BUSINESS PLAN

THE VIRGINIA SPACE FLIGHT CENTER

WALLOPS ISLAND, VA

The Virginia Commercial Space Flight Authority

December 1997

- CENTER FOR INNOVATIVE TECHNOLOGY
- NASA
- OLD DOMINION UNIVERSITY

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EXECUTIVE SUMMARY

VIRGINIA SPACE FLIGHT CENTER

1. Purpose

The Virginia Commercial Space Flight Authority (VCSFA) was established on July 1, 1995 and codified at Sections 9-266.1 et seq., Code of Virginia. It is governed by an eleven person Board of Directors representing industry, state and local government and academia. VCSFA has designated the Center for Commercial Space Infrastructure as its Executive Directorate and Operating Agent. ***This Business Plan has been developed to provide information to prospective customers, prospective investors, state and federal government agencies, the VCSFA Board and other interested parties regarding development and operation of the Virginia Space Flight Center (VSFC) at Wallops Island.*** The VSFC is an initiative sponsored by VCSFA to achieve its stated objectives in the areas of economic development and education.

Further, development of the VSFC is in keeping with the state's economic goals set forth in *Opportunity Virginia*, the strategic plan for jobs and prosperity, which are to:

- Strengthen the rapidly growing aerospace industry in space based services including launch services, remote sensing, satellite manufacturing and telecommunications

- Capitalize on intellectual and technical resources throughout the state and become a leader in the development of advanced technology businesses

2. The Virginia Space Flight Center

The VSFC is a multifaceted project which involves two primary business segments: a multi-user Spaceport and a Center for Excellence in research and education of aerospace related endeavors. It is intended that it be a regional effort, involving several states with a stake in aerospace development and education.

The Spaceport will provide space launch facilities and support services to commercial, government and scientific/academic customers, on a fee basis. It will support launch vehicles with solid fueled boost stages capable of achieving suborbital and orbital missions with payloads of up to 8,500 pounds. The Spaceport will operate in partnership with NASA and the commercial space industry to provide timely, low cost, highly reliable access to space.

The Center for Excellence, a consortium of industry, government and academia, will provide technical/vocational, secondary and higher education opportunities relating to the technology and processes involved in aerospace activities. It is envisioned that the NASA, Wallops Flight Facility

and the VSFC Spaceport activities would provide a hands-on laboratory to support the learning process.

The Center will also generate research opportunities in aerospace related areas, in partnership with industry, government and academia. It is envisioned that the Center will act as a magnet to establish and accelerate industrial development in the region.

In addition to the two business elements, the VSFC will, as it develops, spin-off other revenue generating activities in cooperation with NASA and industry. These spin-offs will seek to employ existing NASA assets which are currently underutilized.

3. Outcomes of the VSFC Initiative

Successful implementation of the VSFC will, over the initial five year planning period, provide to the region:

- *A highly competitive, self-supporting, viable commercial spaceport,*
- *Economic growth and development through creation of jobs and attraction of space related industry, and*
- *A proliferation of research, education, training and technology transfer programs.*

4. Key Stakeholders and Their Roles

State Governments

The primary stakeholders are the departments of commerce and trade of the Commonwealth of Virginia and the State of Maryland. Local government agencies in the counties comprising the Eastern Shore of Virginia and Maryland also play a pivotal role. Virginia's Center for Innovative Technology has been instrumental in the support of efforts to date. State contributions and benefits derive from:

- Providing financing for development and start-up.
- Providing support and liaison regarding State legislative actions.

- Achieving objectives in economic development (capital investment and creation of high-tech jobs).

NASA

The primary stakeholders are the Wallops Flight Facility (WFF) and its parent organization, the Goddard Space Flight Center (GSFC). WFF has supported this initiative from its inception in 1992. The NASA Agency as a whole will also benefit from the favorable outcomes. The NASA contributions and benefits derive from:

- Providing land, facilities and personnel for use by the VSFC, through formal agreements.
- Supporting the planning and design of the VSFC.
- Satisfying legal mandates to support the commercial launch industry.
- Reducing operating costs by sharing fixed overhead with VSFC and industry.
- Reducing effort expended in operations, allowing greater emphasis on research and development.
- Satisfying mandates to support education and technology transfer.

The Virginia Commercial Space Flight Authority

VCSFA will remain as "owner" of the infrastructure enhancements to be developed, and will be the licensee for Spaceport operations as required by the U.S. Department of Transportation. VCSFA will also retain, through its Executive Directorate, high level management control, while contracting routine operations to the private sector. Its contributions and benefits will derive from:

- Providing financing, start-up operational funding and strategic management.
- Achieving its objectives of economic development and stimulation of education.

The Commercial Space Industry

The private sector will play a crucial role in the development and operation of the VSFC. The commercial space industry will provide the primary customer base for the revenue generating business activities. Industry's contributions and benefits will derive from:

- Providing financing for VSFC development.

- Participating in the operational management of the VSFC/Spaceport.
- Providing tactical planning and management support.
- Profiting from investment and/or contract operations.
- Having a low cost, user-friendly, space launch alternative.
- Having a conduit for centralized R&D and technology transfer.
- The cost effectiveness associated with co-located and centralized capabilities and functions.

Academia

The academic community, led by Old Dominion University (ODU), is an important component of the plan. ODU has, and will continue to provide support to the VSFC in the areas of management resources and academic research. Participation by other educational institutions, worldwide, in VSFC activities will be strongly encouraged. The contributions by and benefits to academia derive from:

- Providing support and facilities for VSFC management.
- Providing research and development expertise.
- Satisfying State mandates to support economic development.
- Developing new educational opportunities and methods of delivery.
- Generating funded research projects.
- Supporting student/scientific launch activities.

5. The Need for Involvement by the Commonwealth of Virginia and Other State Governments

The Commonwealth is committed to the support of technology based businesses and a space program that is entrepreneurial and market driven, and which leverages the substantial existing aerospace industry resources within the state. The role of the Commonwealth is crucial to the ultimate success of the VSFC in two fundamental ways:

1. The costs of development of space technologies will continue to require sharing of financial risk and responsibility to engage the support of the private sector. The Commonwealth's objective to support research and development, education and training, combined with the creation of jobs and businesses are broader than those of the private sector.

2. Historically, the leadership and commitment of government have proven essential to achieving significant social goals and benefits which are not as readily achieved by the private sector, where profits are a prerequisite for growth, reinvestment and competitive viability.

Other fundamental reasons for strong leadership on the part of the Commonwealth are summarized briefly as follows:

- Organizational Clarity and Oversight: NASA prefers to work exclusively through a single agency (of the Commonwealth) to develop Spaceport operations, in order to avoid the managerial complexity of multiple private sector operators.

- Fiscal Responsibility and Public Safety: Federal and State Government have a shared responsibility to preserve their sizable resources and assets and to protect the public interest, particularly in the space industry, where public safety, liability and environmental protection are tantamount.

- Equal Access: Government has an important role as an impartial arbiter of access to spaceport and other publicly owned resources and facilities.

- Licensing: the U.S. Department of Transportation is currently negotiating Spaceport Operators Licenses only with State sponsored entities.

The opportunity before the Commonwealth now is to establish a favorable market position in the space industry by making a reasonable, but more substantial investment in the development of the VSFC.

6. Highlights of the Business Plan

Background, History and Current Organization

The history of space launch activity at Wallops Island dates back 50 years. Over that half century an enormous amount of expertise and know-how in the field of small and mid-sized rocket launching has accumulated. This "corporate knowledge" of NASA WFF is irreplaceable. WFF also boasts state-of-the-art facilities to support space activities. Its geographic location not only supports physical access by launch operators, but also provides access to highly desirable low earth orbits using less energy than would be required at

competing launch sites. WFF is internationally recognized as a very safe, reliable and cost effective place to do business.

In 1995 WFF supported the launch of the EER Systems' Conestoga 1620 launch vehicle. This event was the first commercial orbital launch from the facility, and demonstrated the viability of commercial space activity at Wallops.

NASA WFF has, and will continue to play a pivotal role in the development and execution of this plan and implementation of the VSFC, by making available the resident expertise and physical resources through formal agreements.

The current VCSFA organization is extremely lean and cost effective. Supporting the Board of Directors as its Executive Directorate, performing day-to-day operational activities, is the Center for Commercial Space Infrastructure (CCSI) at Old Dominion University. CCSI is currently staffed by two part-time engineering managers with over 50 years of combined military and commercial aerospace experience. Despite significant progress, the level of staffing is not adequate to successfully undertake the required tasks, including marketing and financing, that must soon be accomplished if the VSFC is to be successful.

Although significant capability exists at WFF, the infrastructure will not support the emerging low earth orbit commercial launch market. Enhancements to that infrastructure (a new launch pad, service tower and payload processing and integration facility) detailed in this plan will make VSFC the launch site ***of choice*** for customers with appropriate mission requirements. The design of those enhancements are nearly complete, as a result of industry driven requirements for a similar launch activity in Alaska.

Proposed Organization Structure

The proposed structure will retain the "lean and mean" philosophy of the current structure, while building on its strengths in engineering and project management. Some functional elements, of necessity, must be added, including finance and investment management, business development, government/university liaison and a Commercial Spaceport Operator. It is estimated that all of the VSFC management functions (those not contracted to private enterprise) can be accomplished with a full-time staff of five or less, along with some administrative support and occasional consulting for specialized tasks.

Formation of an Industry Advisory Group has been authorized by legislation, which will provide tactical planning support and technical expertise to the VSFC. The VSFC will also leverage other business and government resources and build on successful business models to maximize probability of success.

The Market Opportunity

A summary market analysis was conducted to describe the potential commercial market opportunity for the VSFC. ***Only commercial orbital markets were surveyed. The***

projections, therefore, are conservative, since all other market segments are excluded. The analysis includes data from highly regarded commercial and government market studies and interviews with several knowledgeable, high level people in key positions in the market place. There was general agreement among these experts that the VSFC would be a valuable and viable commercial space resource.

Annual research on LEO commercial markets is conducted jointly by government agencies including the Department of Transportation (DOT) and the Office of the Associate Administrator for Commercial Space Transportation (OCST) of the Federal Aviation Administration (FAA) .These studies are widely relied upon throughout the space industry as an important barometer of market trends and potential.

OCST projects modest and high growth scenarios. In one case, a range of 5 to 10 medium to large launches per year and 9-12 small vehicle launches is projected over the next 10 year period. The higher growth model shows as many as 10 to 15 small vehicle launches per year. OCST projections represent a portion of the potential market since no suborbital or experimental launches are included. Also, OCST predicts that commercial remote sensing ventures could represent a significant source of demand for small LEO satellites and launch vehicles.

The results of the market analysis show an expanding U.S commercial space industry currently estimated at between $5.5 and $7 billion over the next ten years. A recent survey by Standard and Poors and the Teal group suggest a market size of over $ 7.3 billion. In addition, it is estimated that the space industry continues to experience an annual growth rate of 20 percent. Based on the results of the OCST LEO Commercial Market Study published this year, and an internal R&D study performed by Lockheed Martin in 1996, ***the capture rate of the potential launch market for VSFC would yield an average of between five and eight commercial orbital launches per year between 1997 and 2008***. Once again, these studies include only orbital operations for commercial communications applications. Other suborbital, scientific, military and earth observation applications, which could provide significant additional market opportunity, are not included. This also excludes revenues which could potentially be generated through other, underutilized WFF facilities, including the airfield and fabrication facilities. As discussed subsequently in the financial projections, ***the VSFC would only require four orbital launches (or the revenue generating equivalent thereof) per year to break even.***

The only significant competitor capable of accessing the same orbits as VSFC is Spaceport Florida. The lower costs and faster turn-around for launch missions that should be achievable at VSFC will give the VSFC a significant competitive advantage. There is also projected launch business which is approximately double the capacity of Florida, with its single launch pad and tower. Florida's advantages stem from their heavy capitalization through federal and state grants, and the fact that they have been established far longer and have received much more publicity than has the VSFC. Their geographic location also gives them the advantage of lower cost access to geosynchronous and geostationary orbits than the VSFC. It should be noted that the payloads for these geostationary orbits are typically far more massive than the maximum capability of the launch vehicles supported by the proposed VSFC launch facility.

Finance: Funding Requirements, Cash Flows and Financing Strategies

Given the vast resources already in place at WFF, the required enhancements for VSFC to become fully competitive in the intended market are relatively inexpensive. Construction cost estimates, which have a high degree of accuracy since they reflect an existing and costed design (for Alaska), reveal ***a total infrastructure development cost of approximately $8 million***. Of this, over $2 million is assured, through award of a federal Economic Development Administration grant, matching funds committed by the Commonwealth and CIT and NASA Spaceport grants. The remainder will be financed through a combination of additional federal and state grants, industrial partnerships and debt instruments authorized by the VCSFA.

Fixed and variable costs of operating the facility and providing launch services will be offset by revenues generated by launch fees. ***The target fee for an orbital launch is $750,000, which is at least 25% less than the nearest competitor.***

To develop financial projections, a scenario of activity and financing mix was assumed, based on realistic projections. As mentioned earlier, the break even point is four launches per year. Pro-forma income statements reveal that at the average launch rate of six per year, ***a net income of nearly $900,000 per year will be realized after debt service and return on investment for the industrial partner has been deducted.*** The pro-forma income statements also show a net operating loss for 1997, which implies that ***some additional financial support will be required during the start-up period.***

A more detailed analysis of financial performance is provided by pro-forma statements of cash flows for the years 1996 through 2007. They show ***a net cumulative cash surplus of approximately $5 million, after retirement of all debt and return on investment***, by the end of 2007. This cash surplus could be used to fund other activities or infrastructure development, as desired by the VCSFA Board. The statements also show a net cash deficit in 1998, due to the effects of investing and financing activities. The implication is that additional cash must be infused to float the development and operation of the VSFC during the start-up period.

Since the events which will determine the financing mix are continually unfolding, financial strategies will continue to be assessed as the situation dictates. It is possible to phase the investments based on emerging market information, in order to minimize investment risk. In any case VSFC management will perform due diligence in financial activities to minimize risk, optimize the use of financed funds for development and operation and ensure VSFC viability.

Implementation Plan, Recommendations and Next Steps

The development of an entity such as the VSFC is not without precedent. Each of the other spaceports has developed along a unique path, with the California Spaceport bearing the closest resemblance to the VSFC. These other spaceport models, along with information provided by the private sector, will continue to be used to guide the VSFC implementation.

Implementation will be conducted in two Phases. Phase I will include start-up of operations using the existing launch pad and tower at Pad 0-A, intensive efforts in marketing and financing (including the selection of an industrial partner), and development and construction of the concrete launch pad at Pad 0-B. The VCSFA Executive Directorate will oversee all activity, which will include finalization of NASA agreements and DoT licensing. Funding for this phase will be provided by EDA and NASA grant money, and funds provided by Virginia. The funds currently on hand are dedicated to matching the various grants. Therefore, if any of these funds are used for other purposes, they must be backfilled from some non-federal source(s). Limited launch capability from Pad 0-A will exist upon, or before, completion of Phase I.

Phase II will be undertaken when the necessary financing is identified, a high level of confidence exists that future launch business will justify the additional investment, and an industrial partner is involved in the financing and operation of the VSFC. Phase II will provide the remaining infrastructure (launch service tower and payload processing/ integration facility) necessary to support the target launch market. During this second phase, the marketing and business development function will mature, with a major portion of that responsibility being transferred to the commercial operator. VCSFA will retain overall management oversight.

Following completion of Phase II, it is projected that the VSFC will be a self-sustaining entity, able to provide its own working capital, meet its debt and equity obligations and generate enough revenue to upgrade the facility or undertake other activities. The Center for Excellence, for which planning and some initial operations will be accomplished during Phases I and II, can be fully realized using net income generated from Spaceport operations.

The VCSFA Board of Directors released the $2.2 million in grants and matching funds for infrastructure enhancements in January 1997. In order for the VSFC implementation to proceed, the VCSFA Board must take the following additional actions:

- Organize funding through the Commonwealth and other sources to cover start-up costs.

- Support the Executive Directorate in attempts to secure additional funding from the federal government and other states.

- Explore alternative financing strategies, including revenue bonds.

- Support the Executive Directorate in marketing and business development activities, and in securing an industrial partner.

- Form an Industry Advisory Group to support tactical decision making.

VSFC BUSINESS PLAN

THE VIRGINIA SPACE FLIGHT CENTER

NASA WALLOPS FLIGHT FACILITY

I BACKGROUND, HISTORY AND CURRENT ORGANIZATION

This section discusses the status, context and evolution of the Virginia Commercial Space Flight Authority and Virginia Space Flight Center concept. Remarkable progress, achievements and resources are described briefly below.

1. The NASA Wallops Flight Facility has an Extensive 50 Year History in the Space Industry

The history of Wallops Island dates back to 1692 when an initial award of land was made to John Wallop by Charles II of England. Its beginnings in the space era occurred on June 27, 1945 with the launch of a rocket by NASA's predecessor, the National Advisory Committee for Aeronautics (NACA). The rocket was used to check the location and operations of tracking stations and to test the use of Doppler radar.

Spurred, in part, by the impressive Russian launches of Sputnik I and II in 1957, President Dwight D. Eisenhower signed the 1958 Space Act establishing the National Aeronautics and Space Administration (NASA) absorbing NACA and further organizing resources to pursue space exploration and development.

By 1959, the WFF was the focal point for the dramatic successful launch of "Sam", a Rhesus monkey used to test the Mercury capsule. Mercury was an early orbiting vehicle which served as the model for the nation's first manned space flight.

Government commitment to commercial space enterprise increased in the 1980s in response to growing awareness of its potential economic value. In 1984 the Space Act was amended under the auspices of President Ronald Reagan expanding NASA's mission to:

" Seek and encourage, to the maximum extent possible, the fullest commercial use of space."

To this end, NASA's Office of Commercial Programs emerged as the primary source of support for commercial space ventures, for increased access to NASA resources, and for commercialization of space technology.

2. Diverse and Dynamic Programs Evolved at WFF Contributing Significantly to Industry and Science

The WFF was the location of the first commercial launch of EER Systems Conestoga 1620 in 1995. This 52 foot, 100 ton launch vehicle is designed to place a new unmanned space platform called

Meteor into 250 mile orbit. Although the Conestoga was destroyed following a flawless launch, it proves the superb capabilities for delivery of commercial launch services at WFF.

In addition, WFF was instrumental in the development of the nation's first rocket and rocket engine design. Wide ranging aeronautical research activities included:

- Multistage rocket research
- Rocket motor design
- Ballistic missile cone research
- Jet engine design
- Hypersonic research
- Mercury Program operations and research
- Sounding rocket development

WFF is at the center of NASA's suborbital programs engaged in the use of sounding rockets, balloons and aircraft to advance space and earth sciences as well as aeronautical research throughout the world. Strong technical capabilities in these areas include:

- Mission and Payload Management
- Engineering support and feasibility studies
- Payload design and development
- Launch vehicle systems and test evaluation
- Development and operation of facilities for manufacturing, payload integration and environmental testing for sounding rockets
- Balloon program management both at WFF and the National Scientific Balloon Facility at Palestine, Texas

Today WFF provides a broad range of facilities and services to its customers, including:

- Vehicle and payload certification, range safety and other training programs

- Wallops Orbital Tracking Station offers tracking, telemetry and data acquisition support for NASA research satellites and the Space Shuttle Program

- Wallops Test Range encompasses a launch range, an aeronautical research airport, related tracking and data acquisition equipment

- Earth Science Research Program includes studies of atmospheric dynamics, atmospheric optics, ocean physics, microwave altimetry, wind, wave, current interactions and ocean color research

- Aeronautical research includes real time tests on WFF airfield and use of its aircraft as platforms to develop remote sensing techniques. Also included, is use of instruments to measure ocean and atmospheric parameters on diverse scientific missions

- Aircraft communications, telemetry, radar tracking, flight path guidance, refueling and maintenance facilities

In addition, WFF provides services, technical support and facilities to several major clients including the Navy, the Coast Guard, the National Oceanic and Atmospheric Administration (NOAA) as well as the nearby Fish and Wildlife Service and National Park Service on Assateague Island. These clients, particularly the Navy, represent an existing business base which depend upon Wallops' resources to fulfill their defined objectives.

