George R. Ariyoshi
999 Bishop Street, 23rd Floor
Honolulu, HI 96813

TESTIMONY

February 4, 2011

Re: Testimony in support of SB 112 relating to Space Tourism

Dear Members of the Twenty-Sixth Legislature:

I am writing this testimonial in strong support of SB 112, which provides state support for the environmental studies required to obtain a commercial spaceport license for Hawaii airports from the Federal Aviation Administration.

The effort to establish an international commercial spaceport in Hawaii builds upon the ongoing development of innovative "spaceplanes" that can take off and land at local airports using existing runways that service commercial jet aircraft, but which also employ advanced propulsion technologies to carry satellites, experiments and tourists to space.

Over the past decade, private companies in both the U.S. (e.g., Virgin Galactic, XCOR Aerospace) and foreign nations (e.g., EADS Astrium, Dassault Falcon) have been developing prototype spaceplanes for commercial space transportation. Between 2012 and 2015, at least three and as many as six suborbital spaceplane companies are projected to be in operation worldwide, and the commercial space transport market will be in a major expansion mode - both in terms of the number of people flying suborbitally each year and the number of spaceports working to build market share.

To date, ten states have already obtained or are currently in the process of applying for commercial spaceport licenses to accommodate this anticipated demand. It takes on average approximately three years to complete the spaceport licensing process, including 12 to 18 months to complete the environmental and safety studies required for the license, six to nine months for public review and comment, and an additional six months for the formal license application process with the FAA. Thus, for Hawaii to be "in on the ground floor" when spaceplanes begin operating, we need to initiate the licensing process now.

In contrast with the continental United States and Alaska, Hawaii is in a unique position to support and benefit from spaceplane operations. Situated in the middle of the Pacific, we are ideally located to serve as a node on the soon-to-emerge spaceplane transportation network. In addition, with major airport runways proximal to the ocean, Hawaii can use existing aviation infrastructure to enable the launch and landing of spaceplanes at local airports (the landlocked

state of New Mexico, by contrast, has had to invest over $200 Million in public funds to build a commercial spaceport that can safely accommodate such operations). And establishing spaceplane operations in Hawaii would bring a new dimension to our visitor industry – space tourism (projected to be a multi-billion dollar industry over the next decade).

Several U.S. and foreign entrepreneurial aerospace companies have approached our State to explore opportunities for launching spaceplanes from Hawaii. Their business plans include initial intra-state flight trajectories (launching from and returning to Honolulu and Kona International airports), with future trans-Pacific flights between Hawaii, Japan, and the continental U.S. Several plans also include development of space-themed education and training centers, proximal to airports, that would provide opportunities for both tourists and local residents to experience "virtual reality" simulations of space flight and exploration missions to the Moon and Mars, as well as "space camp" experiences involving simulated interplanetary space travel.

In order for spaceplanes to launch and land from Hawaii's airports, our State must obtain a commercial space transport license from the Federal Aviation Administration (FAA). Funding requested through this legislation will enable the State's Office of Aerospace Development to conduct the environmental and safety assessment studies required for this license to certify that spaceplane operations can be conducted safely in Hawaii.

Commercial space transport will help drive the "next generation" of global aviation technologies, systems and protocols, and states that engage in this industry from its inception will help establish and mature spaceplane operation centers and flight corridors to be networked worldwide. Hawaii is uniquely qualified to assume a leadership role in this effort for the entire Asia-Pacific region – but only if we act proactively to realize this exceptional opportunity.

As you may recall, the twenty-fifth State Legislature passed a measure similar to SB 112 during the 2009 Session (Act 187). Unfortunately, the previous Administration did not release funding appropriated through this legislation. As such, I would strongly encourage you to pass SB 112 this Session, and will work with our new Administration to encourage its execution.

Thank you for the opportunity to provide these comments.

Sincerely,

George R. Ariyoshi

GRA:khy

NEIL ABERCROMBIE
GOVERNOR

RICHARD C. LIM
DIRECTOR

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

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Statement of

RICHARD C. LIM
Director
Department of Business, Economic Development & Tourism

before the

HOUSE COMMITTEE ON FINANCE

Thursday, March 31, 2011
5:00 p.m.
State Capitol, Conference Room 308

in consideration of
SB 112 SD1, HD1
RELATING TO TOURISM.

Chair Oshiro, Vice Chair Lee, and members of the Committee. The Department supports the intent of SB112 SD1, HD1 to provide state support for the environmental studies required to obtain a commercial spaceport license for Hawaii airports from the Federal Aviation Administration.

The effort to establish an international commercial spaceport in Hawaii builds upon the ongoing development of innovative "spaceplanes" that can take off and land at local airports using existing runways that service commercial jet aircraft, but which also employ advanced propulsion technologies to carry satellites, scientific experiments and tourists to space.

Between 2012 and 2015, at least three and as many as six suborbital spaceplane companies are projected to be in operation worldwide. To date, ten states have already obtained

or are currently in the process of applying for commercial spaceport licenses to accommodate this anticipated demand. Given its location, Hawaii is ideally located to serve as a node on a global spaceplane transportation network. In addition, with major airport runways proximal to the ocean, Hawaii can use existing aviation infrastructure to enable the launch and landing of spaceplanes at local airports (the landlocked state of New Mexico, by contrast, has had to invest over $200 Million in public funds to build a commercial spaceport that can safely accommodate such operations). And establishing spaceplane operations in Hawaii would bring a new dimension to our visitor industry – space tourism (projected to be a multi-billion dollar industry over the next decade).

In order for spaceplanes to launch and land from Hawaii's airports, our state must obtain a commercial space transport license from the Federal Aviation Administration (FAA). Funding requested through this legislation will enable our department to conduct the environmental and safety assessment studies required for this license to certify that spaceplane operations can be conducted safely in Hawaii. Similar studies at airports nationwide have universally resulted in "FONSI"s – "findings of no significant impact".

