mr. Dennis O'Brien
1547 Clay Street, #206
San Francisco, CA 94109

Dear Mr. O'Brien:

The President has referred your proposal of June 16, 1985, to me for review and response. I have read with interest your proposal wherein you suggest that legislation be drafted and enacted which would permit only so-called independent entities to own and operate Orbital Transfer Vehicles (OTV's). Neither NASA nor the current aerospace industry would be permitted to own and operate reusable OTV's, with the exception, apparently, that NASA could own and operate reusable OTV's solely for its own governmental purposes.

At this time, I am not prepared to recommend to the Administration that legislation be enacted which would prohibit the current aerospace community from developing, owning and operating an OTV with their own funds. From my point of view it would be premature to do so and not consistent with our current position. It has been a major thrust of this office to persuade the industrial community (including the aerospace community) to invest its funds in the commercial uses of space.

Be assured that your proposal, as well as other options to encourage the commercial uses of space, will continue to receive our attention. We appreciate your interest in the Space Program. It deserves your attention and ingenuity, and I hope that you continue your interest, analysis and study.

Sincerely,

Isaac T. Gillam

Isaac T. Gillam IV
Assistant Administrator
for Commercial Programs