Wallops is easily accessible by air land or sea. In addition to the WFF airport, a full service commercial airport, Norfolk's Virginia International Airport, is located approximately 90 miles away. There is a regional airport located in Salisbury, Maryland 35 miles away. The area is served by the Eastern Shore Railroad and a combination of two and four lane highways which readily support heavy weight traffic.

This rich history and experience in the development of space technology have enormous positive implications for the long term potential of commercial enterprise centered at the VSFC. Physical resources and technical capabilities at WFF can be readily adapted to meet the needs of the private sector as has already been demonstrated by EER Systems.

3. Joint Initiatives of the Commonwealth and Industry Provide Impetus for VSFCFA

Established by the General Assembly on July 1, 1995, VSFCFA created the organizational structure necessary to build a commercial space program in the Commonwealth. Specifically, VSFCFA formed a Board to foster the systematic leveraging of public and private resources.

The eleven member board consists three permanent members: Virginia's Secretary of Commerce and Trade and the presidents of the Virginia Center for Innovative Technology and Old Dominion

University. The eight remaining members include representatives from the space and telecommunications industries, local government and one at large member.

VCSFA is charged with stimulating economic growth and education through commercial space activities. The Board has broad statutory authority to:

- Create and manage projects
- Enter into contracts and interstate agreements
- Develop alliances and partnerships for scientific and technological research
- Borrow money, issue bonds, accept grants, gifts and pledge revenues as security
- Acquire, sell or dispose of property or projects
- Provide services to Universities and other institutions of higher learning
- Hire consultants or other staff as needed

Pivotal roles and events driving the Commonwealth's commercial space program are summarized below:

- **Center for Innovative Technology (CIT)** -- a statewide, private, nonprofit organization established by the Virginia General Assembly to stimulate economic development through the creation of technology based businesses, provided a series of grants which have supported the Center for Commercial Space Infrastructure (CCSI) since 1992. CCSI is the operating arm of VCSFA.

- **Old Dominion University (ODU)** -- Through its Research Foundation and Department of Engineering Management based in Norfolk, Virginia, ODU provides core professional staff experienced in the space industry. In essence, ODU with CIT provide technical and administrative support and act as a crucial base of operations for CCSI.

- **Center for Commercial Space Infrastructure (CCSI)** -- The instrumental operating arm and focal point for development of Virginia's Commercial Space program is making significant progress in achieving its objectives including:
  - Advocacy of growth of commercial space activity
  - Assessment of vital commercial space industry resources at WFF
  - Definition of needs of potential commercial customers

- Structuring of plans to construct the new spaceport including a launch tower and payload processing facility

Specific accomplishments include:

- Development of VSFC and Center for Excellence concepts as a regional spaceport and home for space related training, education, research and development
- $6 million contract with Force for launch services of scientific vehicles
- $900,000 grant from the Federal Economic Development Administration
- $900,000 in Virginia state funding for spaceport development
- $456,000 from NASA for Spaceport development plans
- Development of space industry alliances resulting in joint venture opportunities currently being evaluated. Private industry investments under consideration have ranged from $2 1/2 to $7 million
- Successful promotion of VSFC concept to Virginia General Assembly resulting in establishment of the Virginia Commercial Space Flight Authority and governing Board.
- Execution of a formal Reimbursable Space Act Agreement for use of necessary NASA facilities and services for a period of thirty years in March 1997.
- Receipt of Launch Site Operators License from the U.S. Department of Transportation/Federal Aviation Administration, Office of the Associate Administrator for Commercial Space Transportation on December 19, 1997.

CCSI functions as the Executive Directorate and manager for the Board empowered to:

- Negotiate and enter into agreements and contracts with government agencies such as NASA and DOT to secure licenses, equipment, services, land, facilities and other resources
- Arrange contracts between the Authority and private sector for spaceport development including, design, construction, maintenance, insurance, marketing and management
- Organize and develop educational and research activities
- Secure funding from public and private sources through grants, contracts, investments, joint ventures and partnerships

- Promote industrial development through commercial space enterprise and facilitate technology transfer.

The VCSFA structure provides a basic framework for building a highly entrepreneurial public/private partnership.

4. The Existing CCSI Organization Reflects Strength in Engineering, Project Management and the Space Industry

The current organization structure is shown in Exhibit I-1 on the next page. In addition to the eleven member Board, it consists of two part-time managers. Current Board members are identified in Appendix A.

Under the existing organization structure, CCSI is responsible for day to day management of relationships with government agencies and has, for example, been instrumental in developing initial use agreements with NASA. In addition, CCSI is negotiating with DOT regarding possible licensing requirements. With the support of CIT, CCSI has also developed productive relationships with key officials in Congress, at NASA and with the WFF management team.

The current organization structure reflects strong ongoing support from the private sector. Long-standing ties exist with SPACEHAB and Lockheed Martin who have approached CCSI to explore joint ventures as the VSFC commercial operator. Other space industry relationships are in formative stages.

For more than five years, the CCSI organization has functioned with extremely lean staffing by leveraging the resources of CIT, ODU and industry partners. BRPH Architects and Engineers, for example, contributed extensively to VSFC facilities planning through direct assistance in writing grant applications and in estimating spaceport operating and construction costs.

Despite remarkable progress, the CCSI organization needs strengthening in the areas of strategic planning, finance, sales and marketing. In order to thrive, the new organization requires continued support from the engineering, scientific and space industry communities. CCSI has evolved to a stage where specialized management support is needed.

Existing VCSFA Organization

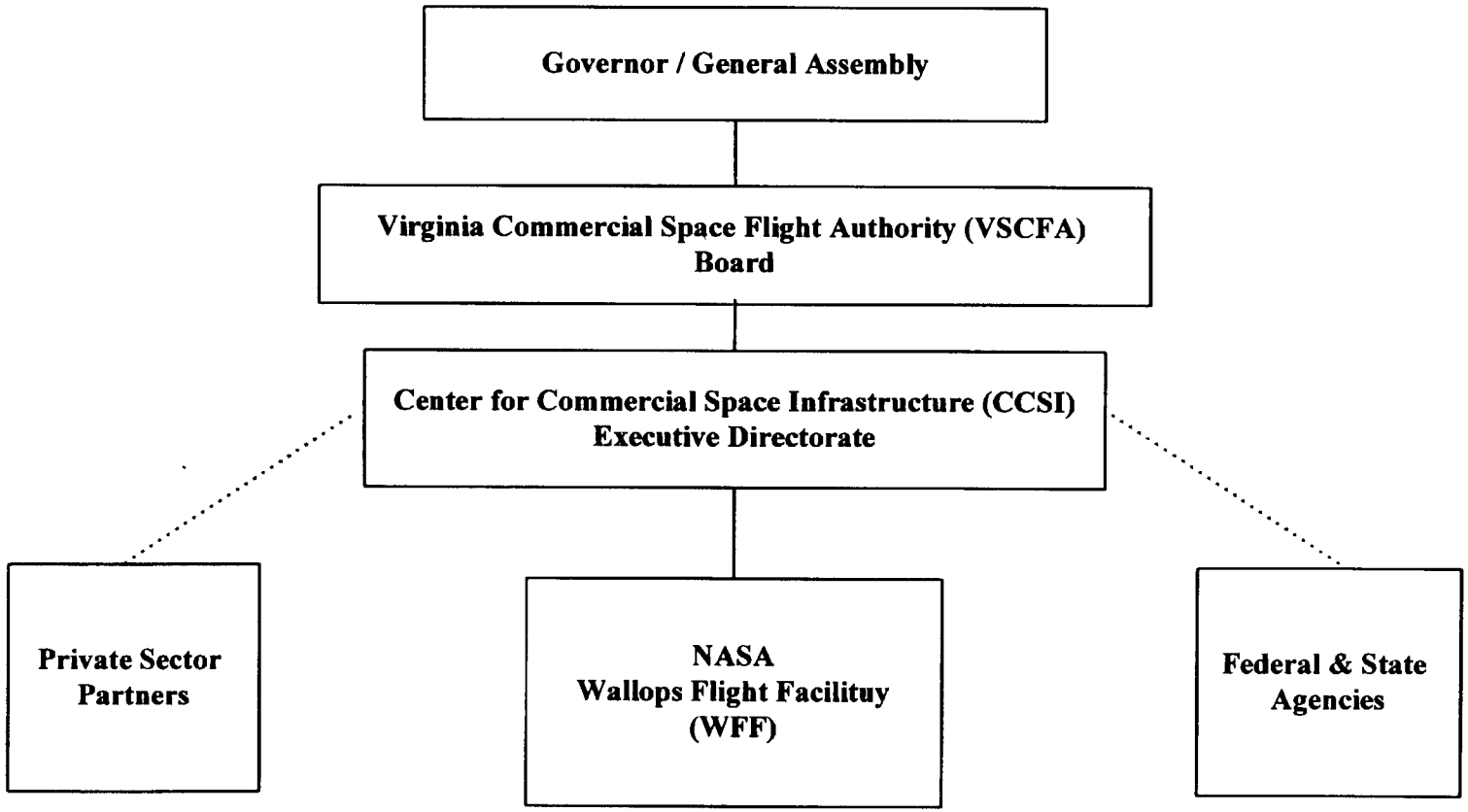


Exhibit I-1

II THE SIGNIFICANT ADVANTAGES OF THE VSFC FOR COMMERCIAL SPACE ENTERPRISE

This section describes the clear benefits and resources offered through development of the VSFC at the WFF, and the importance of this enterprise to the space industry and to NASA.

More specifically, there are multiple advantages to development of the VSFC including:

- Significantly, lower costs for labor and services. According to independent Lockheed Martin analyses, launch and related services are 25% to 50% lower than domestic and international competitors including, most notably, the Florida spaceport.

- Geographic location. Highly convenient access for space industry and technology based firms, as well as many of the nation's finest colleges, universities and research institutions located in the Northeast.

- Ease of access to space for some desirable orbital inclinations to low earth orbit (LEO). Higher relative latitude allows payloads to be placed at higher inclinations for less rocket impulse per pound than is necessary for more southerly launch facilities. This directly affects overall costs to launch. The VSFC would permit convenient access to the proposed NASA space station orbit.

- Flexible launch scheduling and availability.

- Streamlined procedures and operations tailored to unmanned, quick turnaround launches conducive to research and development.

- Minimal bureaucracy and red tape. Because WFF is not encumbered by restrictive Department of Defense security and operating requirements, launch preparation and scheduling is far more efficient and therefore cost effective.

- VSFC design, development and operations tailored to meet the special needs of the private sector. All VSFC facilities plans were developed with the support and collaboration of private industry. Lockheed Martin, for example, has assisted CCSI directly for the past year in developing the spaceport concept.

- Complete existing orbital and suborbital program which includes launch, tracking, recovery, rocket storage, manufacture, staging and testing.

- Established plans to target and serve small and medium size launch vehicle market (up to 8500 lb. of payload), which is among the fastest growing, most promising market segments.

In addition, VSFC plans support NASA objectives through:

- Potential management partnerships with industry, which reduce NASA funding for facilities and operations

- Cost reimbursement from commercial operations which will absorb some fixed overhead costs at Wallops

- Preservation of a critical mass of resources including extensive facilities and highly trained professionals serving the interests of science.

The VSFC would provide strengthened capability to support development and testing of next generation NASA launch vehicles including reusable and low-cost boost technology launch vehicles.

Since NASA currently subcontracts 80% of its functions to the private sector VSFC development plans are in keeping its long-standing objective to reduce the government role in spaceport operations

These many attributes combine powerfully with the extensive history, resources, experience and proven track record of WFF making it an ideal asset and location for the VSFC.

1. WFF Facilities, when Combined with Planned Enhancements Will Offer Cutting Edge Resources For Commercial Space Ventures

There are 84 existing facilities at WFF designed to support simultaneous multiple vehicle launch and processing activities. These include:

- Solid motor, ordnance and liquid propellant storage

- Vehicle and payload processing buildings with overhead cranes

- Reinforced concrete blockhouse

- Launch pads and assorted launchers

- Fire and security protection

- Water and sewage treatment plants

- Machine shop, technical library, offices and health clinic

- Airport with three runways with lengths ranging from 4,000 to 9,000 feet and capable of supporting L-1011 and heavy lift military size aircraft

- Federally restricted and controlled airspace to a defined offshore warning area

- Two state-of-the-art control centers: the Airport Project Control Center and the Range Control Center conveniently located at the main base.

With modification and improvements, the mix of facilities and resources at the WFF offers an outstanding array of self contained, comprehensive services to launchers, payload manufacturers, researchers, and others in the space industry.

2. Potential Additional Revenue for the VSFC From Available WFF Resources

Some of the facilities listed above offer the potential to generate additional income for the VSFC. Specifically, the WFF Airfield, machine shop and controlled range could be utilized through agreement with NASA. This offers opportunities in such areas as:

- Aircraft testing - Existing and future aircraft development programs, particularly drone development and testing, could utilize the airfields, fabrication facilities, and range.

- Suborbital missile launching - Educational programs, high-speed material testing, scientific testing and amateur rocketeers are potential users of the suborbital launch and tracking systems.

- Airline operations - Commercial carriers can perform scheduled maintenance operations. Emergency or other repair requirements would especially benefit from the availability of the machining facilities.

- Test range activities - The Wallops Island facilities have all necessary facilities to support drone target operations.

- Precision manufacturing - The machine shop utilizes high quality, computer controlled fabrication devices that could produce components for a variety of special purpose development businesses. With advertisement, a wide variety of customers, especially start-up enterprise, could benefit from these assets.

Specific customers for such activities may include

- Aircraft development firms
- Airline operations activities
- Educational launch programs
- Suborbital rocket enthusiasts
- Testing organizations
- Department of Defense contractors, especially those supporting the Navy and the Air Force
- Small businesses or other precision machining customers

3. Planned Improvements Are Designed to Meet the Specific Needs of Private Industry

Existing WFF facilities do not meet all the anticipated needs of commercial launch customers. Nor do they provide the processing facilities necessary to satisfy all estimated payload requirements.

In order to become commercially viable, a consolidated single launch complex or spaceport is planned which will support the processing and launch of multiple small and medium sized vehicles at VSFC. As discussed previously, the spaceport will have the capability to integrate and launch payloads of up to 8,500 pounds, a rapidly growing segment of the space industry market.

Conceptually, the spaceport is designed to provide customers with one-stop shopping where all necessary services, supplies and equipment needed to loft a payload are available. The spaceport would contract directly with payload manufacturers as well as providers of launch services and ancillary services and suppliers.

Designs, plans and other proposed enhancements were developed with advice and cooperation from experienced space industry experts including Lockheed Martin and are intended to meet the specific needs of commercial customers.

Proposed plans include construction of a new launch service structure at Pad Zero-B and upgrades to Building Z-41 which will be used as a Processing and Integration Facility. The new facilities and tower capability complement Launch Pad O-A, the 10,000 square foot concrete pad and service tower, completed by EER Systems Inc. to support the Conestoga in 1994.

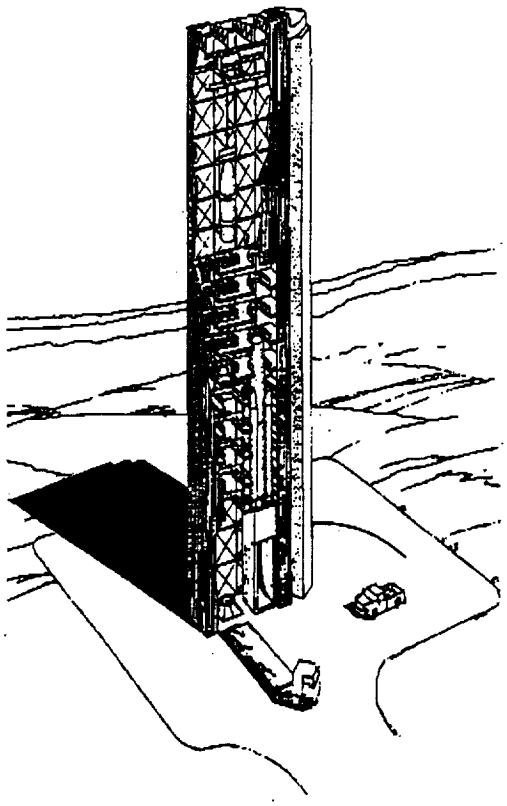
More specifically, new facilities would include:

- **Launch Pad 0-B**--a 19,000 square foot pad and service tower designed to support launch of Expendable Launch Vehicles (ELV) placing small to medium class payloads into space. These include the family of Castor 120™ based vehicles such as the Orbital Sciences Corp. Taurus, the Lockheed Martin LMLV-series and the McDonnell Douglas Delta Lite. A 170 foot service tower would house a 75 ton capacity bridge crane for vehicle and payload handling. The design of Pad 0-B is complete and construction would be finished in 18 to 24 months following project funding and approval.

- **Payload Processing and Integration Facility**--an 8920 square foot building, located approximately 500 feet from Pad 0-A and 600 feet from Pad 0-B. It will provide two high bay payload processing areas with class 100,000 clean work areas and a 15 ton capacity bridge crane with a 50 foot hook height. The facility will include an office, a lab, as well as test and evaluation areas to support operations. It is based on a 2400 square foot addition to an existing building at Launch Complex Zero. With design work partially complete, the facility could be fully operational in approximately one year.

Exhibit II-1 presents the planned Pad O-B design. As discussed, these plans support NASA's objectives and the expressed needs of private industry.

Exhibit II-1
VSC Launch Pad 0-B



Clearly, the primary advantages of the WFF are its vast resources, long experience and proven capabilities in the provision of lower cost, highly accessible, diverse services for space ventures. With the planned infrastructure enhancements, the VSFC will be the launch site of choice for numerous commercial and government customers.

III THE PROPOSED ORGANIZATION STRUCTURE

"No matter how good or how successful you are, or how clever of crafty, your business and its future are in the hands of the people you hire."

Akio Morita, Founder of Sony Corporation

1. The Proposed VSFC Organization Builds Upon Strengths in Engineering, Project Management and the Space Industry

A proposed functional organization structure is shown in Exhibit III-1 on the next page. It is intended to show major functional requirements at this stage of VSFC development.

A small core group of about three full-time professionals would be adequate in the first two years of VSFC development so long as resources are made available to subcontract significant specialized functions and tasks. These might include a legal review of joint venture agreements, the pursuit of growth capital in the private sector or the development of sales and promotional materials.

Structurally, the organization should remain flat, as opposed to hierarchical and employ a multidisciplinary team approach. Principles of leverage will be used to conserve costs.

Central to the proposed organization, is the VSFC Executive Directorate reporting directly to the VCSFA Board. Under this relatively flat organizational plan the Executive Directorate would work closely with the Board to advance VSFC plans. The Board would, to the extent possible, aid the VSFC by identifying and organizing private sector and government support at the highest levels. Other key functions and activities are described briefly below:

- **Executive Directorate**--Responsible for overall day to day planning, management and operations including development and oversight of joint ventures with the private sector and implementation of financial and other business strategies.

- **Industry Advisory Group**--A select group of specialist advisors who would provide tactical planning support and technological advice. Also, they would identify experts who would be brought into the VSFC organization temporarily to perform well defined tasks. This group which might include Board members, would function as a high powered, analytical team.

- **Finance and Investment Management**--A critical function involving the ongoing development and execution of creative financing and cash flow strategies.