Commercial space transport will help drive the "next generation" of global aviation technologies, systems and protocols, and states that engage in this industry from its inception will help establish and mature spaceplane operation centers and flight corridors to be networked worldwide. Hawaii is uniquely qualified to assume a leadership role in this effort for the entire Asia-Pacific region.

Thank you for the opportunity to testify on this bill.

UNIVERSITY
OF HAWAI'I
HILO

February 7, 2011

Testimony in support of SBC 112
Relating to Tourism
Submitted by: Judith Fox-Goldstein
Administrative Director, University of Hawai'i at Hilo Conference Center

Dear Members of the Twenty-Sixth State Legislature:

In my capacity as the Administrative Director of the University of Hawai'i at Hilo Conference Center, an active member of the Big Island Visitors Bureau (BIVB) Board, and the BIVB representative to the Hawaii Visitors and Convention Bureau's Marketing Advisory Committee, I would like present my unqualified support for SB 112.

Hawai`i has long been known as one of the premier tourism destinations on Earth. As one of our state's major economic drivers, it is critical that we keep our tourism product fresh, innovative, exciting, experiential and appealing to potential visitors from around the world. With growing global competition for "sun and surf" destinations, we in the education, business and visitor industry should feel compelled to bring innovation to this field. At the same time, our mission must include respect for our host culture and protection for our native environments.

Diversity in the field of tourism is key to sustaining the flow of visitors to our island state, and space tourism would offer yet another unique experience attracting visitors to Hawai'i, with significant economic benefits for residents statewide.

Space tourism will increase jobs in the fields of hospitality, as well as help improve our visitor industry image by putting an extra "S" ("Science"!) in our Sun, Sand, Sea and Surf marketing message. Hawai`i has long been referred to as the "Greatest Outdoor Classroom in the World". Taking, this message even further, it is now time to expand this "classroom" to space, which we can do by appropriating funds for the environment assessment studies required to secure a spaceport license for Hawai'i from the Federal Aviation Administration.

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In pioneering the field of space tourism, Hawai'i will send its message of Aloha to a much larger global community. By supporting this bill, we will continue to expand our local visitor industry through both innovation and a sustained commitment to economic growth and diversification.

I therefore respectfully ask for your support in joining those of us testifying today in favor of this timely legislation.

Thank you for the opportunity to provide these comments before your Committees.

Judith Fox-Goldstein

Judith Fox-Goldstein, Administrative Director
February 7, 2011
University of Hawaii at Hilo Conference Center
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The Aerospace States Association

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Tel: 202 257-4872 E:mail: AerospaceStates@comcast.net

February 7, 2011
Testimony for SB 112, SB 165 and SB 1496
2011 Session - Hawaii State Legislature

Dear Members of the Twenty-Sixth State Legislature:

We are most pleased to provide testimony in strong support of SB 112, SB 165, and SB 1496 – all of which recognize aerospace as a strategic and timely growth industry for Hawaii, and collectively provide the critically needed support to help realize your State's full potential in this dynamic technology sector.

As you may know, the Aerospace States Association is a nonpartisan organization, led by Lt. Governors and other top-ranking state leaders, that advocates on behalf of all fifty states for R&D funding, workforce training, economic development in aerospace and aviation, and excellence in math and science education to help keep states competitive in the global aerospace marketplace. We view the aerospace industry as an engine that defends our nation, drives our economy, and provides Americans with inspiring and highly paid jobs. Our homeland security, economic vitality, and national mobility clearly rely upon and benefit from a strong and diversified aerospace sector.

The State of Hawaii has been an active member of ASA since its inception, and over the years has substantially contributed to both the growth of our organization and our national debate on aerospace. Your State also has several unique characteristics - in particular, its mid-Pacific location, Moon-Mars like terrain, and strategic international ties with the Asia-Pacific community – which make it an ideal location to support a wide range of aerospace-related activities, including pioneering research in astronomy, planetary geosciences and deep space surveillance; the development, testing and evaluation of innovative technologies to advance both robotic and human space missions: growth as a strategic international node supporting advanced aviation training and the rapidly emerging commercial space transportation sector; and innovation in STEM education to inspire the next generation of aerospace entrepreneurs. The Hawaiian team won the first national Real World Design Challenge sponsored by ASA. Your new Space Act Agreement with NASA also well positions Hawaii to be both a major contributor to and beneficiary of our national space program.

ASA is committed to supporting state-based initiatives that can strengthen our nation's leadership in aerospace, and believe the recommendations set forth in these resolutions will both advance this objective as well as strengthen Hawaii's role as a major contributor to and beneficiary of the global space enterprise. We look forward to working with all of you in realizing this vision.

Thank you for the opportunity to testify on these measures.

Respectfully,

Brian Dubie

Brian Dubie
Chair, Aerospace States Association

Can Your Airport Become a Spaceport?
The Benefits of Foresight in Spaceport Development.

Derek Nolek, PE[1], Brian S. Gulliver, PE[2] and G. Wayne Finger, PhD, PE[3]
Reynolds, Smith & Hills, Inc., 2235 N. Courtenay Parkway, Suite C, Merritt Island, FL, 32953, (800) 225-7201

The next generational leap in aviation will come with the integration of affordable commercial suborbital spaceflight. Reusable launch vehicles (RLVs) have critical site requirements to support their flight profiles. Emerging Spaceports can position themselves now for support of near term up and down suborbital adventure tourism, while preparing for the future of suborbital point-to-point travel. Aviation authorities, who plan future development with RLVs in mind, stand to reap the rewards of commercial spaceflight. Creation of a Spaceport Development Plan can serve to identify critical path infrastructure, siting, and facilities needed to support RLV requirements, and streamline the Spaceport licensing process. To date, the authors have completed (or are now completing) designs of orbital and/or suborbital launch sites in Florida, Texas, Virginia, Australia and other locations. The authors have also accomplished a detailed analysis of mission profiles for Suborbital RLVs to support the approval for a FAA Launch Site Operators License, including Environmental Assessment for Cecil Field Spaceport in Jacksonville, FL. This paper will outline some of the unique facility requirements of RLV launches, the Spaceport Development Planning process, and illustrate the benefits of having a definitive yet flexible planning document.