Proposed VCSFA Organization

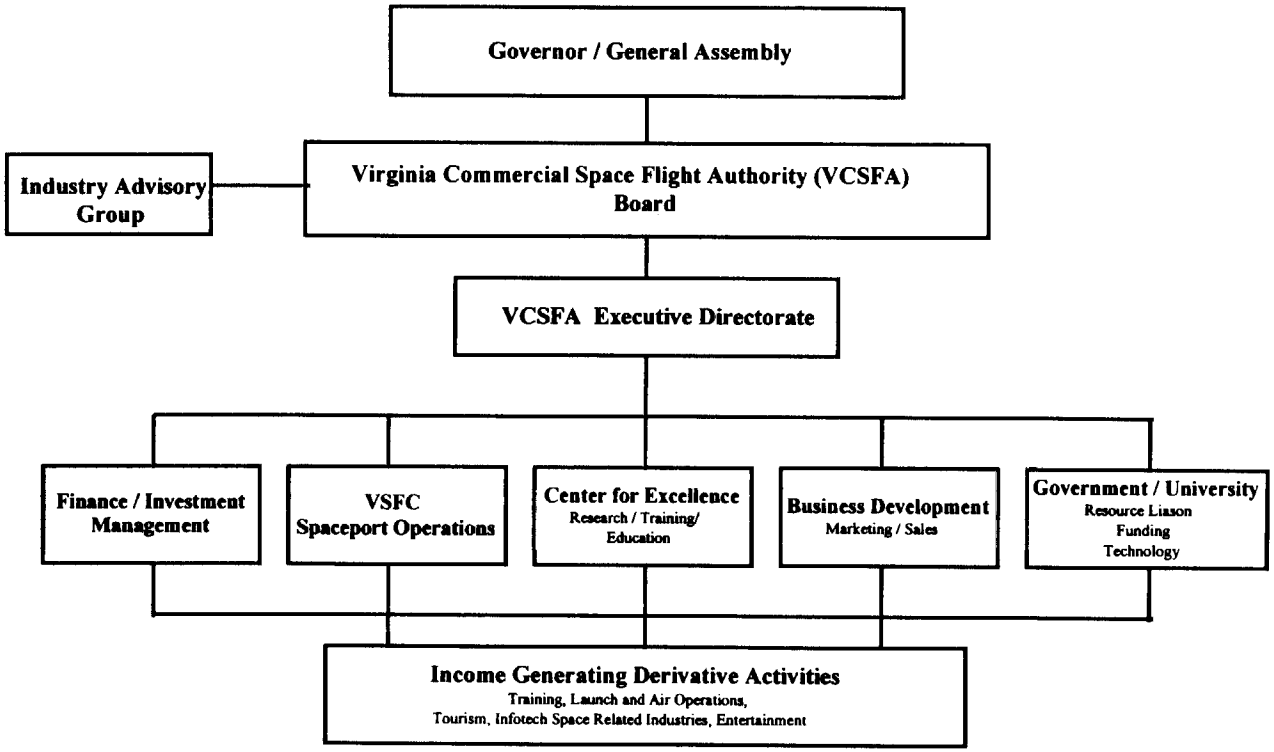


Exhibit III-1

- **Business Development**--Closely allied with finance, this function involves structuring and implementation of strategic marketing plans as well as direct sales of VSFC services. Responsibility for marketing would be shared by all VSFC professionals

- **Spaceport Operations**--Oversight and day to day management of the spaceport are at the heart of the VSFC business organization and are crucial to its success as it represents a primary source of revenue. This function would be shared with a private industry partner and investor.

- **Center for Excellence**--Development and management of this center will evolve in concert with the spaceport. It would serve as a hub for research, technology transfer, education, training, recreation and tourism. It would be financed through grants and contracts as well as profits generated by the spaceport initially, and in time, through its own income generating businesses and activities.

- **Government and University Resource Management**-- Systematic planning, management and liaison functions are crucial to VSFC success since these groups represent sources of funding, intellectual resources and technology. They are potential customers.

- **Income Generating Derivative Activities**--As an entrepreneurial organization, the VSFC would pursue development of high potential space related ventures through strategic alliances, partnerships, joint ventures and other arrangements. These activities would be designed to generate additional revenue streams for the VSFC and fulfill economic development goals.

To ensure success, the organization will be balanced and strengthened by experts from other disciplines, particularly marketing, sales and finance. Execution of aggressive strategies in these areas will be critical to the immediate and long-term viability of the VSFC.

2. The Proposed VSFC Organization Would Be Composed of Highly Skilled Entrepreneurs and Innovators

In some respects the current organization mirrors the space industry, which historically has been dominated by rocket enthusiasts, engineers, scientists and technicians. These individuals continue to play an instrumental role in the advancement of technology. At the same time, other highly imaginative, entrepreneurial individuals are essential to building the VSFC organization. These must be energetic individuals comfortable with abstraction in order to understand and define new market opportunities. Special skills are required to secure financing in emerging space businesses.

The VSFC organization would function as a lean entrepreneurial team, therefore, its small core group of professionals would share some crosscutting responsibilities. As discussed, all would be involved in business development activities. Within the team framework, a single individual would, for example, assume dual responsibility for business development and government relations. The formation of alliances with government and business will be the major organizational priority. The organization is designed to permit maximum flexibility and expand only as resources and revenues permit further growth.

3. The VSFC will Leverage Government and Business Resources to Build Upon Other Successful Spaceport Models

Leverage would be extended under this plan to include:

- Private sector partners outside of the space industry e.g. with experience in data manipulation, information technology, entertainment and education
- Universities both in the U.S. and abroad with strength in space science and technology as partners in research and as possible investors
- Foreign governments interested in space science
- State and local government agencies beyond Maryland and Virginia.

Some of these broad potential organizational relationships are illustrated in Exhibit III-2 on the next page.

Through the effective use of leverage, much can be accomplished as has already been demonstrated, by the significant achievements of CCSI. Additional specialized support should be out-sourced to fill temporary gaps as they emerge. Other specialty areas which need immediate attention to develop more detailed operating plans include:

- **Legal**--Review and structuring of insurance requirements and examination of appropriate vehicles for securing capital through, for example, the debt markets. Development of government use agreements and proposals with potential investors
- **Environmental Impact** -- Expert analysis is needed to assure requirements are met and to devise proactive strategies to avoid potential conflicts in the future
- **Insurance** -- Quite separate from the legal oversight required, experts in the field should be used to develop the best insurance policy for the VSFC and to assure adequate coverage on the part of strategic partners
- **Other Industry Specialists** – Business development and strategic support through use of experienced executives and entrepreneurs.

Once the organization is in place, it is essential that lines of authority, responsibility and accountability are clearly defined. Business objectives will be developed and reviewed annually as part of a rigorous planning process and performance measures and benchmarks will be established and applied.

VCSFA

Organizational Interelationships

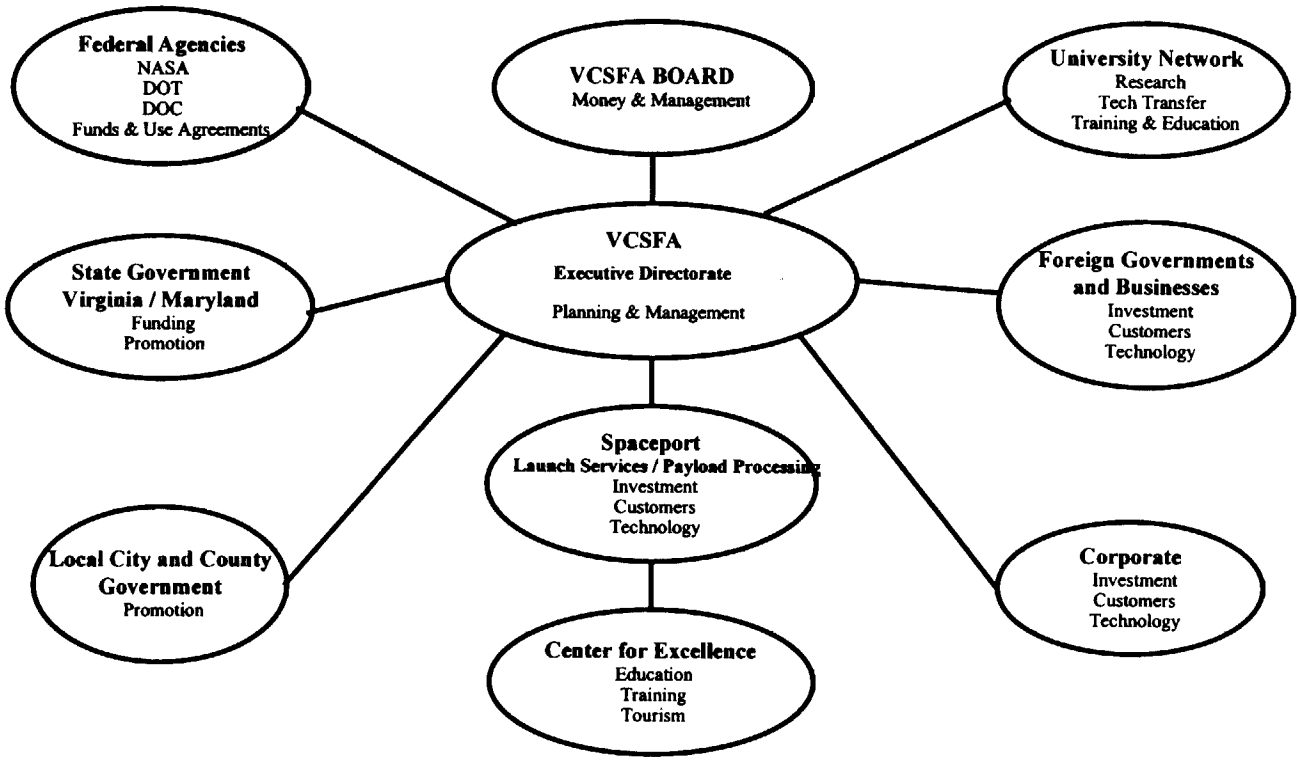


Exhibit III-2

Leverage is a powerful and well tested tool. However, its use adds complexity and requirements for procedures to achieve effective management control. Operating plans will incorporate parameters and performance measures to ensure effective working relationships with all VSFC partners.

Identifying business models in fields not directly related to the space industry would be useful. For example the, Washington Metropolitan Airport Authority operates as an effective umbrella organization subcontracting to a diverse mix of businesses as a means of generating income. It provides core services and has a management structure which might prove relevant to the VSFC as it evolves.

VSFC will operate as an entrepreneurial enterprise that is customer driven and market focused. Clear definition of high potential market opportunities and the systematic testing of those markets will ensure that customer needs are met. This is critical to the ultimate success of the VSFC organization.

IV THE MARKET OPPORTUNITY: TRENDS AND GROWTH IN DEMAND FOR SERVICES

This market analysis demonstrates overall growth trends in the space industry and describes the potential commercial market opportunity for VSFC services. It is based upon the best estimates of approximately 15 experts as well as highly regarded government and industry studies.

The projected market size for commercial launches from NASA WFF is drawn from assessments developed by Lockheed Martin as part of their VSFC investment planning. Projections from the Department of Transportation, Office of Commercial Space Transportation, developed annually and considered an industry standard, were reviewed along with reports from the Teal Group.

Several significant issues should be taken into account when considering the size, potential and opportunity for development of commercial space enterprise at the VSFC:

- Large and increasing levels of investment indicate a serious commitment and conviction on the part of industry that market and business potential are strong.

- History, economics and the huge cost of developing commercial space ventures, force continuing interdependence between business and government. The formation of large corporate alliances such as that of Lockheed Martin will continue out of necessity: that is the advantages of shared risk, cost, and of synergy.

Technology is transforming the space industry and will gradually drive down the costs of getting there. With the advent of reusable and recoverable vehicles, the current $10,000 per pound of payload for the Shuttle may drop to as little as $1000. Telecommunications is the "10,000 pound gorilla" driving the industry. It represents the largest, fastest growing segment of the total market currently estimated at over $ 7 billion.

Another strong indicator of potential demand at WFF is the initiative of three private sector investors, Lockheed Martin, SPACEHAB, ITT and Pegasus Group each have initiated negotiations with the VSFC.

VSFC commercialization plans were developed with industry experts who understand the needs of the business, the markets and, most importantly, commercial customers.

1. The Small Satellite Market is Expanding Rapidly Because of Lower Costs and Increasing Reliability

There is a growing demand for small satellites. According to Lockheed Martin, more than 200 satellites weighing less than 6600 lbs. will be launched over the next ten years. The majority of these will weigh less than 2200 lbs. Approximately two thirds of these will be used for

communications as part of constellations planned to provide voice and data communications from low earth orbit (LEO).

In addition to the initial launch of LEO communication constellations, there will be a continuing market for replacements. Replacement launches can be conducted in a very cost effective manner using smaller, rapid response vehicles inherent in the VSFC design.

Lockheed Martin anticipates at least 10 missions annually between the years 2000 and 2006, of its Lockheed Martin Launch Vehicles (LMLVs). Orbital Sciences Corporation is pursuing the commercial space market with its Pegasus and Taurus rockets. The Taurus vertical launch vehicle is capable of lifting satellites weighing 4180 lbs. into low earth orbit. Pegasus has been launched successfully 10 out of 13 times since 1990. Despite the technical problems experienced by EER Systems Conestoga rocket, its launch in the fall of 1995 demonstrated the viability of commercial launch services from Wallops. Other rockets ideally suited to the VSFC are presented in Exhibit IV-1.

Lower access costs to space will stimulate an increase in other space related activities such as scientific missions which will, in turn, increase demand for space transportation.

2. Industry Experts Agree that VSFC is a Valuable and Viable Commercial Space Resource

According to industry experts, NASA Wallops resources combined with a VSFC tailored to meet commercial customer needs, represent an irreplaceable industry asset.

Specific advantages, opportunities and issues of significance are addressed below:

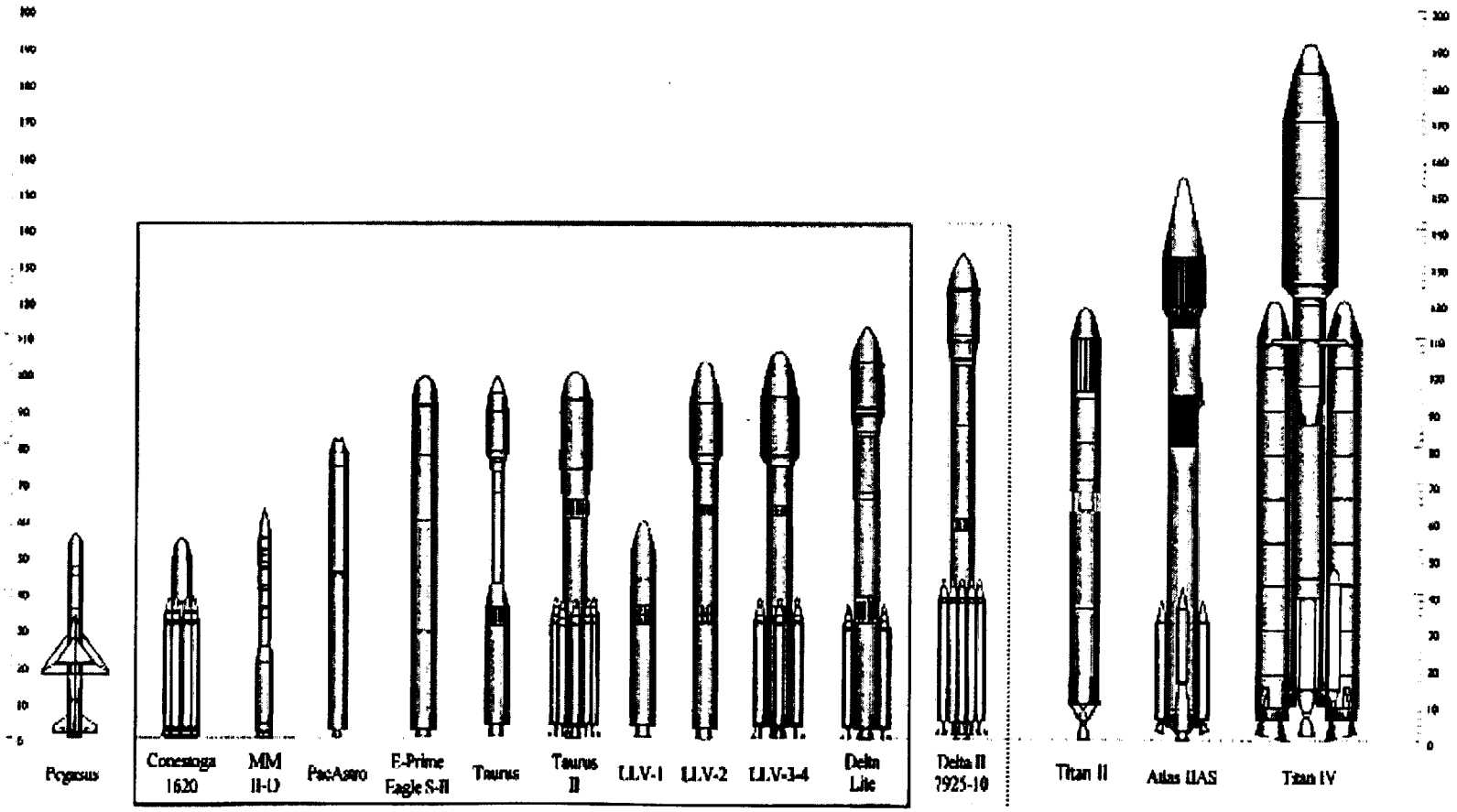
- Ideal positioning, as the low cost provider with average costs 50% to 75% of other spaceports
- Accessible, flexible scheduling of launches with minimal red tape and security requirements conserve costs and increase efficiency
- Wide range of launch site options and high quality services differentiate VSFC in the minds of customers

Thoughts and perceptions on emerging space markets provided by industry experts are summarized briefly below:

Launch Vehicle Market

Exhibit IV -1

Boosters for Small to Medium Payloads



- According to SpaceTec, a broad, synergistic mix of services is essential to sustained business growth and success. VSFC services should include:
  - Sounding rockets
  - Aircraft and balloon launches
  - Orbital launches
  - Payload Integration and test facilities
  - Instrument and payload fabrication
  - Tracking and range safety
  - Education and training

- EER Systems believes the VSFC is positioned ideally as the center for microgravity experiments benefiting science, technology and education. High altitude robotics aircraft could also support microgravity experiments.

- CTA sees the expansion of remote sensing as data processing and manipulation techniques advance. Refined techniques in weather forecasting would, for example, attract insurance, airlines and shipping industries.

- Serving small rocket builders, according to AreoAstro, requires minimum launch support services and should be pursued actively because of continuing growth potential and their ability to attract other lucrative customers

- CTA, EER Systems and Starsys envision a fascinating array of emerging businesses in earth sciences, global positioning, satellite replacement in constellation systems, FEDEX style delivery and retrieval services.

Comments on the VSFC were provided by several industry executives:

"Orbital is extremely interested in the potential for the Virginia Space Flight Center to be a reliable, low cost launch facility. We have successfully flown Pegasus and many suborbital rockets from the Wallops Island facilities. In fact, we have 5 Pegasus and suborbital flights on our current manifest for launch from Wallops Island. Once the new Castor 120 class facilities are on line, we expect to add launches of our larger Taurus rocket when cost and orbital requirements are appropriate."
John H. Mehoves, Senior Vice President, Corporate Strategy, Orbital Sciences Corporation.

"Wallops Island is home base for EER Systems' Conestoga vehicle. We initiated space flight from there in October 1995. Currently, two new missions are shaping up, one in 1998 and the other in the year 2000. I continue to envision Wallops Island as the future focus of the nation's microgravity research in space. One day soon this research will change our lives on Earth."
James E. Hengle, Vice President, EER Systems

"Virginia Commercial Space Flight Authority certainly has generated strong interest among prospective industry partners and has the capability to be a key leader in the continued development of future commercial space launch activities.. The Authority will significantly influence the U.S. domestic space launch industry in regaining a national leadership role in the global commercial space launch business."
William A. Sample, Director of Operations and Analysis and Systems
Lockheed Martin Space Operations

"We were genuinely impressed with your progress and plans to bring together the resources of Virginia and key members of the space industry to establish a full service spaceport activity focused on the West Coast. We also see the obvious advantages to a national spaceport service perspective, bringing synergy and operational flexibility to potential mutual customers requiring a variety of services and launch locations to meet specific azimuth, inclination and orbit requirements. ITT Defense and Electronic has both it's headquarters and substantial business operations in Virginia. Therefore, we would have a regional as well as national interest in becoming a knowledgeable supporter of Virginia's future role in space. We were also pleased to hear of your interest in pursuing possible business arrangements with ITT."
Harry W. Jenkins, Jr., Director, Congressional Liason and
Program Development, ITT Defense and Electronics

"From a Starsys perspective, Wallops would offer the only U.S. based launch facility which can get the Starsys constellation into the most desired orbital inclination, and offers overall reduced costs for actually conducting the launch campaign as well as relative ease of access to the facility for our team. Satellite constellations require multiple launches, maintenance and replenishment and there are numerous opportunities for Virginia to position itself to host these activities not unlike a space industry Olympics. California and Florida are aggressively pursuing this business. Virginia has a potential competitive edge and pursuit of these activities affords an equal opportunity to attract and retain the growing aerospace industry to the state."
Stephen Lee Morgon, Director of Business Development,
North American Collection & Location by Satellite, Inc.

"CTA Space Systems is very interested in the opportunity to use the Wallops Flight Facility for future spacecraft launches. Our experience with the October 1995 launch of the METEOR spacecraft on the Conestoga launch vehicle from Wallops was very positive, despite the unfortunate failure of the Conestoga launch vehicle. The Wallops Flight Facility proved to be conveniently located to our manufacturing facility in northern Virginia which facilitated rapid movement of engineers and equipment to and from the launch site as needed. Wallops was also very cost effective compared with other launch sites in Florida and California. In addition, the Wallops location offers easy access to the NASA laboratories and facilities at the Langley Research Center which can be a valuable resource. Moreover, because the Wallops facility is not regularly used to support military spacecraft launches, CTA can reliably schedule commercial launches without concern about last minute preemption by high priority military missions. Finally, Wallops is an attractive launch site for our customers who require a mid- inclination orbit, which can be achieved easily from the Wallops Flight Facility."
Christopher B. Roberts, Director Business Development, CTA Space Systems

With its diverse resources and capabilities, the VSFC has an extraordinary opportunity to test new business opportunities systematically. Against this background, overall market size and demand are described briefly in the next section, followed by specific projections related to the VSFC. Market information, based on highly objective, internal industry studies was used to develop realistic conservative estimates of demand.

3. U.S. Commercial Space Industry Size is Estimated in the Range of $5.5 to over $ 7 Billion

Exhibit IV-2, on the next page, shows the U.S. commercial space market at $ 5.5 billion. A recent survey by Standard and Poors and the Teal Group suggest a market size of over $ 7.3 billion. In addition, it is estimated that the space industry continues to experience an annual growth rate of 20 percent. The Exhibit illustrates the distribution of costs and expenditures across market segments with the smallest investment being made in spaceports. Massive expenditures are allocated to development of satellites, related services, boosters and earth stations.

To support these numbers, the Teal Group has developed a 10 year forecast projecting 656 combined civil and commercial satellite launches. These estimates are considered conservative since hundreds of potential satellites were not included due to lack of financing or more mature program development.

An estimated 88% of those projected will be for communications. Of these 99% will belong to multi-satellite mobile communications systems. Some industry experts believe that the VSFC would have a share of the satellite replacement market for these constellations. It is anticipated that the number of satellites launched should peak around 1998 as the bulk of first generation mobile communications satellites would be launched in the 1997-1999 timeframe.

All satellites counted weigh 3300 lbs. or less. This is well within the target market range of the VSFC. Since the VSFC will handle launches up to 8500 lbs., it could capture an even larger share of the overall market.

As shown in Exhibit IV-4, another analysis allocates known projected payloads across market segments through the year 2006 showing a total of 1508 possible launches. of these, 63% weigh 6600 lbs. or less. This is double the level of launches projected three years ago.

Of the total payload 1030 or nearly 68% will be again in commercial communications. Significantly, for the VSFC, nearly two thirds, 65.3% of the payloads are destined for LEO positioning. This is because of the large number of proposed mobile communications satellites which will have an altitude of less than 2000 kilometers.

The VSFC will be positioned to garner a potentially profitable share of business in most of the defined markets.

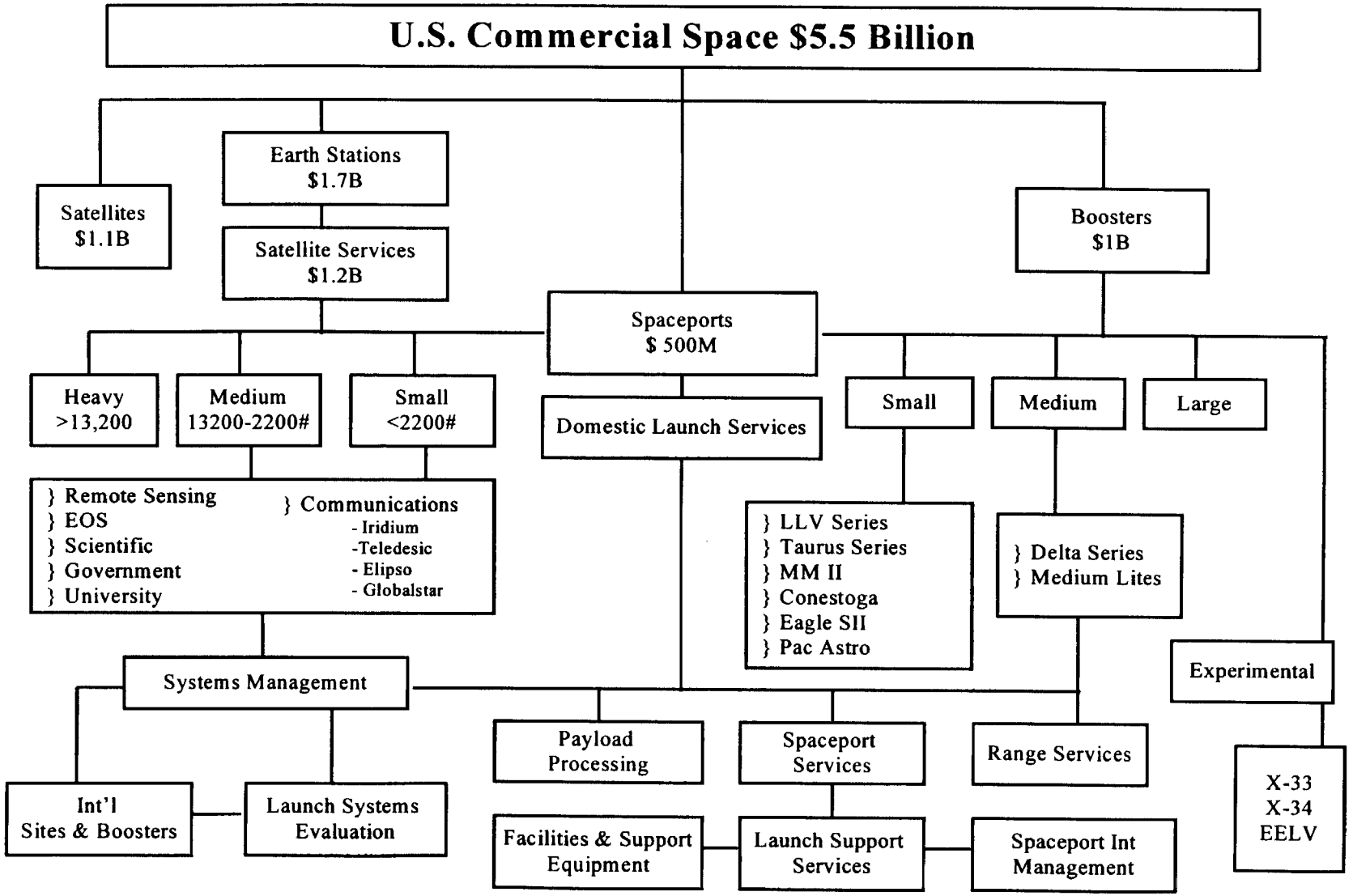
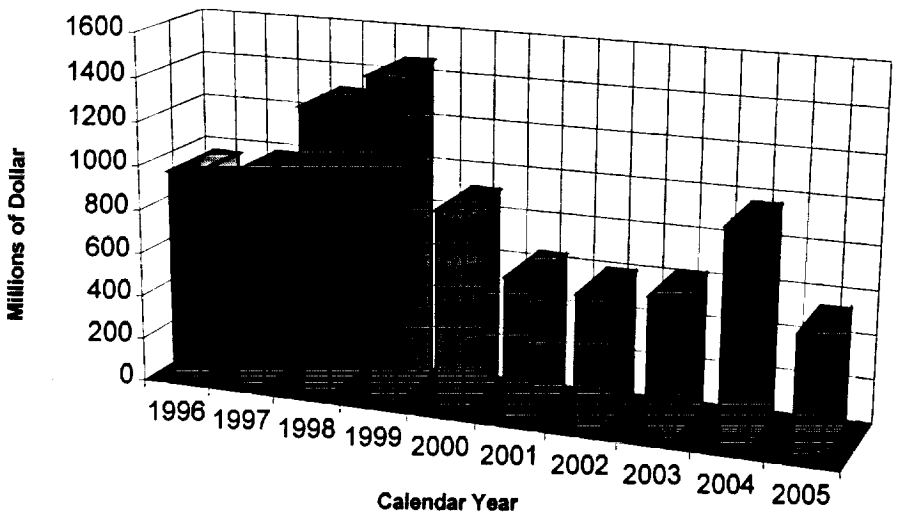

U.S. Commercial Space $5.5 Billion
Satellites $1.1B
Earth Stations $1.7B
Satellite Services $1.2B
Spaceports $ 500M
Boosters $1B
Heavy >13,200
Medium 13200-2200#
Small <2200#
Domestic Launch Services
Small
Medium
Large
} Remote Sensing
} EOS
} Scientific
} Government
} University
} Communications
- Iridium
-Teledesic
- Elipso
- Globalstar
} LLV Series
} Taurus Series
} MM II
} Conestoga
} Eagle SII
} Pac Astro
} Delta Series
} Medium Lites
Experimental
Systems Management
Payload Processing
Spaceport Services
Range Services
X-33
X-34
EELV
Int'l Sites & Boosters
Launch Systems Evaluation
Facilities & Support Equipment
Launch Support Services
Spaceport Int Management

Exhibit IV-2

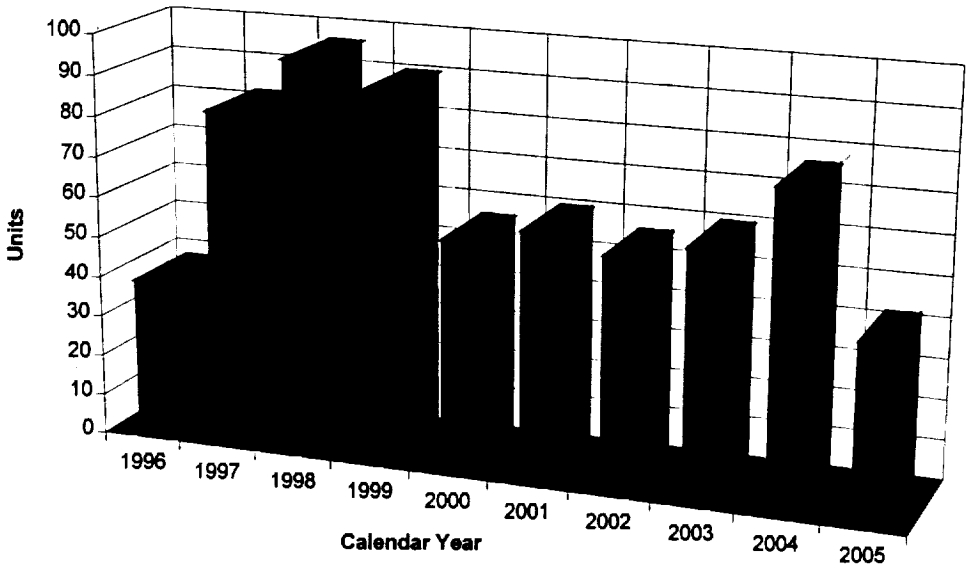
Exhibit IV-3

Leo Small Civil/Commercial Satellites 10-Year Launch Forecast

Value



Launches



Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Total
Communications	123	212	277	166	122	21	60	44	2	3	1030
Military	21	11	17	8	10	7	2	6	26	14	122
Manned/Space Ops Spacecraft	18	23	15	14	11	11	12	6	0	0	110
Scientific	33	18	12	17	5	7	2	5	5	1	105
Earth Observation	22	16	15	16	13	5	10	3	2	6	108
Experimental	7	4	4	1	1	1	0	0	0	0	18
Other	7	2	1	1	1	1	0	1	1	0	15
Total	**231**	**286**	**341**	**223**	**163**	**53**	**86**	**65**	**36**	**24**	**1508**

World Wide Mission Model 1996 - 2005
Known Possible Payloads for Launch

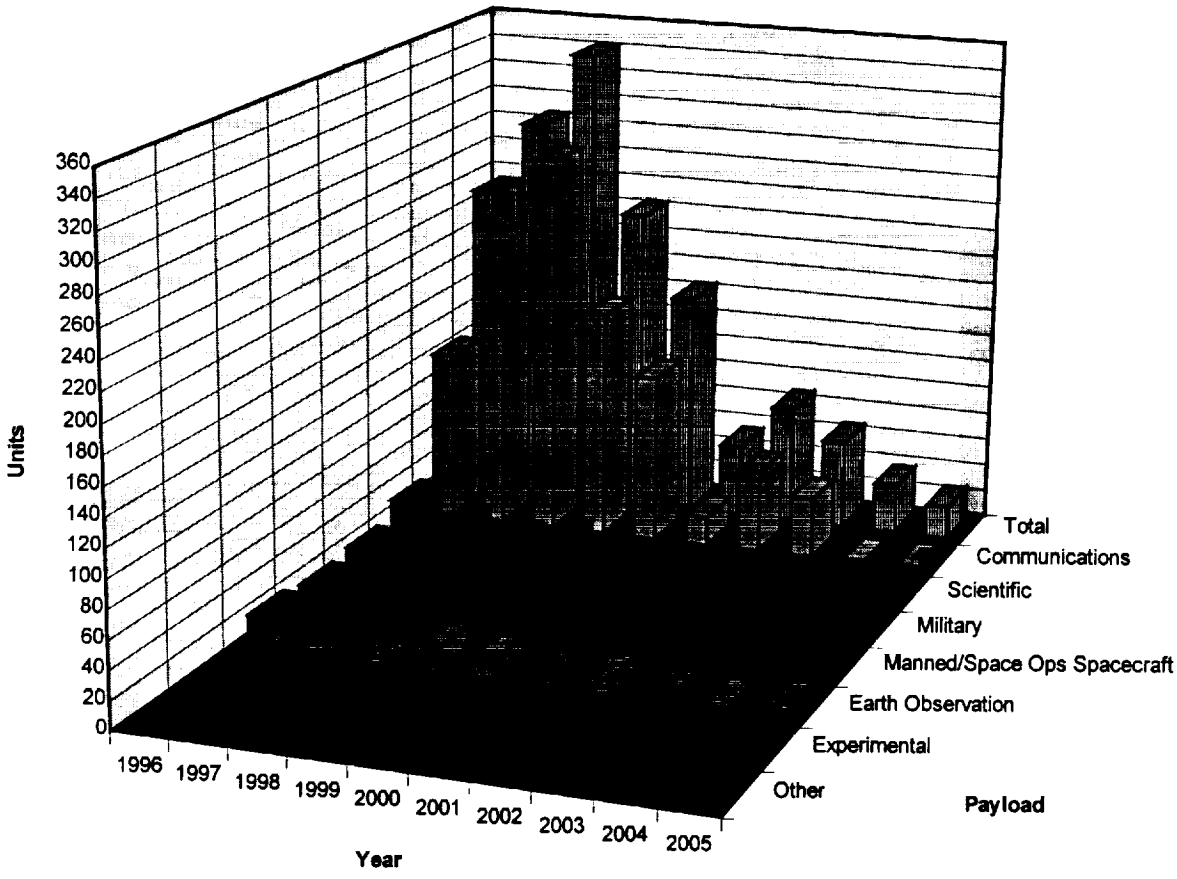


Exhibit IV-4

4. Government Projections for LEO Commercial Market 1996-2005 Anticipate Dramatic Growth

Annual research conducted by the Department of Transportation and the Federal Aviation Administration, Office of the Associate Administrator for Commercial Space Transportation (OCST) on LEO commercial payload and launch markets, is widely relied upon throughout the space industry as an important barometer of market trends and potential.

In developing projections, the OCST takes into account significant market influences such as the projected customer demand for personal communications services, the impact of competing technologies, access to capital, government licensing requirements, the availability of frequency spectrum and the status of contracts for satellite production and launches. OCST projects modest and high growth scenarios for 5 to 10 medium-to-large launches per year during deployment phases as follows.

Scenario 1

- Launches will fall into the high end of this range during 1996-1998 and 2002-2003
- Launches will fall into the low end of this range during 1999-2000 and 2004-2005

- 9 to 12 small vehicle launches with only five in 1996

Scenario 2

- Launches will fall into the high end of this range during 1996-2000 and 2002-2003
  Launches will fall into the low end of this range during 2001 and 2004-2005

- 10 to 15 small vehicle launches per year. Again, with only five launches in 1996.

Both scenarios assume deployment of Big and Little LEO communications systems as follows:

- Modest growth -- at least three Big LEO, including MEO and two Little LEO systems

- High growth -- four Big LEO systems and three of the larger Little LEO constellations.

MEGA LEO systems are not included in either scenario because of complex development and financing issues and the present lack of contracts for satellite production and launches. It is of significance to the VSFC that little LEO replacement launches will be conducted on small launch vehicles because of the relatively small size of these payloads.

Exhibit IV-6 shows the orbital inclinations and altitudes of several of the proposed LEO communications systems. Those systems which have orbits ideally suited to VSFC (45 to 65 degrees)
comprise approximately two thirds of the total launches required. At a capture probability of 50% , the VSFC is projected to provide an average of between six light launches per year between now and 2005. Florida is the only other site from which those orbits can be reached. Note that these projections include *only orbital communications applications*.

The OCST also predicts that commercial remote sensing applications could represent a *"significant source of demand for small LEO satellites and launch vehicles"*. OCST estimates that as many as four systems containing between one and four satellites designed to provide commercial high resolution imagery will be deployed.