I. Introduction

Traditionally, spaceport development has been the domain of the Federal Government. In the 1990's several commercial spaceports were developed to support commercial orbital launches. At that time most of these commercial spaceports were based on a cooperative State-Federal system. They were still located on Federal property, such as the California Spaceport located on Vandenberg Air Force Base. Spaceport development has continued to evolve and is now a mix of approaches, which include private funding.

An Aerospaceport, as considered in this paper, is a traditional airport that has also become licensed to support space launch operations. The current generation of Aerospaceports is typically a former military or general aviation airport that has obtained a FAA licensing to operate as a launch site in support of suborbital Reusable Launch Vehicles (RLVs). Aerospaceports are expected to evolve to support a wide range of missions including orbital space access for both passengers and cargo.

As of writing this paper there are six commercial spaceports with an active license. Of these spaceports three evolved from Federal ranges and are hybrid State-Federal spaceports, two evolved from traditional airfields and are "Aerospaceports", and one is an independent spaceport built on a new site from the ground up.

The three currently FAA / AST licensed Aerospaceports include Oklahoma Spaceport, licensed to the Oklahoma Space Industry Development Authority, Mojave Air & Space Port, licensed to The East Kern Airport District, and Cecil Field Spaceport in Jacksonville, Florida licensed to the Jacksonville Aviation Authority (JAA) for which the authors have provided support during the planning, analysis, and development of the Environmental Assessment and FAA Launch Site Operators License Application. There are several other proposed Aerospaceports in the US.

The possibility exists for many airports around the United States and the world to become Aerospaceports and provide the necessary infrastructure and capabilities to support suborbital launch activities. For an airport or aviation authority that are considering the option of becoming a spaceport the best place to begin is with the creation of a Spaceport Development Plan.

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II. What is a Spaceport Development Plan?

Before an airport or aviation/aerospace authority invests significant capital into the development of a spaceport it is prudent to begin with a Spaceport Development Plan. The core of the plan is a feasibility study that evaluates a candidate airport/location for its potential to support suborbital space launch activities. The plan begins with understanding and outlining the requirements/expectations of the proposed Aerospaceport. The candidate site is then analyzed based on a variety of fundamental licensing requirements from the FAA to identify any potential fatal flaws or areas of concern for the candidate site. Following the feasibility analysis a variety of follow-on analyses are completed, such as development of a preliminary Explosive Site Plan, and identification of potential suborbital operating areas, ignition points, and flight routes. Once all analyses are completed a plan is created for the development of the Aerospaceport that includes required infrastructure, process for obtaining licensing, and Rough Order of Magnitude (ROM) costs and schedule for the development of the spaceport. With a Spaceport Development Plan in hand the airport or aviation/aerospace authority will have much clearer understanding of the capabilities of a candidate airport and the development costs associated with becoming a spaceport.

III. Reasons Aerospaceports are Developing Now

The primary reason for developing an Airport into an Aerospaceport is to assure continued improvement to the economic development for both the Aerospaceport and the local community.

Numerous new revenue sources are created for Airports that become Aerospaceports:

- Use fees for vehicle operators launching or landing at Aerospaceport.
- Use fees for passengers using Aerospaceport.
- Use fees for concessionaires (themed space entertainment, training, maintenance, commodities, etc.)
- User fees on cargo.
- Ticket revenue from spectators for discrete aerospace missions or events.
- Ticket revenue from spectators for scheduled tours of Aerospaceport.
- Lease revenue for hangars for storage or maintenance of RLVs.
- Lease revenue for payload processing facilities or services.
- Lease revenue for training facilities for prospective suborbital tourists or RLV pilots.
- Lease revenue for test facilities.
- The sale of aviation jet fuel and launch vehicle propellants
- Co-location of Private Research and Development ventures related to the space program
- Co-location of intermodal-transportation hubs
- Increased use fees from all existing sources, as their utilization increases.

To date, these revenue sources are of strategic value more than of instant financial value. This portion of the space market is developing slowly on its own as an adventure space tourism market, and it is envisioned to eventually mature into a point-to-point passenger market. The "barrier to entry" for an Aerospaceport in this market is more of time sensitivity than of cost. It takes many years to complete the planning, preparations, licensing and modifications required become an Aerospaceport. The airports that act now will be prepared for this market when it arrives. Those who wait to act until the market is strong will find that they will be "late to the table". Their schedule delay will make it more difficult to complete with the existent Aerospaceports. Consequently, they may never develop as a major hub in this new market.

The strategic advantages of performing the planning and licensing now include:

- Accomplishing the multiyear planning and licensing activities so that the community's Aerospaceport is timed to be ready when market demand develops.
- Securing the community's geographic position in this market.
- Securing the required airspace and specific flight corridors, so they are protected from interference.
- Securing the real estate required for safe storage of propellants so it is not inadvertently used for other purposes.
- Providing the planning and development tools to convey to state and federal bodies the financial and regulatory needs, so portions of the financial needs can be shared among political stakeholders.
- Positioning the community as a serious player in this developing market. Stimulates the interest of the vehicle operators. Enables serious discussions.

IV. Requirements of an Aerospaceport

The current Aerospaceports support Suborbital RLVs that takeoff from the runway in a horizontal configuration. While the capability may eventually be added to some Aerospaceports to support vertically launched rockets, the discussion of Aerospaceports provided in this paper will be focused on launch vehicles that utilize the runway to take off and land in a horizontal configuration. Aerospaceports can operate missions that start and end at the same spaceport or point-to-point missions that start at one Aerospaceport and end at another.

Aerospaceports seek to operate like airports, accommodating a wide variety of existing and planned flight vehicles and operators, and providing quick turnaround times between flights. Hence we typically define certain candidate flight vehicles to be served by the Aerospaceport. Presently there are three broad generic launch vehicle concepts that are compatible with use at an Aerospaceport. These are referenced as Concept X, Concept Y, and Concept Z launch vehicles and are described below.

A. Compatible Launch Vehicles

There are a number of vehicle categories that are emerging in the marketplace that make use of Aerospaceports. Each vehicle category requires specific facilities and language in the spaceport license. An Aerospaceport need not be licensed for all types of launch vehicles. It may be in the best interest of the Aerospaceport authority to choose one or two vehicle concepts that fit existing infrastructure to pursue for licensure. The Aerospaceport will also have to decide if it will host experimental RLV's or just proven vehicles. Even though the end goal of RLV providers is a proven, licensed vehicle, many never reach this stage. If an Aerospaceport wants to attract a broad variety of RLV business it will want to consider doing the extra work it takes to host experimental RLV's.

A "Concept X" launch vehicle is an all-in-one RLV, similar to an airplane that takes off from a runway using jet power and flies to a safe location before igniting its rocket engines to complete its launch profile. Upon completion of its mission, the Concept X launch vehicle will return for a horizontal landing by either restarting its jet engines or by gliding unpowered. Current generation Concept X launch vehicles would be capable of providing suborbital flights for both passengers and cargo. An example of a Concept X launch vehicle is the Rocketplane XP being developed by Rocketplane Global, Inc.

A "Concept Y" launch vehicle is an all-in-one RLV that ignites its rocket engines while on the ground and takes off horizontally from a runway. This RLV is under rocket power until engine cutoff during ascent of it suborbital trajectory. Upon completion of its launch profile it then returns gliding unpowered for a horizontal landing. Current generation Concept Y launch vehicles would be capable of providing suborbital flights for both passengers and cargo. An example of a Concept Y launch vehicle is the Lynx being developed by XCOR Aerospace.

A "Concept Z" launch vehicle is a two part launch vehicle consisting of a reusable carrier aircraft and a reusable/expendable launch vehicle. The carrier aircraft is powered by jet engines and designed/modified to carry the launch vehicle to a high altitude where the two components detach and the rocket engine of the launch vehicle is ignited. The carrier aircraft flies back to the Aerospaceport and lands normally. The launch vehicle, which can be either suborbital or orbital, completes its mission profile and either returns for a horizontal landing or is expended. Two examples of Concept Z launch vehicles include the Orbital Sciences Pegasus and its carrier aircraft, a modified L-1011, and Scaled Composites SpaceShipOne and its carrier aircraft the White Knight. Current generation Concept Z launch vehicles are capable of providing suborbital flights for both passengers and cargo, and as in the case of the Pegasus, orbital launch capability for satellite payloads.

Table 1. Comparison of RLV Concepts

Characteristics	Concept X	Concept Y	Concept Z
Takeoff Orientation	Horizontal	Horizontal	Horizontal
Takeoff Method	Jet Powered	Rocket Powered	Jet Powered
Uses Carrier Aircraft	No	No	Yes
Landing Method	Glide or Jet Powered	Glide	Glide / Expendable
Suborbital or Orbital	Suborbital	Suborbital	Either
Manned or Unmanned	Manned	Manned	Either
Examples	Rocketplane XP	XCOR Lynx	Scaled Composites SpaceShipOne / Orbital Sciences Pegasus

B. Aerospaceport Infrastructure

In order for an Aerospaceport to be able to support one of the current RLV launch vehicles, there are certain facilities that must be provided. The facilities required vary between the concepts, but the general needs are similar. Possible common infrastructure an airport can leverage for Aerospaceport conversion include:

- Runways / Taxiways
- Control Tower
- Parking Areas – For passengers and equipment.
- Regional Airspace Precedent
- Electric Power, Communication, Water, and other utilities
- Hangar facilities
- Passenger Loading Areas
- Fueling Facilities
- Security Processes, infrastructure, and personnel
- Emergency Processes, infrastructure, and personnel.

How much of this infrastructure can be utilized by the Aerospaceport can be investigated in the planning.

Much of the existing infrastructure at an airport can be reused or modified to serve in an Aerospaceport role.

Just as standard airplanes need hangers for maintenance and processing, RLVs require hangers and processing buildings as well. Depending on the size and requirements of an RLV existing airport facilities may be sufficient for RLV processing and component storage. Unlike airplanes which only require fuels, rocket engines require both fuels and oxidizers. These propellants must be stored a safe distance from each other and other high value items. Designated areas at an Aerospaceport must be assigned for Propellant Storage. These areas can be either permanent or temporary and spaced in such a way as to keep the fuels and the oxidizers safely apart. The most common fuels for RLVs include Liquid Kerosene (RP-1), solid Hydroxyl-Terminated Polybutadiene (HTPB), and Jet Fuel, and the most common oxidizers are Liquid Oxygen (LOX) and Nitrous Oxide (N2O).

At least one runway of sufficient length and width to accommodate RLV takeoff and possible glided returns must be available. Designated areas for propellant loading onto the vehicle are required, as fuels and oxidizers are then in close proximity and require larger separation distances than the propellants stored independently.