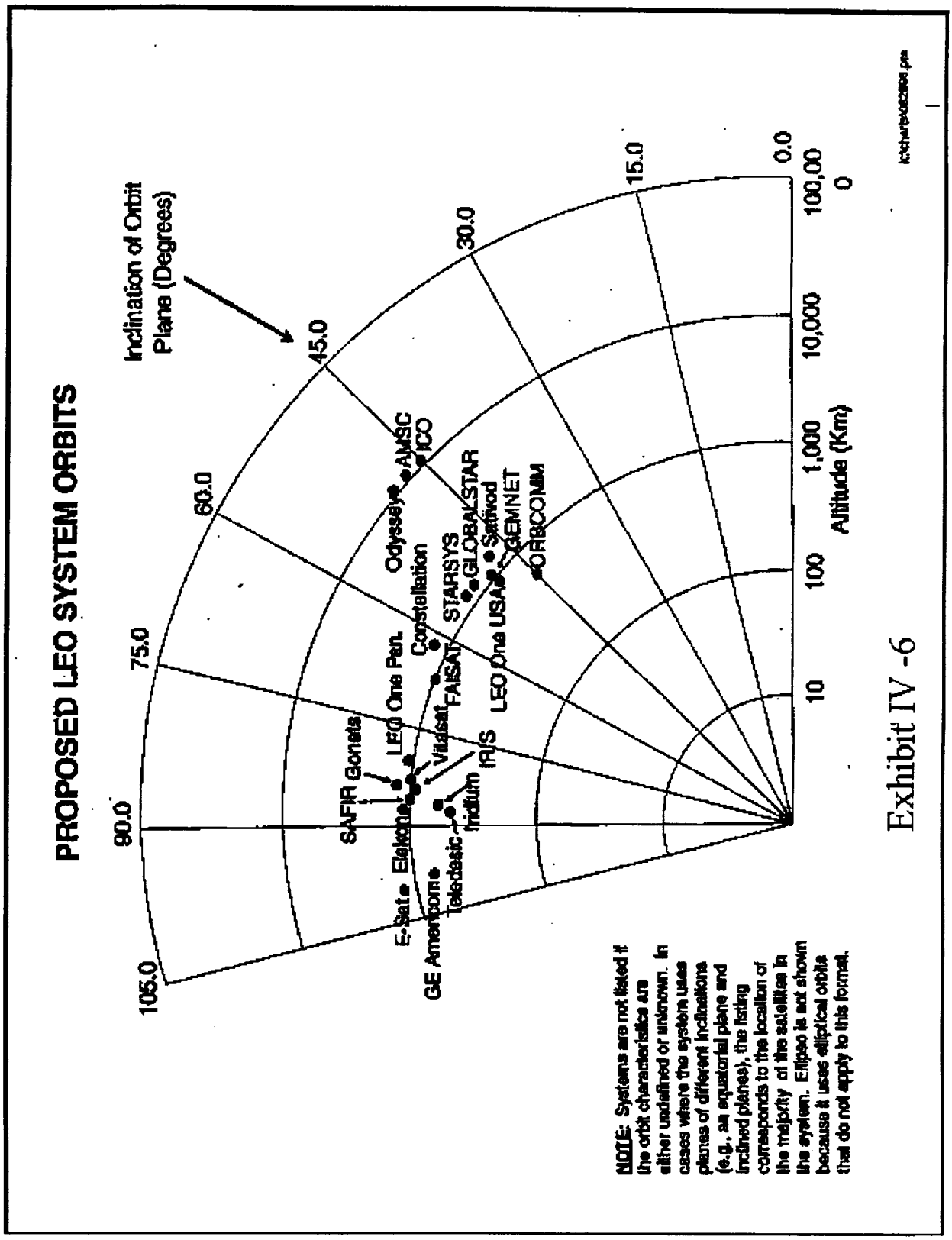

PROPOSED LEO SYSTEM ORBITS
Inclination of Orbit Plane (Degrees)
90.0
75.0
60.0
45.0
30.0
15.0
0.0
105.0
10
100
1,000
10,000
100,00
0
Altitude (Km)
E-Sat
Elektro
S-NFIR
Gonets
LEO One Pan.
Constellation
Vitasat
FAISAT
IRIS
Iridium
Teledesic
GE Americom
Odyssey
AMSC
ICO
STARSYS
GLOBALSTAR
Satmod
GEMNET
ORBCOMM
LEO One USA
NOTE: Systems are not listed if the orbit characteristics are either undefined or unknown. In cases where the system uses planes of different inclinations (e.g., an equatorial plane and inclined planes), the listing corresponds to the location of the majority of the satellites in the system. Ellipso is not shown because it uses elliptical orbits that do not apply to this format.

Exhibit IV -6

5. Lockheed Martin Estimates an Investment in the Wallops VSFC Would Generate $52.7 Million in Sales by the Year 2008

As a basis for a $2.5 million investment to become spaceport operators, Lockheed Martin estimated the market for commercial launches at the VSFC. Based on a total of 370 unmanifested satellites to be launched between 1997 and 2008, they project a probable capture rate of 18% as follows:

Year	Launches	Year	Launches
1997	3	2003	8
1998	4	2004	6
1999	5	2005	5
2000	8	2006	5
2001	5	2007	5
2002	8	2008	3

This analysis, like the DOT/OCST study, does not include any suborbital or experimental activity.

Also, the total of 65 launches was reduced from an original projection of 77, due to an IOC schedule for VSFC of mid-1997. However, since the VSFC will be operational as soon as the necessary agreements are in place, the actual projections for 1997 through 1999 could be more optimistic.

The economics and probable income producing potential of the VSFC are discussed in the section on costs and projected revenues. However, the projections generated from two independent studies are relatively conservative estimates of launch rates. Break even rates for the VSFC are estimated at approximately four orbital launches per year. Lockheed projects annual averages of 5.4 per year and OCST projects 6.2 in its most conservative estimates.

6. Spaceport Florida Represents the Primary Competitive Threat for the VSFC

Spaceport Florida is ahead of VSFC in several areas including levels of funding, state support, organization, staffing, marketing and promotion. In addition, tax incentives and bond financing programs have been undertaken.

It is the only other U.S. spaceport which can achieve the same orbital inclinations accessible from the VSFC. However, because of higher latitude, the VSFC can reach desirable high inclination orbits more efficiently, i.e., more payload mass for a given launch vehicle than Florida. This combined with the far lower costs for launch services represents a competitive advantage for the VSFC. In addition, the VSFC is not be encumbered by red tape, bureaucracy, scheduling backlogs and complex security procedures which customers admit have been posed problems in Florida.

Spaceport Florida's Launch Complex 46 consists of one launch pad and service tower. Improvements to this facility are underway. There is no immediate plan to expand to a second pad. These resources can only support a maximum of eight launches per year, far less than the projected east coast launch market. There is, therefore, an increasing need for the VSFC facility to support the emerging launch services market.

V FINANCE: FUNDING REQUIREMENTS, CASH FLOWS AND FINANCING STRATEGIES

As discussed previously, multibillion dollar levels of investment, when combined with head spinning technological advances, particularly in the areas of telecommunications and information systems, indicate a growing commercial launch market. Further, the review of recent market studies and discussions with space industry experts suggest a substantial economic opportunity for the VSFC.

In fact, there was universal agreement among experts that the NASA WFF represents a significant resource which merits development. At issue is development of the appropriate financial and marketing strategies which minimize risks associated with Spaceport operations specifically, and VSFC development in general. This financial plan is structured to minimize and offset potential risks to investors and to the Commonwealth.

This is reflected in the conservative projections of launch services and estimates of operating costs. In addition, performance measures and tight financial management controls will be instituted as part of this plan.

One compelling indicator of the VSFC business opportunity at Wallops is the serious level of interest expressed by several investor groups including Lockheed Martin, ITT, EG&G, SPACEHAB and Pegasus Group. Each has proposed development of a joint venture with VSFC to fund and operate the spaceport.

Independent analysis of the long-term viability and value of Spaceport operations has been performed by Lockheed Martin and the Pegasus Group. It is reasonable to assume that their estimates of long-term profitability are conservative.

VSFC is assessing carefully each investor proposal, while actively seeking other investment partners. An Announcement of Opportunity has been published to formally solicit equity partners from industry. Opportunities, however, have developed without any aggressive direct marketing effort. This begs the question regarding the potential level of interest of other parties, both in and out of the space industry. Some specific sources of capital outside of the space industry that will be evaluated include:

- Venture Capital companies
- Banks and Investment Banks
- Corporations
- Foundations and other nonprofit organizations
- Government agencies

While the space industry is a natural ally and source of funding, these other groups represent sources of revenue which should be pursued. Venture capital companies are known for requiring a high rate of return and would not typically have an interest in this type of venture. Nonetheless, they are an outstanding source of information and connections to other investor groups. In addition, some well endowed Universities such as Yale, for example, invest up to two per cent of their portfolio in high risk ventures. Exhibit V-1 presents high potential investor groups.

The actual market value of the Wallops Spaceport operation can be tested through pursuit of other investment partners. VSFC recognizes that it is important not to act precipitously in entering into any partnership agreement that possibly undervalues the financial potential of the Spaceport. Safeguards and procedures to reassess and equitably distribute profits can be built into the partnership. It is, however, far better to accurately estimate costs and the opportunity from the outset. For purposes of discussion, issues covered in this section include:

- Cost estimates, operating expenses and projected revenue streams for the VSFC Spaceport
- Marketing, sales and other unfunded expenses
- Financing alternatives

The use of debt instruments is covered in the plan as an option which would be explored as needed.

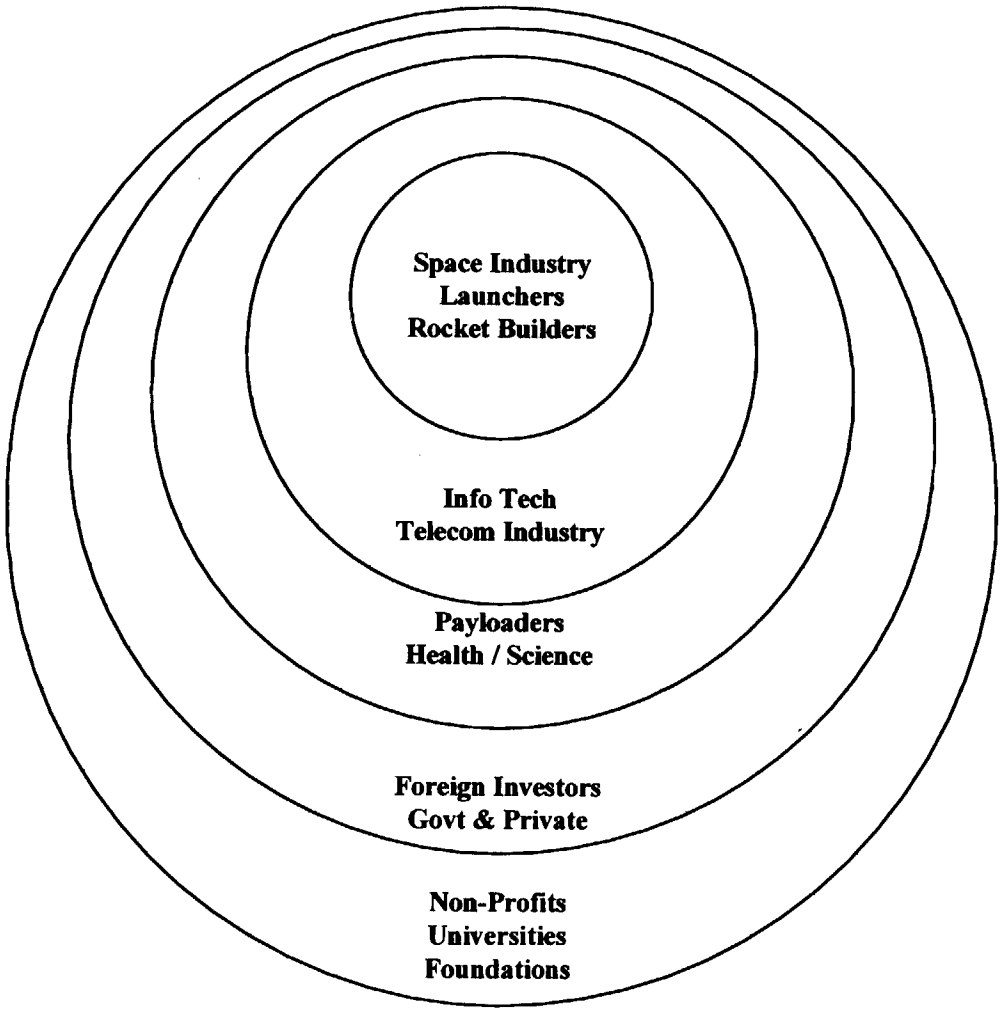
1. VSFC Capital Funding Requirements and Projected Cash Flows are Realistic Best Estimates

As shown in Exhibit V-2, total projected Spaceport construction costs are approximately $8 million. This cost estimate was provided by BRPH Architects & Engineers of Melbourne, Florida. They were selected as the design firm for the VSFC, through a competitive process, because of their extensive experience in the development and construction of space launch facilities worldwide and a highly competitive price quote. BRPH did the designs for NASA WFF Launch Pad 0-A and for the Alaska Spaceport. The Alaska Spaceport Kodiak Launch Complex is the basic cost model for the VSFC since it is nearly identical in design requirements to that of Launch Pad 0-B.

Annual operating costs and revenues, shown in Exhibit V-3, were developed with the guidance of several knowledgeable industry professionals. Estimates of NASA WFF costs were provided by WFF and are based upon customer pricing under the Commercial Space Launch Act.

Exhibit V-1

VCFSA High Potential Investors / Partners



Virginia Space Flight Center
Spaceport Construction Estimates

Exhibit V-2

Launch Site Facility Cost Breakdown

Launch Site	
Earthwork	$86,000
Paving & Utilities	$234,000
Pad Apron	$178,000
Foundation & Pilings	$216,000
Launch Mount/Flame Duct	$248,000
Siding/Enclosure Panels	$400,000
Insulation	$46,000
Roof & Deck	$10,000
SUBTOTAL	$1,418,000
Launch Tower	
Service Tower	$2,400,000
Mechanical/HVAC	$258,000
Electrical	$345,000
SUBTOTAL	$3,003,000
Special Equipment	
Elevator	$150,000
Crane (75T)	$800,000
SUBTOTAL	$950,000
Adjustments	
Escalation (3.5% to 6/97)	$187,985
Contingencies (5%)	$268,550
SUBTOTAL	$456,535
Fees	
Design	$127,300
Review and Coordination	$8,000
Drawing Review	$5,000
Construction Admin.	$10,500
Geotech and Survey	$7,000
Environmental	$100,000
SUBTOTAL	$157,800
Total Cost	$5,985,335

PPIF Cost Breakdown

Building Modification	$1,600,000
Adjustments	
Escalation (3.5% to 6/97)	$56,000
Contingencies (5%)	$80,000
SUBTOTAL	$136,000
Fees	
Design	$62,700
Review and Coordination	$4,000
Drawing Review	$3,000
Construction Admin.	$5,000
Geotech and Survey	$1,000
Environmental	$50,000
SUBTOTAL	$125,700
Total Cost	$1,861,700

TOTAL CONSTRUCTION COST	$7,847,035

Exhibit V-3

Wallops Space Flight Center
Spaceport Cost and Revenue Summary
(Based on a Steady State Operation of Six Launches per Year)

Annual Fixed Operating Costs

Facilities Maintenance Costs		$75,000
Space Flight Center Administration (VCSFA)		
Personnel (3 professional/1 clerical)	$315,000	
Administrative Travel & Per Diem	$25,000	
Administrative Services	$75,000	
Marketing & Business Development	$50,000	
Physical Facilities & Equipment	$20,000	
Subtotal		$485,000
Spaceport Insurance		$50,000
Spaceport Operating Expenses		$500,000
Interest on Debt ($3.2M @ 5%)		$160,000
Investor Return on Investment (15%/yr on $3M)		$600,000
Total Fixed Cost		**$1,870,000**

Variable Costs on Per Launch Basis

NASA WFF Range Fees (See Note)	$250,000	
Special Equipment	$20,000	
Supplies & Services	$50,000	
Total Variable Cost		**$320,000**

Revenues From Launch Operations Per Launch

Pad & Facilities Time, NASA WFF Range Fees and VSFC Technical Support Services (See Note)	**$750,000**

Note: NASA WFF range fees are estimated. Variations will be reflected in both the variable costs and revenues per launch.

In order to develop financial projections, a specific scenario of activity and financing was assumed. The launch activity (sales forecast) is derived from the Lockheed Martin industrial study. Financing is based on a scenario which includes the EDA Grant, a $406,000 NASA grant, State matching funds, a $3 million investment by an industrial partner, and $3.2 million financed through low cost, tax free revenue bonds.

The following describes some of the cost elements shown in Exhibit V-3, which will require further assessment as events transpire:

- Insurance--$50,000, based on determinations by NASA and the Virginia Department of Risk Management. This coverage assumes that all insurance, waivers and indemnification associated with the processing and launch of the launch vehicle are carried by the launch operator (the standard way of doing business on a Federal launch range).

- Marketing and Business Development--Assuming shared (by VSFC and its industrial partner) responsibility for this function, the $50k figure is adequate to cover probable costs associated with activities such as advertising and promotion in the early stages of VSFC development. This figure should be reassessed based on needs and the experience of other Spaceports.

- Legal--There will be some expenses incurred in the development of partnership agreements and in the structuring of financial strategies. This is not isolated in the Exhibit, since it is assumed that required funds are embedded in the personnel and business development budgets.

- Interest on debt--This estimate is based on the issuance of tax-exempt state revenue bonds to fund part of the VSFC project ($3.2M @ 5% or $160,000 annual interest). The amount financed will vary, depending on availability of financing through industrial partnerships and other state and federal assistance.

- Return on investment by industrial partner--An annual expense of $600,000 is projected. This reflects a 10 year capital recovery of $3 million investment at 15%. Since it is likely that the industrial partner will also function as the Commercial Spaceport Operator, some or all of the Spaceport Operating Expenses will also be available as return on investment.

The projected price for supporting a commercial orbital launch has been established at $750,000. This is approximately 25% below the nearest competitor's price.

With these costs and pricing, once steady state operations have been achieved, the break-even point for operations will be between 4 and 5 launches per year. This is more clearly shown on the pro-forma income statement presented as Exhibit V-4. The exhibit also demonstrates a robust net income of $700 thousand ***after debt service and return on investment for the industrial partner***, at the expected average launch rate of 6 per year (refer to year 2005).

Pro-forma Income Statement for Spaceport Operations

($ x 1,000)

Year	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Number of Launches	0	2	4	5	8	5	8	8	6	5	5	5
Net Operating Revenue	$175	$1,500	$3,000	$3,750	$6,000	$3,750	$6,000	$6,000	$4,500	$3,750	$3,750	$3,750
Variable Expenses	$0	($795)	($1,410)	($1,530)	($2,490)	($1,530)	($2,490)	($2,490)	($1,850)	($1,530)	($1,530)	($1,530)
Gross Margin	$175	$705	$1,590	$2,220	$3,510	$2,220	$3,510	$3,510	$2,650	$2,220	$2,220	$2,220
Fixed Operating Expenses	($175)	($860)	($985)	($1,160)	($1,185)	($1,185)	($1,185)	($1,185)	($1,185)	($1,185)	($1,185)	($1,185)
Operating Income	$0	($155)	$605	$1,060	$2,325	$1,035	$2,325	$2,325	$1,465	$1,035	$1,035	$1,035
Other Expenses												
Interest on Debt	$0	($140)	($160)	($160)	($160)	($160)	($160)	($160)	($160)	($160)	($160)	($20)
Return on Investment	$0	$0	($600)	($600)	($600)	($600)	($600)	($600)	($600)	($600)	($600)	($600)
Net Income	$0	($295)	($155)	$300	$1,565	$275	$1,565	$1,565	$705	$275	$275	$415

Notes:
1. Launch schedule reflects Lockheed Martin market study, with projections slipped by one year. The 2 launches in 1998 consist of one USAF OSP launch and one commercial orbital launch. No other OSP missions are included in launch projections.
2. Contributions to sinking fund are not shown on this statement. They would reduce net income for the applicable years.
3. The $175K net operating revenue shown for 1997 is derived from CIT operating funds and a NASA grant.

Exhibit V-4

Another critical aspect of the data in Exhibit V-4 is the net operating losses shown for 1998 and 1999. This implies that the operation will require some additional financial support during this "start-up" period.