Each concept RLV has unique requirements and may need additional processing facilities or support equipment. In addition to the vehicle specific facility requirements, an Aerospaceport may have additional requirements to support various missions. If the Aerospaceport is supporting suborbital space tourism, there may be onsite training facilities and hotel accommodations. If the Aerospaceport is supporting small orbital payloads, there may be payload processing and monitoring capabilities onsite. Aerospaceports will have to provide the capabilities that their customers need, much like traditional airports currently do.

C. Licensing Requirements

The licensing requirements for Aerospaceports currently follow the same regulatory requirements as typical launch sites and are described in the United States Code of Federal Regulations (CFR) Title 14 Part 420 (known as 14 CFR Part 420). An outline of the specific requirements of obtaining a license to operate a launch site is provided in Part 420 and includes four subparts and multiple appendices.

Some of the licensing requirements identified in Part 420, as it relates to Aerospaceports, include the following:

- General information about the Aerospaceport
- Environmental Assessment
- Identification of proposed launch vehicle type and class considered for use at Aerospaceport
- Launch site location information and review
    - Identification and review of launch site boundary (of Aerospaceport)
    - Identification of proposed operational flight profiles originating from Aerospaceport
        - Identify Launch Point (at Aerospaceport)
        - Identify phases of flight profile following launch from Aerospaceport
        - Identify RLV Operating Area where ignition phase occurs
        - Identify arrival and departure routes from Aerospaceport to RLV Operating Area
        - Identify and review flight corridor (inclusive of entire flight profile)

    - Ensure that launch site meets required safety requirements
    - Provide appropriate maps of Aerospaceport and flight profile
- Explosive site plan
- Launch site operations
    - Provide example concept of operations at launch site
    - Provide information on how public access to launch site is controlled
    - Provide information on how launch site operations are scheduled
    - Provide launch site accident investigation plan
    - Provide details on handling solid and liquid propellants at the Aerospaceport
    - Provide details on lightning protection
- Risk Analysis & Safety Requirements – must satisfy the public risk criteria by not exceeding the expected casualty value of $30x10^{-6}$ for a sample mission.

V. Economic and Schedule Guidelines for Development of an Aerospaceport

Two of the most common aerospace business metrics are costs and time to completion. The development of an Aerospaceport is no different and it is critical to have an understanding of both of these metrics.

A. Financial Requirements

Traditional spaceport development can be an expensive endeavor. Development costs of a new launch complex at traditional spaceports are typically measured in the range of $100-$500 Million. Developing a new Aerospaceport from scratch is similarly expensive. For example Spaceport America in New Mexico is expected to cost in excess of $200 Million. While spaceport development may initially appear cost prohibitive, converting an existing airport into an Aerospaceport can actually be quite economical for certain airports. An Aerospaceport can become functional for a fraction of these amounts.

The basic requirements of an Aerospaceport is a sufficiently long runway (greater than or equal to 12,000 ft), onsite locations for propellant storage and loading that satisfy the required safety separation distances, an Aircraft Firefighting and Rescue (ARFF) Station, perimeter fences and security for keeping the public sufficiently far from spaceport operations, processing and storage facilities for RLV components and payloads, and an RLV operating area with routes to and from the Aerospaceport that provide sufficient safety to the general public. These topics may be assessed in a Aerospaceport Development Plan. If these basic requirements can be reasonably satisfied, then the most cost effective way for an existing airport to become an Aerospaceport is to submit an application with the FAA/AST for a license to operate a launch site along with an appropriate Environmental Assessment. The cost of drafting an application and environmental assessment is typically in the $500,000 to $1,000,000 range. If no major infrastructure changes are required to support the Aerospaceport then this initial investment may be all that is required to become an Aerospaceport. If the basic list of requirements is not initially met, then it may still make sense for the airport to become an Aerospaceport, however the infrastructure development will cost more in upfront expenses to meet the requirements of the Aerospaceport. Usually the development costs for converting an existing airport to a spaceport are significantly less than a traditional spaceport.

The following is a list of potential projects that could reasonably enable converting an airport into an Aerospaceport:

- Extend a runway to support larger RLVs or unpowered return of RLVs if the existing runway is too short.
- Modify or construct processing facilities or storage facilities if existing aviation hangars are insufficient.
- Construction of a fence/gate to limit access to launch operations.
- Modification of the airport's Master Plan to incorporate Aerospaceport facility projects.
- Mitigation of environmental impact, restoration of disturbed areas.
- Modifications to roads or bridges to support multimodal receipt of specific RLV components or payloads.
- Addition of rail or barge access to support multimodal receipt of specific RLV components or payloads.
- Addition of new propellant and gas infrastructure to the Aerospaceport.
- Addition of training/testing facilities or other accommodations.
- Documenting agreements with neighboring agencies for launch day operations.

Understanding the potential costs of developing a spaceport is only one component of the expenditure side of an Aerospaceport. Once an Aerospaceport has been licensed there are continual Operations and Maintenance (O&M)

expenses. For Aerospaceports these O&M expenses are believed to be of a similar order of magnitude as normal aviation O&M expenses, and should be an order of magnitude less than traditional Spaceport O&M expenses.

B. Schedule Requirements

The schedule for the development of an Aerospaceport is measured in years and is entirely dependent on the requirements of the Aerospaceport. If an existing airport meets all the basic safety requirements for an Aerospaceport, has no environmental impacts, has identified a safe location to operate RLV missions, and has the support of a launch provider, the launch site operators license application and environmental assessment can take as little as two years to complete. If, however, the existing airport requires significant infrastructure changes, and there are certain safety issues that must be coordinated and corrected, it could take longer than four years.

The following table provides a listing of potential items that can result in an increased development/licensing timeline for an Aerospaceport. The table includes the reason for the impact on the schedule along with an approximate magnitude of the impact expressed as the total development schedule, assuming 2 years is the expected development time in a nominal example. Items marked with an asterisk (*) in the following table should all be initially assessed in the Aerospaceport Development Plan to identify "Fatal Flaws", concept of operations, infrastructure modification concepts and the development schedule and budget. Such a plan represents the first logical step for an Airport to realistically assess it Aerospaceport potential.

Table 2. Schedule Guidelines for Aerospaceport Development

Aerospaceport Development Characteristics	Resultant Impact on Schedule	Development Timeframe
1) Ideal Airport to Aerospaceport conversion for single suborbital vehicle without significant modifications	Nominal	2-3 years
2) Supporting multiple types of launch vehicles	Requires greater analysis and support for different propellant types and operational scenarios	3 years
3) Supporting an RLV with expendable orbital capability	Extended risk analysis and flight corridor development, and environmental impacts of expendable components	3-4 years
4) Airport to Aerospaceport conversion requires addition of major facilities or major modifications	Design and construction of facilities	3-4 years
5) Airport to Aerospaceport conversion requires significant environmental mitigation	Resolving environmental impacts	4+ years (*)
6) High population density along RLV flight corridor	Complex risk analysis and potential for exceeding allowable limits	3+ years (*)
7) Dense air traffic along RLV flight corridor	Potential air traffic control concerns	3+ years (*)
8) Uninformed community or community opposition of Airport to Aerospaceport conversion	Difficulties with public support may result in delays	4+ years (*)
9) No existing Airport - Creating the Aerospaceport from scratch	Design and construction of facilities	4-6 years

(*) Potentially a "Fatal Flaw'. In some instances, such as the risk analysis, if a favorable result cannot be obtained, then schedule may be irrelevant as a launch site operators license will not be issued by the FAA.

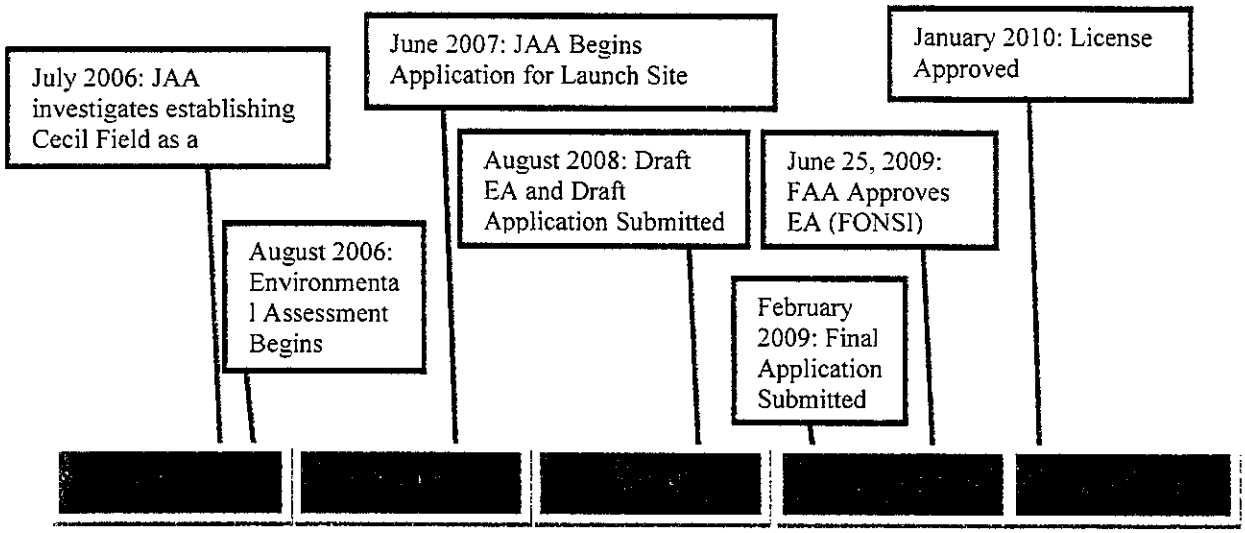

Figure 1: Cecil Field Spaceport Licensing Timeline

Many factors influence the schedule of becoming a licensed spaceport and a realistic timeframe for most Aerospaceports is in the range of 3-4 years from program initiation until a license is issued. In July 2006 Jacksonville Aviation Authority investigated establishing Cecil Field Airport in Jacksonville, FL as a Spaceport. It took about 2.5 years to develop and submit all the required licensing and environmental assessment documentation to the FAA/AST. Following the submittal of all required documentation, the FAA review period began and as of December 2009 issuance of the launch site operator's license is imminent. When the license was issued for Cecil Field Spaceport the total licensing process took 3.5 years. Details of the spaceport licensing timeline for Cecil Field Spaceport are shown in Figure 1.

VI. Developing a Spaceport Development Plan

Planning is the first phase in the process of developing an Aerospaceport and the main component of planning, after identifying goals and objectives to create a Spaceport Development Plan. The other phases of Aerospaceport Development include Permit Development, Permitting Review/Approval, and Spaceport Operations. A typical planning and approval process flow chart is provided in Figure 2.