A more detailed analysis of the expected cash flows is provided by Exhibit V-5. It shows that there will be a ***net cumulative cash surplus of approximately $3.7 million, after retirement of all debt and return on investment***, by the end of 2008. This is assuming that no unscheduled maintenance or upgrades to the facilities are accomplished. These funds may be used to leverage other revenue generating projects, or for any other purpose considered advisable by the VCSFA Board. The Exhibit also highlights a net cash deficit in 1998 and 1999, due to the effects of investing and financing cash flows. The implication is that additional cash will be required to float the development and operation of the VSFC. While it is possible that additional grants and other external sources of funding will become available, this situation can also be ameliorated by restructuring the schedule of debt repayment or ROI for the industrial partner.

If it becomes evident that the market will not materialize as quickly as predicted, it is possible to delay the development of the fully operational launch facility (and the associated financial burden) as necessary. It is likely, however, that some period of cash deficit will occur since there is a one to two year lead time for the development of the improved facilities.

Exhibit V-4 shows no net income or loss for 1997. Exhibit V-5 shows a neutral cash flow from operations in the same year. This assumes a "steady state" of activity at the VSFC - that is, only limited efforts in the critical initiatives in the areas of marketing, business development and financing will be undertaken in 1997. This steady state is not a desirable condition in light of the imminent market and progress by the competition.

Note that inflation is not treated in the pro-forma financial statements. It is assumed that the pricing of launch services will inflate at the same rate as the costs of doing business.

As introduced, Exhibits V-4 and V-5 depict a likely scenario of VSFC activity and financing. Since many scenarios are possible, financing of the VSFC should be an on-going concern, with projections updated as the environment changes.

2. Cost Containment and Competitiveness are Assured Through Use of NASA Assets

To contain costs, the VSFC will rely on NASA WFF resources which permit the provision of launch services at significantly lower cost than that of other spaceports including Florida, the closest direct competitor. The use of NASA services, staffing and facilities offers a substantial cost and competitive advantage to both commercial customers and service providers.

Pro-forma Statement of Cash Flows

	1997	1998	1999	2000	2001	2002
Cash flows from Operating Activities						
Number of Launches	0	2	4	5	8	5
Net Operating Revenues	$175,000	$1,500,000	$3,000,000	$3,750,000	$6,000,000	$3,750,000
Fixed Operating Costs						
VCSFA Management & Admin. Fees	($150,000)	($490,000)	($490,000)	($490,000)	($490,000)	($490,000)
Marketing and Business Development	($25,000)	($50,000)	($50,000)	($50,000)	($50,000)	($50,000)
Admin. Facilities and Equipment	$0	($20,000)	($20,000)	($20,000)	($20,000)	($20,000)
Spaceport Liability Insurance	$0	($50,000)	($50,000)	($50,000)	($50,000)	($50,000)
Spaceport Operating Expense	$0	($250,000)	($350,000)	($500,000)	($500,000)	($500,000)
Launch Facilities Maintenance	$0	$0	($25,000)	($50,000)	($75,000)	($75,000)
Variable Costs						
NASA Range Fees	$0	($500,000)	($1,000,000)	($1,250,000)	($2,000,000)	($1,250,000)
Special Equipment	$0	($65,000)	($80,000)	($100,000)	($160,000)	($100,000)
Supplies and Services	$0	($30,000)	($130,000)	($180,000)	($330,000)	($180,000)
Fees to EER for Tower and Support	$0	($210,000)	($210,000)	$0	$0	$0
Contribution to Sinking Fund	$0	$0	($240,000)	($300,000)	($480,000)	($300,000)
Total Cash from Operating Activities	$0	($165,000)	$355,000	$760,000	$1,845,000	$735,000
Cash flows from Investing Activities						
Design and Construction of Launch Pad	($1,800,000)	$0	$0	$0	$0	$0
Design and Construction of Service Tower	($1,400,000)	($3,000,000)	$0	$0	$0	$0
Design and Construction of PPIF	($500,000)	($1,300,000)	$0	$0	$0	$0
Sinking Fund	$0	$0	$240,000	$300,000	$480,000	$300,000
Total Cash from Investing Activities	($3,700,000)	($4,300,000)	$240,000	$300,000	$480,000	$300,000
Cash flows from Financing Activities						
Federal Grants	$1,306,000	$0	$0	$0	$0	$0
State Grants & Matching Funds	$900,000	$0	$0	$0	$0	$0
Industrial Partner Investment	$2,000,000	$1,000,000	$0	$0	$0	$0
Issuance of Bonds/Notes	$0	$2,800,000	$400,000	$0	$0	$0
Interest/Repayment of Debt	$0	($140,000)	($160,000)	($160,000)	($160,000)	($160,000)
ROI for Industrial Investment			($600,000)	($600,000)	($600,000)	($600,000)
Total Cash from Financing Activities	$4,206,000	$3,660,000	($360,000)	($760,000)	($760,000)	($760,000)
Net Increase/Decrease in Cash	$506,000	($805,000)	$235,000	$300,000	$1,565,000	$275,000
Cash at Beginning of Year	$0	$506,000	($299,000)	($64,000)	$236,000	$1,801,000
Net Cumulative Year-end Cash Position	$506,000	($299,000)	($64,000)	$236,000	$1,801,000	$2,076,000

Exhibit V-5 (Sheet 1 of 3)

Pro-forma Statement of Cash Flows

	2003	2004	2005	2006	2007	2008
Cash flows from Operating Activities						
Number of Launches	8	8	6	5	5	5
Net Operating Revenues	$6,000,000	$6,000,000	$4,500,000	$3,750,000	$3,750,000	$3,750,000
Fixed Operating Costs						
VCSFA Management & Admin. Fees	($490,000)	($490,000)	($490,000)	($490,000)	($490,000)	($490,000)
Marketing and Business Development	($50,000)	($50,000)	($50,000)	($50,000)	($50,000)	($50,000)
Admin. Facilities and Equipment	($20,000)	($20,000)	($20,000)	($20,000)	($20,000)	($20,000)
Spaceport Liability Insurance	($50,000)	($50,000)	($50,000)	($50,000)	($50,000)	($50,000)
Spaceport Operating Expense	($500,000)	($500,000)	($500,000)	($500,000)	($500,000)	($500,000)
Launch Facilities Maintenance	($75,000)	($75,000)	($75,000)	($75,000)	($75,000)	($75,000)
Variable Costs						
NASA Range Fees	($2,000,000)	($2,000,000)	($1,500,000)	($1,250,000)	($1,250,000)	($1,250,000)
Special Equipment	($160,000)	($160,000)	($120,000)	($100,000)	($100,000)	($100,000)
Supplies and Services	($330,000)	($330,000)	($230,000)	($180,000)	($180,000)	($180,000)
Fees to EER for Tower and Support	$0	$0	$0	$0	$0	$0
Contribution to Sinking Fund	($480,000)	($480,000)	($360,000)	($300,000)	($300,000)	($300,000)
Total Cash from Operating Activities	$1,845,000	$1,845,000	$1,105,000	$735,000	$735,000	$735,000
Cash flows from Investing Activities						
Design and Construction of Launch Pad	$0	$0	$0	$0	$0	$0
Design and Construction of Service Tower	$0	$0	$0	$0	$0	$0
Design and Construction of PPIF	$0	$0	$0	$0	$0	$0
Sinking Fund	$480,000	$480,000	$360,000	$300,000	$300,000	$300,000
Total Cash from Investing Activities	$480,000	$480,000	$360,000	$300,000	$300,000	$300,000
Cash flows from Financing Activities						
Federal Grants	$0	$0	$0	$0	$0	$0
State Grants & Matching Funds	$0	$0	$0	$0	$0	$0
Industrial Partner Investment	$0	$0	$0	$0	$0	$0
Issuance of Bonds/Notes	$0	$0	$0	$0	$0	$0
Interest/Repayment of Debt	($160,000)	($160,000)	($160,000)	($160,000)	($2,960,000)	($420,000)
ROI for Industrial Investment	($600,000)	($600,000)	($600,000)	($600,000)	($600,000)	($600,000)
Total Cash from Financing Activities	($760,000)	($760,000)	($760,000)	($760,000)	($3,560,000)	($1,020,000)
Net Increase/Decrease in Cash	$1,565,000	$1,565,000	$705,000	$275,000	($2,525,000)	$15,000
Cash at Beginning of Year	$2,076,000	$3,641,000	$5,206,000	$5,911,000	$6,186,000	$3,661,000
Net Cumulative Year-end Cash Position	$3,641,000	$5,206,000	$5,911,000	$6,186,000	$3,661,000	$3,676,000

Exhibit V-5 (Sheet 2 of 3)

Pro-forma Statement of Cash Flows

Notes:

1. Launch rates are those projected by the Lockheed Martin industry study, slipped by one year. The 1998 launches are likely to be the first USAF OSP launch and a commercial launch (see Notes 6 and 7).
2. Interest on $3.2M debt is estimated at 5% per year with return of principal due in year 10.
3. ROI for industrial partner is estimated at 15% with a capital recovery period for initial $3M investment of 10 years.
4. It is assumed that EER will support one launch each in 1998 and 1999.
5. Sinking fund transactions are shown by equivalent cash outflows from operating activities and inflows to investing activities
6. Cash flows from operating activities only include those resulting from commercial orbital operations. For this analysis, a 1998 USAF OSP launch is considered a commercial operation.
7. Special Equipment for 1998 includes $45K for a Minuteman II launch mount, in the event that the 1998 launch is a USAF OSP mission.
8. Other sources of funding which will reduce the overall debt and equity service, such as other federal and state grants, have not been included in the financing cash flows.
9. The $175,000 revenue shown for 1997 is from CIT and NASA grants.
10. In 1998, no contribution is made to the sinking fund due to net operating loss.
11. The Supplies and Services variable cost element includes a contract administration services fee.

Exhibit V-5 (Sheet 3 of 3)

Provision of WFF resources by NASA fulfills its goal to support the emerging commercial space industry through technology transfer. Also, commercial partnerships will not interfere with on-going NASA programs or operations, but will result in efficiencies through sharing of cost and operating responsibilities.

In the early phases of development, the VSFC will rely heavily upon NASA WFF resources for:

- Launch monitoring and control
- Vehicle and payload flight certification
- Range tracking and clearance
- Range safety and flight termination
- Facilities

It is anticipated that some of these functions will be transferred to commercial subcontractors with VSFC business growth. The gradual shift in operations management functions will produce potential revenue streams for the VSFC and free NASA to fulfill its strategic objectives to refocus resources into scientific research and development.

The highly experienced support of NASA assures the development of private capability that is technically sound and safe.

3. Financial Risk Will be Minimized By Sound Private Sector Partnerships, Strategic Market Planning and Creative Financing

While risks can never be completely eliminated from any venture, they will be minimized by:

- Aggressive marketing of the VSFC partnership opportunity to appropriate investor groups
- Development of alternative sources of funding in both public and private sectors
- Pre-selling customers directly to determine what they need and then meeting those needs, and securing commitments in the form of written agreements
- Development of income generating businesses.

4. Financial Strategies Will be Assessed to Ensure Long-term VSFC Viability

The VSFC will evaluate financing alternatives with due diligence to ensure spaceport development in the most cost effective and efficient manner.

The private sector proposals being evaluated are quite similar in the financial assumptions and results anticipated. However, it would not be reasonable to rely upon the financial projections presented by potential vendors without independently verifying the accuracy of this information.

Since it is anticipated that the VSFC will generate considerable revenue, resources will be committed to establish a corporate structure to capture and reinvest additional revenues from the venture on behalf of the Commonwealth.

If, following further analysis, the project is viewed as entailing excessive risk, the VSFC can shift more operating responsibility to the private sector, but would thereby surrender the right to the higher potential return associated with such risks.

The VSFC might determine that the best way to finance the venture is through the prepayment of license fees, launch fees or capital improvements. The potential venture partner would pay an up-front fee (referred to in the financial projections as "investment" by industrial partner) and then have the right to exploit the opportunity in order to recover its investment. After the capital and a prescribed interest rate has been returned to the investor, the revenue would then be shared at a pre-established rate.

In this scenario, the total return on investment must be deconstructed into its component parts. First is the cost of capital (i.e. the effective interest rate charged by the partner for the capital advanced to the VSFC). Second is any management fee earned by the licensee on an ongoing basis for services rendered (i.e. marketing, operations, etc.).

The financial projections (Exhibits V-3 and V-5) show such a division of components of the cash flows. If the partner provides minimum operational services, then the effective rate of interest would be quite large, since return on equity would be the only avenue by which the investment could be recovered. These kinds of financial issues would be carefully considered in the development of contracts and operating agreements with prospective partners.

Because of the legal structure of the Authority, the project may be financed through grants, appropriations, debt, industrial investments, revenues from associated activities, or a combination of those sources of funds. The debt alternatives available to the Board include:

- An offering of the debt to the general public in accordance with the requirements of the Securities Act of 1933 (the "Securities Act")

- A private placement of debt with qualified institutional buyers or accredited investors.

Because the VSFC is a not-for-profit agency of Virginia, it might be granted the authority to issue government bonds that would qualify for certain tax and Securities Act exemptions. Such an offering would require the assistance of legal counsel experienced in such offerings. The nature of the government bonds would depend upon the perceived risk of default under the obligations, which in turn, depends upon the due diligence report. The VSFC could send out invitations to discrete firms to explore the alternatives available.

Because of the risks associated with the venture, the Authority might issue high-yield securities to the public markets. High yield securities carry a rather high rate of interest (in excess of prime plus eight) and rather strict covenants that limit the flexibility of management to deviate from a prescribed business plan. However, once the business plan is finalized, this form of security might be an attractive financial alternative for the VSFC to consider.

Spaceport Florida has issued "conduit bonds" which are not backed by the state's tax dollars. Instead, Florida issues bonds on behalf of companies who are responsible for repayment of the debt or who make other arrangements for repayment of the debt. Bonds are being used in Florida to finance the Apollo/Saturn V Center museum and educational center.

Instead of making a public offering of the debt, the VSFC might elect to make a private placement of the debt to certain institutional investors under Regulation D promulgated under the Securities Act. Regulation D is a "safe harbor" for offerings made under Section 4(2) of the Securities Act that do not involve a "public offering."

Because the term "public offering" is not defined, the SEC promulgated rules which define certain types of offerings that are not considered to be "public" and therefore are exempt from the regulation requirements of the 1933 Act.

The parties most likely to be interested in holding debt issued by the Authority would be the very parties that would use the facility or provide services to the facility. Therefore, when making a list of the contacts in the satellite industry, it is essential to be sensitive to the dual role these parties might play in the venture that is as customer, service provider, and debt holder.

A more traditional protocol is that a company draft an offering memorandum describing the debt and its business and send the memorandum to certain investment banks that specialize in private offerings. The bankers will then work with the issuer to define the terms of the security and place it with institutional investors. Therefore, the VSFC should have a good estimate of the potential profits to be generated by the facility and should "shop the deal" to as many qualified participants as possible.

To attract industry partners and serve as a magnet for space industries, the VSFC will encourage development of incentives. A sales tax exemption for business conducted under the auspices of the VCSFA has been enacted by the Virginia legislature. Consideration is also being given to establishment of a Foreign Trade Zone and an Enterprise Zone, which would provide users additional incentives. Incentives such as these have been used successfully to attract Motorola, Mitsubishi and other major firms to the state, and are in keeping with Virginia's economic

development goals. An incentives plan will be constructed by building upon the experiences of other states.

5. Release of Economic Development and Start Up Funding Will Speed Realization of VSFC Potential

In order to proceed, to operate effectively and to take advantage of the immediate market opportunity, the VSFC needs funding. Based on market assessments and the level of interest expressed by potential investors, it is essential and urgent that funding be released.

Exhibit V-6 illustrates the funding profile used to develop the financial projections. As discussed previously, construction and development costs are estimated at $ 8 million. VSFC has $900,000 available for the project. Of this, $525,000 is from industrial contributions. The remaining $375,000 is from State appropriations. In addition, the VSFC has been awarded $900,000 from the U.S. Department of Commerce, Economic Development Administration, and $406,000 from NASA. It is anticipated that some additional funding will be available through other federal and state grants and appropriations. However, since their availability is uncertain, the remaining funds sre assumed to be provided through industrial partnerships and Authority debt.

The VSFC has operated with minimum funding. By continuing at this meagerly level of investment, certain critical functions can not be accomplished. Exhibit V-3 projects an annual fixed cost of $485,000 for on-going management of the operation.

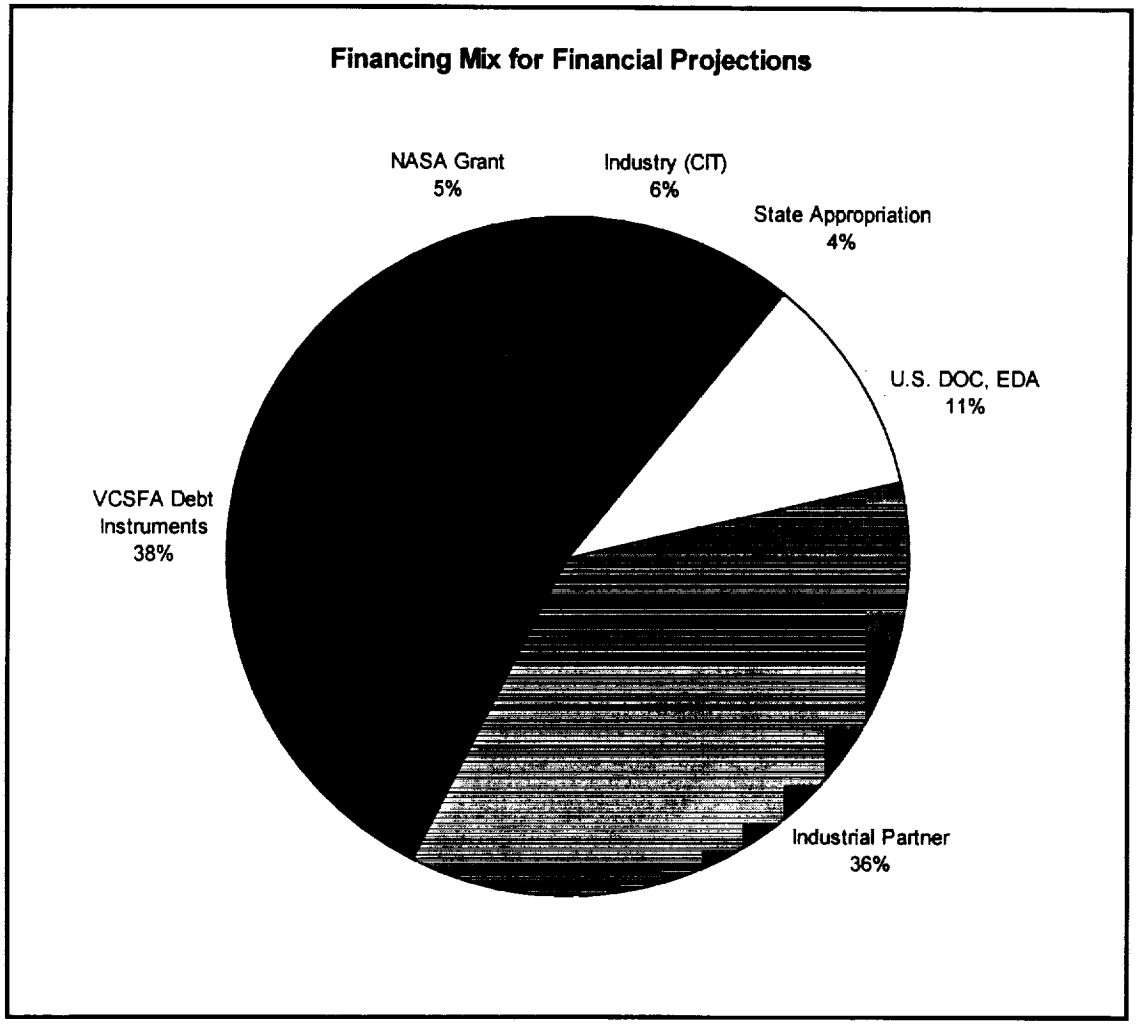
In 1996 and 1997, Virginia's CIT funded the VSFC at $100,000. NASA Headquarters funded an additional $50,000 for marketing initiatives, to be expended in 1997. Additional funding, which approaches the $485,000 level is required to:

- Further define the scope of the project and develop management control systems and procedures
- Market the VSFC and get customers on a launch manifest
- Develop industrial partners interested in investment and in operation of the spaceport
- Perform independent due diligence to determine that resources are applied judiciously

With the award by the Air Force of $6,000,000, VSFC has its first launch services contract and customer. The contract requires launch support for as many as six launches of Minuteman II and other vehicles, for scientific missions, over the next five years. The first of these launches is included as a 1998 launch in the financial projections. None of the other five potential launches are included in the market projections used to develop the financial statements. Aside from its financial significance, this award lends support to the viability of the VSFC.