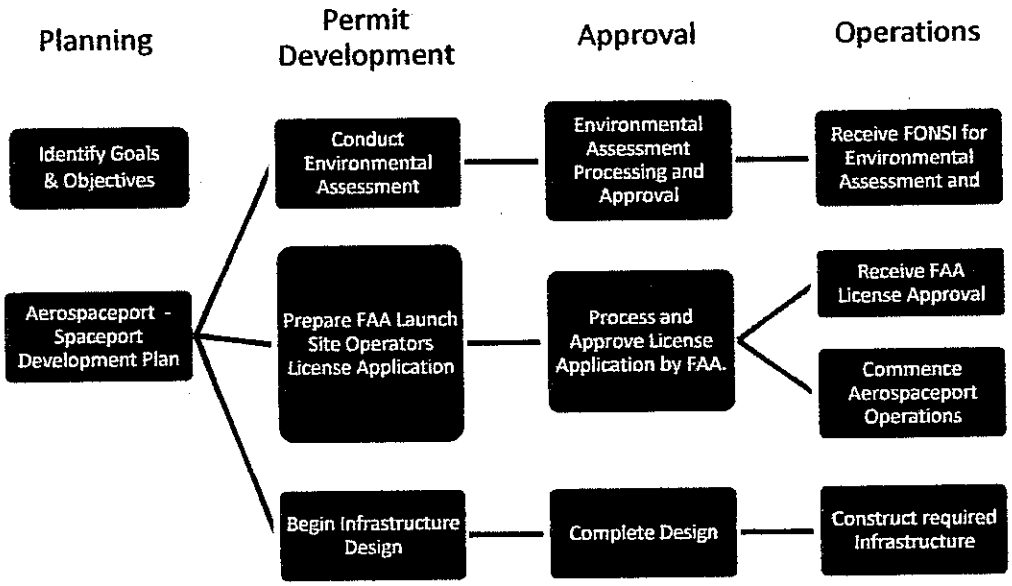

Figure 2. Typical Planning and Approval Process Flow Chart

A. Spaceport Development Plan Outline

The purpose of the Spaceport Development Plan is to identify the goals of the spaceport, evaluate the spaceport against licensing requirements, and outline a plan for achieving the development goals. The following outline is provided as a guideline and should be adjusted as appropriate to better meet the objectives of an individual spaceport:

- Section A – Introduction & Goals of Spaceport
- Section B – Current Infrastructure Assessment
- Section C – Preliminary Analyses of Spaceport Development
- Section D – Recommended Spaceport Development Activities
- Section E – ROM Cost Estimate & Schedule for Development

In Section A – Introduction & Goals of Spaceport, a variety of preliminary data and assumptions are gathered and identified. Before a spaceport can be developed it is critical to understand what the overall objective of the spaceport will be. This includes, but is not limited to, the identification of launch vehicles and launch operators considered for operation from the spaceport (Concept X, Y, and/or Z), the location where the launch vehicles will be operating (in the direct vicinity of the Aerospaceport or in a remote operating area), potential stakeholders for the spaceport (including universities and community colleges), identification of potential research and economic zones, and how much of an investment is planned for spaceport development.

In Section B – Current Infrastructure Assessment, a catalog of existing infrastructure at the candidate site and review of the broader area surrounding the site is completed. Future airport expansion plans are also reviewed to determine how the impact spaceport development.

In Section C – Preliminary Analyses of Spaceport Development, a variety of higher level assessments and reviews are completed and compared to the federal regulations that govern licensing of a launch site. These analyses include a review of fundamental requirements (such as runway length and public safety), the development of a preliminary explosive site plan at the Aerospaceport, the identification of potential RLV processing locations, a review of population density to determine the safest arrival and departure routes from the airport and a potential ignition point and RLV operating area. The end result of all of the analyses is a determination if any fatal flaws exist in the potential development of the spaceport and a yes/no recommendation for spaceport development is provided. Potential challenges are also identified along with what their impact is to the development of the spaceport.

In Section D – Recommended Spaceport Development Activities, an overall plan is outlined for the development of the spaceport and steps to be taken to obtain licensure. This section includes a preliminary listing of required infrastructure that will need to be developed or modified to support spaceport activities as well as recommendations for optional infrastructure and facilities that should be considered for optimal operations.

In Section E – ROM Cost Estimate & Schedule for Development, a Rough Order of Magnitude (ROM) Cost Estimate and a Preliminary Development Schedule is provided based on the recommended spaceport development activities identified in Section D.

While ideally the entire spaceport development schedule is completed at one time as a cohesive document, the plan itself can be developed in multiple phases. Phase One would consist of Section A, Phase Two would consist of Sections B & C, and Phase Three would consist of the previous sections combined together with the inclusion of Sections D & E. As a rule of thumb a Spaceport Development Plan can be completed within a 3 month time frame for 10%-15% of the total permitting development cost.

B. Benefits of a Spaceport Development Plan

There are a wide number of benefits of creating a Spaceport Development Plan and they include the following:

- Aerospaceport goals and objectives are identified.
- Add substance to plans for spaceport development and provides a good foundation for beginning the permitting phase.
- Airports and aviation/aerospace authorities have a better understanding of requirements for Aerospaceport development.
- The plan includes a feasibility analysis to identify potential fatal flaws in Aerospaceport development at a candidate location.
- The plan can be used by an airport or aviation/aerospace authority to promote the project, educate local residents, and secure funding sources.
- Potential facilities infrastructure modifications and/or development are identified in the plan.
- The results of the preliminary analyses conducted can used in the development of the launch site operators license application and environmental assessment to reduce the overall amount of time the permitting phase takes.
- A preliminary explosive site plan is developed for review of potential impact to normal airport operations.
- Potential RLV operating area and arrival and departure routes are identified in the plan.
- The plan provides good references for discussions with the FAA/AST when starting the permitting phase.
- The plan provides cost and schedule information specific to the planned spaceport.