Investor interest appears high at the moment, but further delay in funding will result in a loss of potential market share to competitors.

Exhibit V-6



VI VSFC Implementation Plan, Recommendations and Next Steps

1. Models for Spaceport Implementation

The development of the VSFC has precedent. Spaceports at Cape Canaveral, Florida and Vandenberg Air Force Base, California are further along in development. The Alaskan spaceport at Kodiak Island is on the verge of ground-breaking. Each has its own unique development process, but all use a combination of State and Federal funding for start-up and operations. Alaska and Florida relied particularly heavily on state financing.

The model which most closely resembles the VSFC philosophy is that of the California Spaceport. The Western Commercial Space Center (WCSC), a non-profit corporation, has been designated, by legislative action, as the California Spaceport Authority. Its charter is to foster the development of commercial launch, manufacturing and academic and research operations related to space flight. The WCSC generated a for-profit spin-off corporation known as California Commercial Spaceport, Inc. (CCSI) to develop the business aspects of the Spaceport. CCSI subsequently entered into a limited partnership with ITT Defense and Electronics to form Spaceport Systems International (SSI), the commercial spaceport operator. In that partnership, ITT has agreed to finance spaceport development in return for future considerations. SSI has recently signed a 25 year lease with the Air Force, for use of Space Launch Complex 6 at Vandenberg, and is currently using state and federal grants, along with ITT contributions, to develop the spaceport infrastructure.

These models, along with proposals and suggestions from various industry sources, have been used to shape the following implementation plan.

2. Use Agreement for NASA Facilities and Services

VSFC is unique since it is the only "Spaceport" which will operate on NASA property. Therefore, a critical element of VSFC development is the formal agreement or set of agreements with NASA that establish the terms under which VSFC will exist. The agreements delineate enhancements to NASA property and define support and services as necessary. No physical spaceport development could be undertaken prior to the establishment of these agreement(s) in March 1997.

The auspices under which the agreements are made are based on Federal law: the National Aeronautics and Space Act, the Commercial Space Launch Act (As Amended) and Title 49, Subtitle IX of the U.S. Code. All of these pieces of legislation encourage NASA to cooperate with public and private organizations to effectively use the launch assets of the United States.

Specifically, the agreements enable:

- Access to the VSFC for personnel, subcontractors and customers

- Construction and improvement of the physical infrastructure
- Use of NASA facilities and personnel, on a direct ("delta") cost reimbursable basis
- Provision of NASA technical data required for development and operation of the Spaceport
- Connection to utilities and data transfer facilities existing on NASA property.

Additional formal agreements with NASA will be necessary to cooperatively develop the research and education opportunities within the Center for Excellence. Since the Center's development is not as advanced as the Spaceport's, those agreements are not as critical at this juncture. They will, however, be pursued with due diligence at the appropriate time.

3. Initiation of this Business Plan

Exhibit VI-1 shows the planned phased approach from a financial resources standpoint. Phase I will include the following activities:

- Start up of operations using the existing Pad 0-A infrastructure
- Intensive efforts in marketing, to secure launch and other business commitments
- Intensive efforts to identify and secure the remainder of the finances necessary to proceed to Phase II
- Development and construction of the concrete launch pad at Pad 0-B.

Funding for this phase will be provided by State, industrial, EDA and NASA grant money which is now available.

Phase II will employ the additional financing generated in Phase I, along with income generated from launch operations, to accomplish the following:

- Development and construction of the Pad 0-B service tower and the Payload Processing and Integration Facility (PPIF)
- Fund full scale operations of a Commercial Spaceport Operator
- Intensified marketing and business development.

Phase II will be undertaken as financing is available and the business backlog (in launch commitments) justifies proceeding. This can begin as early as the third quarter of CY-97. Latest

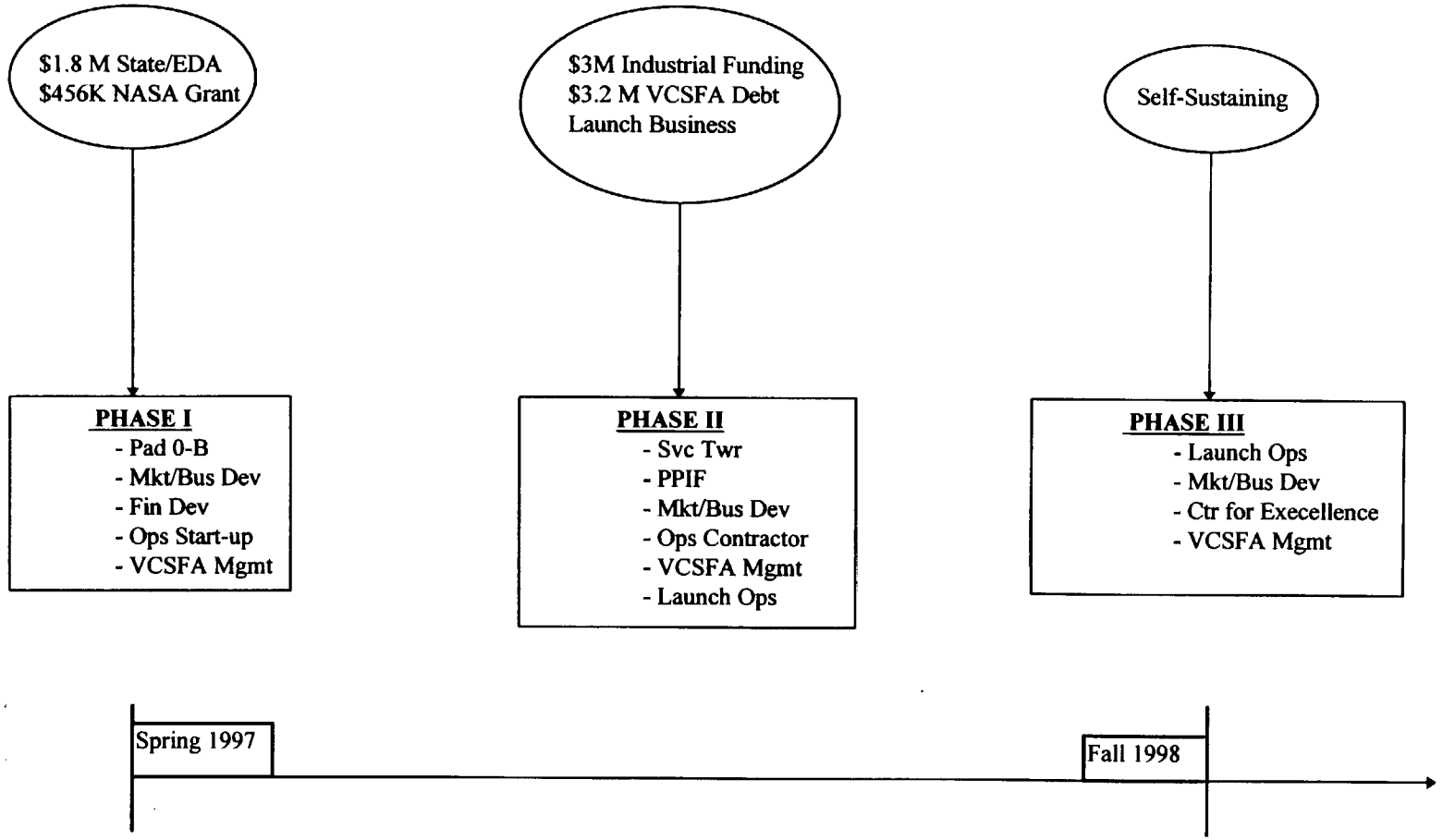


Exhibit VI-1. VSFC Phased Implementation Plan

possible start time depends on the emergence of the launch market for the larger vehicles, given a one year lead time for development.

Phase III is achieved when the VSFC becomes financially self-sustaining. As discussed previously, this will occur when the revenues derived from all operating sources are equivalent to a launch rate of four per year. At this time, the development of those elements of the Center for Excellence that require funding support can be undertaken. There is no hard date associated with Phase III, but the pro-forma financial statements indicate that it will occur sometime in late CY-98 or into CY-99.

Exhibit VI-2 shows a more detailed view of the sequence of events. Three event streams (securing NASA Use Agreements, obtaining a DOT Spaceport Operator License and establishing working agreements with EER Systems Corp.) are shown as on-going at present. These activities require the use of existing Pad 0-A to begin launch operations.

Board approval of this plan has initiated three actions.

- With funding from EDA/NASA in place and the NASA Agreements signed, development of the Phase I physical infrastructure will began in February 1997 by contracting with a design agent.

- Funding of intense business development and financing efforts has been authorized. These marketing initiatives will culminate in the capture of launch and other related business and in the generation of an industrial/state/federal partnership for financing and operating the spaceport.

- As the requirements emerge, start-up funding for operations will be provided from either Phase I or Phase II funding sources, as necessary. These funds will be used to cover the cost of insurance, commercial operator fees, up-front payments for NASA services, modifications to existing (Pad 0-A) infrastructure and other costs necessary to begin generating revenues from launch operations.

As shown in Exhibit VI-2, the signal to proceed for Phase II development will be predicated on obtaining the necessary financing and building a high level of confidence through firm commitments from investors and customers.

Launch operations, as depicted on Exhibit VI-2, can be from either Pad 0-A (in Phase I, and into Phase II as necessary) or Pad 0-B (subsequent to Phase I completion). The "Commercial Operator" is likely to be EER for initial launch operations using their service tower. Subsequently, commercial operations will be undertaken either by the industrial funding partner (if so specified in the partnership agreement) or by an independently contracted commercial entity. The dotted arrow connecting the commercial operator to the Phase I development event represents the desire of the VCSFA to convey as much activity as possible to the private sector, as early as possible. If the commercial operator is selected early in the development cycle, that it will act as construction manager for Phase I.

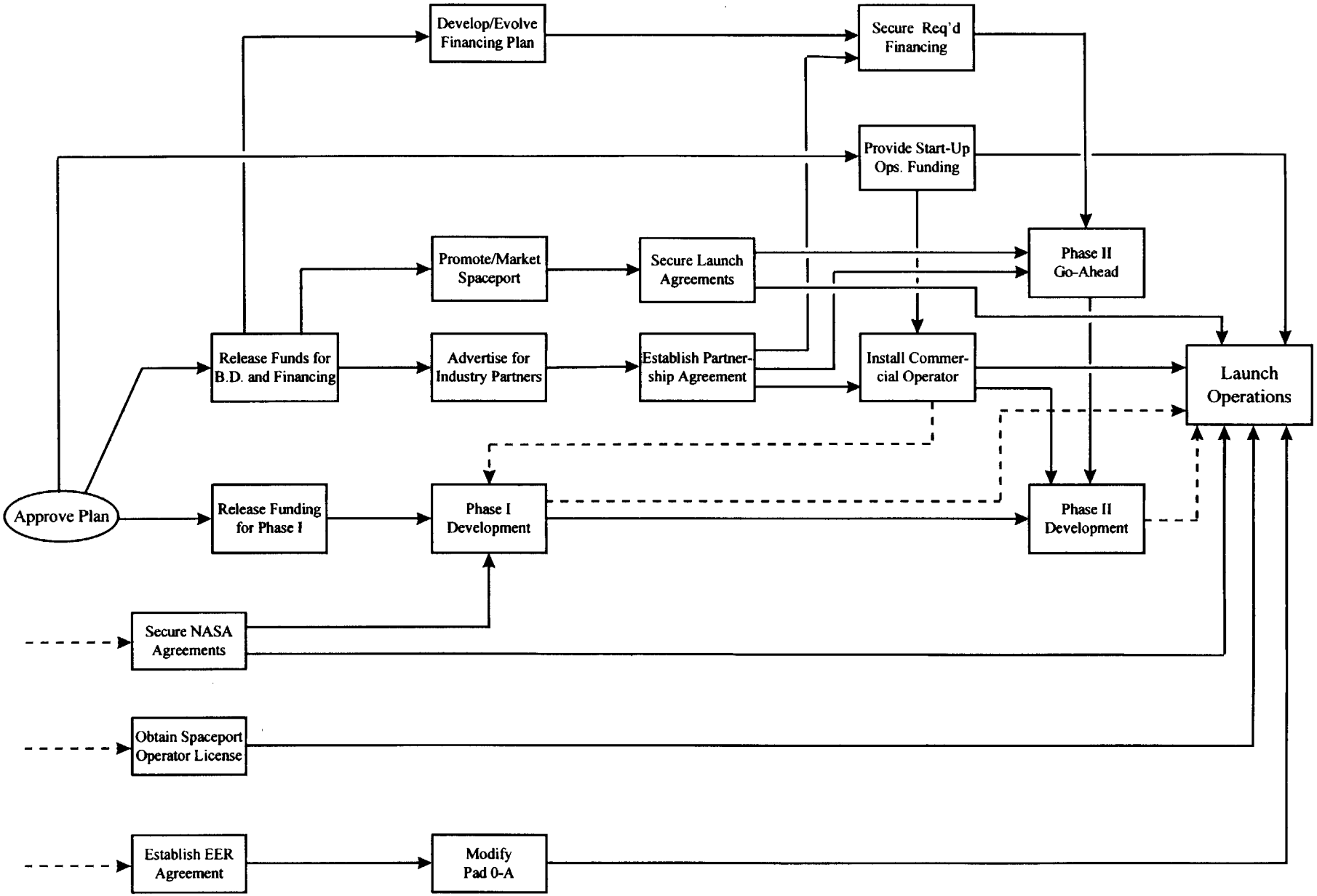


Exhibit VI-2. Implementation Event Flow

Of the events anticipated in the near term, development of Phase I infrastructure and acquisition of a Spaceport Operator License involve important subtasks as follows:

Prior to construction of the Pad 0-B facility, VSFC management had to:

- Select a design agent and contract for the final design (2/97)
- Contract for the conduct of Environmental Assessments for the pad and PPIF (11/96)
- Contract for a construction manager (1/97).

As part of the licensing process VSFC must:

- Develop a Spaceport Explosives Site Plan
- Develop a Spaceport Safety Plan
- Tailor the WFF RSM-93 Range Safety Manual for Spaceport operations.

The VSFC Business Plan establishes a framework for development of the VSFC in the Commonwealth. The plan is intended to illuminate key issues for consideration.

Basic recommendations related to implementation of the VSFC Business Plan are summarized as follows:

- **Finance**
  - Access the $2.2 million in funding to continue development of VSFC (1/97)
  - Continue to develop potential private sector investors both in and out of the space industry. Pursue negotiations with ITT, SPACEHAB, Lockheed Martin, Pegasus Group and others
  - Explore development of alternative financial strategies including revenue bonds
  - Organize funding through the Commonwealth or other sources to cover startup operational costs
  - Develop additional grants and contracts through government, foundations and other non profit organizations.
- **Marketing**
  - Further develop and execute sales and marketing plans

- Conduct customer needs assessment and pre-selling of high potential customers
- Develop and distribute promotional materials
- Perform deeper competitor analysis
- Develop strategic marketing alliances with Spaceport California and other potential marketing partners
- Market the VSFC to universities, colleges and school districts throughout the Northeast
- Expand marketing and lobbying activities with the state legislatures and Congress.

- **Organization and Management**
  - Secure operating agreements from NASA, DOT and other relevant government agencies
  - Select core management team
  - Form an industry advisory group
  - Subcontract to specialists in areas including finance and law as needed
  - Develop innovative organizational models for the Spaceport and the Center for Excellence through analyses of best practices in similar business organizations
  - Develop detailed operating plans defining roles and responsibilities, performance measures, spans of control and centers of accountability.

As a result of these activities, numerous benefits will be realized by the Commonwealth, NASA, and the commercial space industry, including:

- A highly competitive, self supporting, commercially viable spaceport within five to six years
- Economic growth and development through the creation of jobs and attraction of space industries
- A proliferation of research, education, training and technology transfer programs.

The Business Plan is a working document which will evolve with VSFC development.

VSFC Business Plan

APPENDICES

APPENDIX A - VCSFA BOARD MEMBERSHIP

Dr. Robert G. Templin, Jr.
VCSFA Chairman
President, Virginia Center for innovative Technology

Dr. James V. Koch
President, of Old Dominion University

Honorable Robert T. Skunda
Virginia Secretary of Commerce and Trade

Joseph C. Casas
President and Chief Executive Officer, SpaceTec

John H. Mehoves
Senior Vice President, Corporate Strategy
Orbital Sciences Corporation

Dr. Brian D. Dailey
Senior Vice President for Business Development
Lockheed Martin Space and Strategic Missiles Sector

Fred Cooke
Director of Community Relations and External Affairs
Bell Atlantic Video Services

Thomas J. Savage, Jr.
Retired Associate Chief Engineering Division
Suborbital Projects and Operations

Frank V. Moore
Former Associate Director of Management Operations
NASA Goddard Space Flight Facility
President, FV Moore and Associates

Edward Weise
President
GTE Telephone Operations, Virginia Region

One vacancy exists due to the death of Mr. Harold C. Hoy

APPENDIX B - INDUSTRY EXPERTS INTERVIEWED

Robert G. Templin
Chairman of the VCSFA Board
President, Virginia's Center for
Innovative Technology

John M. Jerke
Industry Director
Aerospace and Transportation

John H. Mehoves
VCSFA Board Member, Senior Vice
President, Corporate Strategy,
Orbital Sciences Corporation

Ronald J. Grabe
Senior Vice President Business
Development, Launch Systems Group
Orbital Sciences Corporation

James E. Hengle
Vice President, EER Systems, Inc.

William A. Sample
Director Operations Analysis and
Systems Development, Lockheed
Martin Space Operations

Ron Sabatino
Technical Operations Analysis and
Systems Development, Lockheed
Martin Space Operations

Stephen Lee Morgan
Director of Business Development,
North American Collection & Location by Satellite, Inc.

Christopher B. Roberts
Director Business Development
CTA Space Systems

Charles J. Williamson
Program Control Manager
CTA,Inc.

Appendix B (continued)
Industry Experts Interviewed

Martin Kazenowski
Marketing Director, SPACETEC

Ernest M. Briel, P.E.
President, BRPH, Architects and Engineers

Rick Fleeter
President, Aero Astro

Peter D. Goldberg
Project Manager, Aero Astro

Kathy J. Nado
Special Assistant for Outreach,
Office of the Director, NASA

Paul Maye
Senior Director, Strategic
Planning and Business Development
Spaceport Systems International

John M. Franke
Physicist, Technology Applications
Group, NASA

APPENDIX C - VIRGINIA COMMERCIAL SPACE FLIGHT AUTHORITY ACT

CODE OF VIRGINIA
TITLE 9. COMMISSIONS, BOARDS AND INSTITUTIONS GENERALLY
CHAPTER 29.1. VIRGINIA COMMERCIAL SPACE FLIGHT AUTHORITY ACT

Current through laws passed at the 1996 Regular Session

Sec. 9-266.1. Short title

This chapter shall be known and may be cited as the "Virginia Commercial Space Flight Authority Act."

Sec. 9-266.2. Definitions

The following terms, whenever used or referred to in this chapter, have the following meanings, except where the context clearly indicates otherwise:

"Authority" means the political subdivision of the Commonwealth created by this chapter.

"Board" means the board of directors of the Authority.

"Bonds" means the notes, bonds, certificates and other evidences of indebtedness or obligations of the Authority.

"Federal agency" means the United States; the President of the United States; and any department, corporation, agency, or instrumentality heretofore or hereafter created, designated, or established by the United States.

"Person" means natural persons, firms, foundations, associations, corporations, business trusts, partnerships, joint ventures and public bodies, including but not limited to the Commonwealth of Virginia; any state; and any agency, department, institution, political subdivision or instrumentality of the Commonwealth or any state.

"Project" means the construction, improvement, furnishing, maintenance, acquisition or operation of any facility or the provision for or funding of any activity that will further the purposes described in Sec. 9-266.3 of this chapter.

Sec. 9-266.3. Declaration of public purpose; Authority created

The General Assembly has determined that there exists in the Commonwealth a need to (i) disseminate knowledge pertaining to scientific and technological research and development among public and private entities, including but not limited to knowledge in the area of commercial space flight, and (ii) promote industrial and economic development. In order to facilitate and coordinate scientific and technological research and development and to promote the industrial and economic development of the Commonwealth, which purposes are declared to be public purposes, there is created a political subdivision of the Commonwealth to be known as the "Virginia Commercial Space Flight Authority." The Authority's exercise of powers conferred by this chapter shall be deemed to be the performance of an essential governmental function and matters of public necessity for which public moneys may be spent and private property acquired.

Sec. 9-266.4. Board of directors

The Authority shall be governed by a board of directors consisting of eleven members, two of whom shall be the President of the Center for Innovative Technology, the President of Old Dominion University, and the Secretary of Commerce and Trade, who shall serve as directors during their terms in offices. The remaining seven members shall be appointed by the Governor as follows: three members representative of the commercial space flight industry; two members representing the telecommunications industry; one member representing the County of Accomack, one member representing the County of Northampton, and one at-large member. Two of such directors appointed by the Governor shall be appointed for terms of one year, three for terms of two years, and three for terms of three years, from the effective date of their appointment; and thereafter the members of the board shall be appointed for terms of three years. All members of the board appointed by the Governor shall be confirmed by each house of the General Assembly. Vacancies in the membership of the board shall be filled by appointment for the unexpired portion of the term. Members of the board shall be subject to removal from office in like manner as are state, county, town and district officers under the provisions of Secs. 24.2-230 through 24.2-238 of the Code of Virginia. Immediately after such appointment, the directors shall enter upon the performance of their duties. The board shall annually elect one of its members as chairman and another as vice chairman, secretary, and a treasurer who may or may not be a member of the board. The board may also elect other subordinate officers, who may or may not be members of the board, as it deems proper. The chairman or, in his absence, the vice chairman shall preside at all meetings of the board. In the absence of both the chairman and vice chairman, the board shall appoint a chairman pro tempore, who shall preside at such meetings. Six directors shall constitute a quorum for the transaction of the Authority's business, and no vacancy in the membership shall impair the right of a quorum to exercise all the rights and perform all the duties of the Authority. The members of the board shall be entitled to reimbursement for their reasonable travel, meal and lodging expenses incurred in attending the meetings of the board or while otherwise engaged in the discharge of their duties. Such expenses shall be paid out of the treasury of the Authority upon vouchers signed by the chairman of the board or by such other person or persons as may be designated by the board for this purpose. The board may employ an Executive Director of the Authority, who shall serve at the pleasure of the board, to direct the day-to-day operations and

activities of the Authority and carry out the powers and duties conferred upon him as may be delegated to him by the board. The Executive Director and employees of the Authority shall be compensated in the manner provided by the board and shall not be subject to the provisions of Chapter 10 (Sec. 2.1-110 et seq.) of Title 2.1 of the Code of Virginia.

Sec. 9-266.5. Powers

The Authority is hereby granted and shall have and may exercise all powers necessary or convenient for the carrying out of its statutory purposes, including, but without limiting the generality of the foregoing, the power to:

1. Sue and be sued, implead and be impleaded, complain and defend in all courts;

2. Adopt, use, and alter at will a common seal;

3. Acquire any project and property, real, personal or mixed, tangible or intangible, or any interest therein, by purchase, gift or devise and to sell, lease (whether as lessor or lessee), transfer, convey or dispose of any project or property, real, personal or mixed, tangible or intangible or any interest therein, at any time acquired or held by the Authority on such terms and conditions as may be determined by the board of the Authority;

4. Plan, develop, undertake, carry out, construct, equip, improve, rehabilitate, repair, furnish, maintain and operate projects;

5. Make bylaws for the management and regulation of its affairs;

6. Fix, alter, charge and collect rates, rentals, fees, and other charges for the use of projects of, the sale of products of, or services rendered by the Authority at rates to be determined by it for the purpose of providing for the payment of the expenses of the Authority; the planning, development, construction, improvement, rehabilitation, repair, furnishing, maintenance, and operation of its projects and properties; the payment of the costs accomplishing its purposes set forth in Sec. 9-266.3; the payment of the principal of and interest on its obligations; and the creation of reserves for such purposes, for other purposes of the Authority and to pay the cost of maintaining, repairing and operating any project or projects and fulfilling the terms and provisions of any agreements made with the purchasers or holders of any such obligations;

7. Borrow money, make and issue bonds including bonds as the Authority may, from time to time, determine to issue for the purpose of accomplishing the purposes set forth in Sec. 9-266.3 or for refunding bonds previously issued by the Authority, whether or not such outstanding bonds have matured or are then subject to redemption, or any combination of such purposes; secure the payment of all bonds, or any part thereof, by pledge, assignment or deed of trust of all or any of its revenues, rentals, and receipts or of any project or property, real, personal or mixed, tangible or intangible, or any rights and interest therein; make such agreements with the purchasers or holders of such bonds or with others in connection with any such bonds, whether issued or to be issued, as the Authority shall

deem advisable; and in general to provide for the security for said bonds and the rights of holders thereof;

8. Make and enter into all contracts and agreements necessary or incidental to the performance of its duties, the furtherance of its purposes and the execution of its powers under this chapter, including interstate compacts and agreements with any person or federal agency;

9. Employ, in its discretion, consultants, attorneys, architects, engineers, accountants, financial experts, investment bankers, superintendents, managers and such other employees and agents as may be necessary, and to fix their compensation to be payable from funds made available to the Authority;

10. Receive and accept from any federal or private agency, foundation, corporation, association or person grants, donations of money, real or personal property for the benefit of the Authority, and to receive and accept from the Commonwealth or any state, and any municipality, county or other political subdivision thereof and from any other source, aid or contributions of either money, property, or other things of value, to be held, used and applied for the purposes for which such grants and contributions may be made;

11. Render advice and assistance, and to provide services, to institutions of higher education including, but not limited to, Old Dominion University, and to other persons providing services or facilities for scientific and technological research or graduate education, provided that credit toward a degree, certificate or diploma shall be granted only if such education is provided in conjunction with an institution of higher education authorized to operate in Virginia;

12. Develop, undertake and provide programs, alone or in conjunction with any person or federal agency, for scientific and technological research, technology management, continuing education and in-service training; however, credit towards a degree, certificate or diploma shall be granted only if such education is provided in conjunction with an institution of higher education authorized to operate in Virginia; foster the utilization of scientific and technological research, information discoveries and data and obtain patents, copyrights and trademarks thereon; coordinate the scientific and technological research efforts of public institutions and private industry and collect and maintain data on the development and utilization of scientific and technological research capabilities;

13. Pledge or otherwise encumber all or any of the revenues or receipts of the Authority as security for all or any of the obligations of the Authority;

14. Appoint an industry advisory board to advise the Authority on issues related to the performance of its duties, the furtherance of its purposes and the execution of its powers under this chapter. The Authority shall have full discretion in determining the number and qualifications of members it appoints to the industry advisory board, and whether such members shall be compensated from the funds made available to the Authority; and

15. Do all acts and things necessary or convenient to carry out the powers granted to it by this chapter or any other acts.

Sec. 9-266.6. Form, terms, execution and sale of bonds; use of proceeds; interim receipts or temporary bonds; lost or destroyed bonds; faith and credit of state and political subdivisions not pledged; expenses

The bonds of each issue shall be dated, shall bear interest at such rate or rates as shall be fixed by the Authority, or as may be determined in such manner as the Authority may provide, including the determination by agents designated by the Authority under guidelines established by the Authority, shall mature at such time or times not exceeding forty years from their date or dates, as may be determined by the Authority, and may be made redeemable before maturity, at the option of the Authority, at such price or prices and under such terms and conditions as may be fixed by the Authority prior to the issuance of the bonds. The Authority shall determine the form of bonds and manner of execution of the bonds and shall fix the denomination or denominations of the bonds and the place or places of payment of principal and interest, which may be at any bank or trust company within or without the Commonwealth. The bonds shall be signed by the chairman or vice chairman of the Authority or, if so authorized by the Authority, shall bear his facsimile signature, and the official seal of the Authority, or, if so authorized by the Authority, a facsimile thereof shall be impressed or imprinted thereon and attested by the secretary or any assistant secretary of the Authority, or, if so authorized by the Authority, with the facsimile signature of such secretary or assistant secretary. Any coupons attached to bonds issued by the Authority shall bear the signature of the chairman or vice chairman of the Authority or a facsimile thereof. In case any officer whose signature or a facsimile of whose signature shall appear on any bonds or coupons shall cease to be such officer before the delivery of such bonds, such signature or facsimile shall nevertheless be valid and sufficient for all purposes the same as if he had remained in office until such delivery and any bonds may bear the facsimile signature of, or may be signed by, such persons as at the actual time of the execution of such bonds shall be the proper officers to sign such bonds although at the date of such bonds such persons may not have been such officers. The bonds may be issued in coupon or in registered form, or both, as the Authority may determine, and provision may be made for the registration of any coupon bonds as to principal alone and also as to both principal and interest, for the reconversion into coupon bonds of any bonds registered as to both principal and interest, and for the interchange of registered and coupon bonds. Bonds issued in registered form may be issued under a system of book-entry for recording the ownership and transfer of ownership of rights to receive payment of principal of, and premium on, if any, and interest on such bonds. The Authority may contract for the services of one or more banks, trust companies, financial institutions or other entities or persons, within or without the Commonwealth for the authentication, registration, transfer, exchange and payment of the bonds, or may provide such services itself. The Authority may sell such bonds in such manner, either at public or private sale, and for such price as it may determine will best effect the purposes of this chapter.

The proceeds of the bonds of each issue shall be used solely for the purposes, and in furtherance of the powers, of the Authority as may be provided in the resolution authorizing the issuance of such bonds or in the trust agreement hereinafter mentioned securing the same.

In addition to the above powers, the Authority shall have the authority to issue interim receipts or temporary bonds as provided in Sec. 15.1-227.18 of the Code of Virginia and to execute and deliver

new bonds in place of bonds mutilated, lost or destroyed, as provided in Sec. 15.1-227.23 of the Code of Virginia.

No obligation of the Authority shall be deemed to constitute a debt, or pledge of the faith and credit, of the Commonwealth or of any political subdivision thereof, but shall be payable solely from the revenues and other funds of the Authority pledged thereto. All such obligations shall contain on the face thereof a statement to the effect that the Commonwealth, any political subdivision thereof and the Authority shall not be obligated to pay the same or the interest thereon except from revenues and other funds of the Authority pledged thereto, and that neither the faith and credit nor the taxing power of the Commonwealth or of any political subdivision thereof is pledged to the payment of the principal of or the interest on such obligations.

All expenses incurred in carrying out the provisions of the act shall be payable solely from funds provided under the provisions of this act, and no liability shall be incurred by the Authority hereunder beyond the extent to which moneys shall have been provided under the provisions of this chapter.

Sec. 9-266.7. Trust indenture or agreement securing bonds

At the discretion of the Authority, any bonds issued under the provisions of this chapter may be secured by a trust indenture or agreement by and between the Authority and a corporate trustee, which may be any trust company or bank having the powers of a trust company within or without the Commonwealth. Such trust indenture or agreement or the resolution providing for the issuance of such bonds may pledge or assign the revenues to be received and provide for the mortgage of any project or property or any part thereof. Such trust indenture or agreement or resolution providing for the issuance of such bonds may contain such provisions for protecting and enforcing the rights and remedies of the bondholders as may be reasonable and proper and not in violation of law, including covenants providing for the repossession and sale by the Authority or any trustees under any trust indenture or agreement of any project, or part thereof, upon any default under the lease or sale of such project, setting forth the duties of the Authority in relation to the acquisition of property and the planning, development, acquisition, construction, rehabilitation, establishment, improvement, extension, enlargement, maintenance, repair, operation and insurance of the project or projects in connection with which such bonds shall have been authorized; the amounts of rates, rents, fees and other charges to be charged; the collection of such rates, rents, fees and other charges; the custody, safeguarding and application of all moneys; and conditions or limitations with respect to the issuance of additional bonds. It shall be lawful for any national bank with its main office in the Commonwealth or any other state or any bank or trust company incorporated under the laws of the Commonwealth or another state which may act as depository of the proceeds of bonds or of revenues to furnish such indemnifying bonds or to pledge such securities as may be required by the Authority. Any such trust indenture or agreement or resolution may set forth the rights of action by bondholders. In addition to the foregoing, any such trust indenture or agreement or resolution may contain such other provisions as the Authority may deem reasonable and proper for the security of the bondholders including, without limitation, provisions for the assignment to a corporate trustee or escrow agent of any rights of the Authority in any project owned by, or leases or sales of any projects made by, the Authority. All

expenses incurred in carrying out the provisions of such trust indenture or agreement or resolution or other agreements relating to any project, including those to which the Authority may not be a party, may be treated as a part of the cost of the operation of the project or projects.

Sec. 9-266.8. Moneys received deemed trust funds

All moneys received pursuant to the authority of this chapter, whether as proceeds from the sale of bonds or as revenues, shall be deemed to be trust funds to be held and applied solely as provided in this chapter. The resolution authorizing the bonds of any issue or the trust indenture or agreement or resolution securing such bonds shall provide that any officer with whom, or any bank or trust company with which, such moneys shall be deposited shall act as a trustee of such moneys and shall hold and apply the same for the purposes hereof, subject to such regulations as this chapter and such trust indenture or agreement or resolution may provide.

Sec. 9-266.9. Proceedings by bondholder or trustee to enforce rights

Any holder of bonds issued under the provisions of chapter or any of the coupons appertaining thereto, and the trustee under any trust indenture or agreement or resolution, except to the extent the rights herein given may be restricted by such trust indenture or agreement or resolution authorizing the issuance of such bonds, may either at law or in equity, by suit, action, mandamus or other proceeding, protect and enforce any and all rights under the laws of the Commonwealth or granted hereunder or under such trust indenture or agreement or resolution, and may enforce and compel the performance of all duties required by this chapter or by such trust indenture or agreement or resolution to be performed by the Authority or by any officer thereof, including the fixing, charging, and collecting of rates, rentals, fees, and other charges.

Sec. 9-266.10. Bonds made securities for investment and deposit

Bonds issued by the Authority under the provisions of this chapter are hereby made securities in which all public officers and public bodies of the Commonwealth and its political subdivisions, all insurance companies, trust companies, banking associations, investment companies, executors, administrators, trustees, and other fiduciaries may properly and legally invest funds, including capital in their control or belonging to them. Such bonds are hereby made securities which may properly and legally be deposited with and received by any state or municipal officer or any agency or political subdivision of the Commonwealth for any purpose for which the deposit of bonds or obligations of the Commonwealth is now or may hereafter be authorized by law.

Sec. 9-266.11. Refunding bonds; bonds for refunding and for costs of additional projects

The Authority is hereby authorized to provide for the issuance of refunding bonds of the Authority for the purpose of refunding any bonds then outstanding that shall have been issued under the provisions of this chapter, including the payment of any redemption premium thereon and any interest accrued or to accrue to the date of redemption of such bonds. The issuance of such bonds, the maturities and other details thereof, the rights of the holders thereof, and the rights, duties and obligations of the Authority in respect of the same shall be governed by the provisions of this chapter insofar as the same may be applicable.

Sec. 9-266.12. Grants or loans of public or private funds

The Authority is authorized to accept, receive, receipt for, disburse, and expend federal and state moneys and other moneys, public or private, made available by grant or loan or both or otherwise, to accomplish, in whole or in part, any of the purposes of this chapter. All federal moneys accepted under this section shall be accepted and expended by the Authority upon such terms and conditions as are prescribed by the United States and as are consistent with state law; and all state moneys accepted under this section shall be accepted and expended by the Authority upon such terms and conditions as are prescribed by the Commonwealth.

Sec. 9-266.13. Appropriations by any government

Any government may make appropriations for the acquisition, construction, improvement, maintenance or operation of any project acquired, constructed, improved, maintained or operated by the Authority.

Sec. 9-266.14. Conveyance, lease or transfer of property by a city or county to the Authority

Any city or county within the Commonwealth in order to provide for the construction, reconstruction, improvement, repair or management of any project, or in order to accomplish any of the purposes of this chapter may, with or without consideration or for a nominal consideration, lease, sell, convey or otherwise transfer to the Authority any real, personal or mixed property located within such city or county.

Sec. 9-266.15. Exemption of Authority from personnel and procurement procedures

The provisions of Chapter 10 (Sec. 2.1-110 et seq.) of Title 2.1 and Chapter 7 (Sec. 11-35 et seq.) of Title 11 of the Code of Virginia shall not apply to the Authority in the exercise of any power conferred under this chapter.

Sec. 9-266.16. Moneys of Authority

All moneys of the Authority, from whatever source derived, shall be paid to the treasurer of the Authority. Such moneys shall be deposited in the first instance by the treasurer in one or more banks or trust companies, in one or more special accounts. All banks and trust companies are authorized to give such security for such deposits, if required by the Authority. The moneys in such accounts shall be paid out on the warrant or other order of such person or persons as the Authority may authorize to execute such warrants or orders.

Sec. 9-266.17. Forms of accounts and records; audit; annual report

The accounts and records of the Authority showing the receipt and disbursement of funds from whatever source derived, shall be in such form as the Auditor of Public Accounts prescribes. The Auditor of Public Accounts, and his legally authorized representatives, shall annually examine the accounts and books of the Authority. Such accounts shall correspond as nearly as possible to the accounts and records for such matters maintained by corporate enterprises. The Authority shall submit an annual report to the Governor and General Assembly on or before November 1 of each year. Such report shall contain the audited annual financial statements of the Authority for the year ending the preceding June 30. The annual report shall be distributed in accordance with the provisions of Sec. 2.1-467.

Sec. 9-266.18. Exemption from taxes or assessments

The exercise of the powers granted by this chapter will be in all respects for the benefit of the people of the Commonwealth, for the increase of their commerce and prosperity, and for the improvement of their health and living conditions, and as the operation and maintenance of the projects by the Authority and the undertaking of activities in the furtherance of the purposes of the Authority will constitute the performance of the essential governmental functions, the Authority shall not be required to pay any taxes or assessments upon any project or any property acquired or used by the Authority under the provisions of this chapter or upon the income therefrom, including sales and use taxes on the tangible personal property used in the operations of the Authority. The exemption hereby granted shall not be construed to extend to persons conducting on the premises of the facility businesses for which local or state taxes would otherwise be required.

Any bonds or refunding bonds issued under the provisions of this chapter and any transfer of such bonds shall at all times be free from state and local taxation. The interest on the bonds and any refunding bonds or bond anticipation notes shall at all times be exempt from taxation by the Commonwealth and by any political subdivision thereof.

Sec. 9-266.19. Title to property

The Authority may acquire title to property in its own name.