VII. Summary

Aerospaceports will play a critical role in the continued development of commercial space transportation. With several types of Suborbital Reusable Launch Vehicles currently in development, utilization of Aerospaceports will be the preferred operations approach by launch providers. The first step in the development of an Aerospaceport is the completion of a Spaceport Development Plan to evaluate a candidate airport or site for its ability to support space launch activities. The results of completing the Spaceport Development Plan can then be used to make important decisions about the Aerospaceport and streamline the development of the FAA/AST Launch Site Operators License Application. The main benefits of a Spaceport Development plan include (1) the ability to identify potential issues/fatal flaws with the development of an Aerospaceport before a large amount of capital is invested, (2) provide an airport or aviation/aerospace authority with a plan that can be used to promote the project and find funding, and (3) complete preliminary analyses that can used in the development of the launch site operators license application.

VIII. Acknowledgments

The authors would like to thank Reynolds, Smith and Hills, Inc. for providing research funding, computer time and other technical resources for accomplishing this work.

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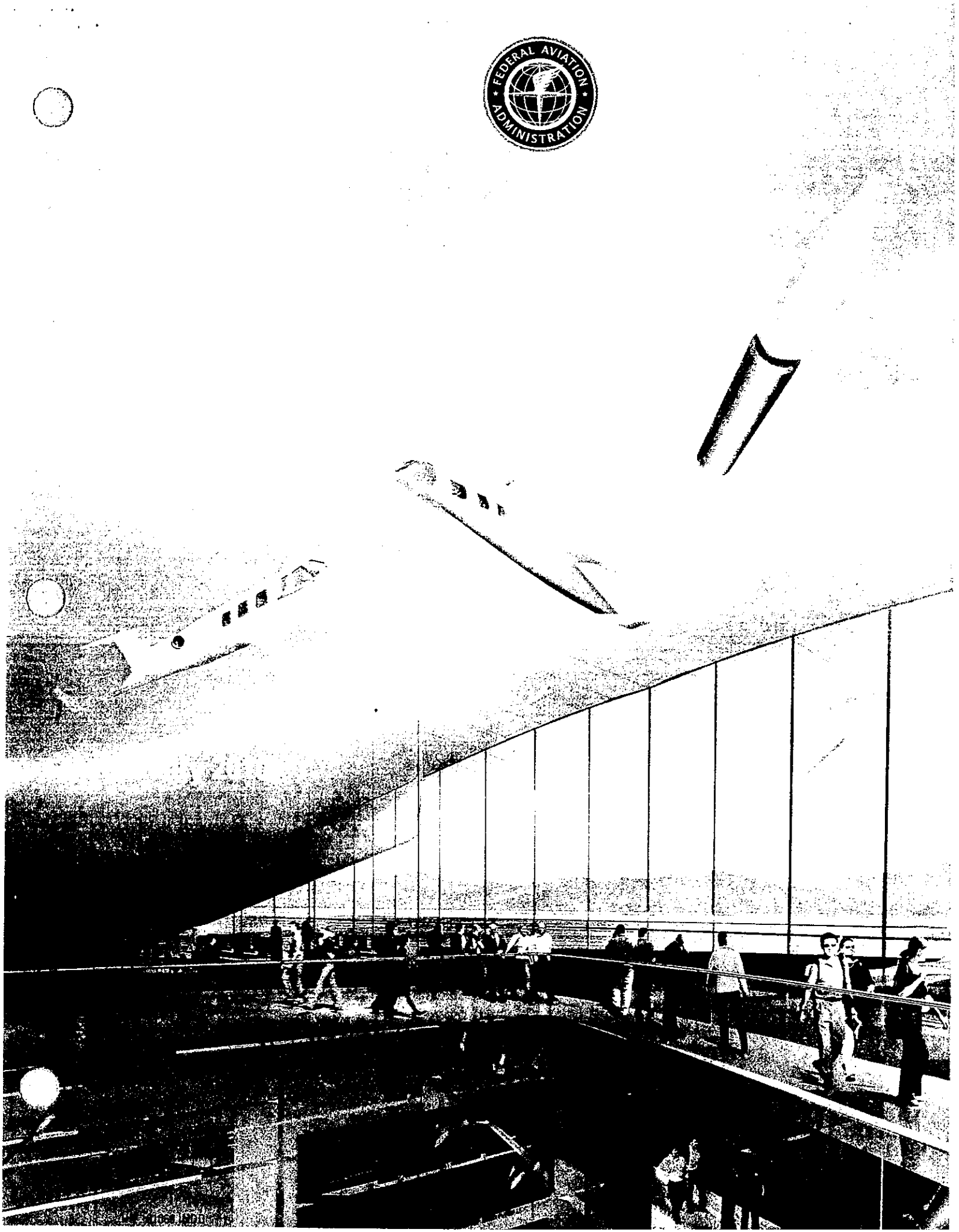

SPACEPORTS

Launch and reentry sites—sometimes referred to as "spaceports"—are the nation's gateways to and from space. Although individual capabilities vary, these facilities may house launch pads and runways as well as the infrastructure, equipment, and fuels needed to process launch vehicles and their payloads before launch. Spaceports usually have access to airspace that is restricted to allow spaceflight operations that minimize danger to other aircraft and people on the ground. The first such facilities in the United States emerged in the 1940s when the federal government began to build and operate space launch ranges and bases to meet a variety of national needs.

Alaska	x		
California	x	x	
Florida		x	x
Kwajalein		x	
New Mexico	x	x	
Oklahoma	x		
Texas	x		x
Virginia	x	x	
Washington			x
Wisconsin			x
Wyoming			x

Table 2: Spaceport summary by state

While U.S. military and civil government agencies were the original and still are the primary users and operators of these facilities, commercial payload customers have become frequent users of federal launch ranges. Federal facilities are not the only portals to and from space. Indeed, the commercial dimension of U.S. space activity is evident not only in the numbers of commercially procured launches but also in the presence of non-federal launch sites supplementing federally operated sites.

Table 2 shows the states that have active non-federal, federal, and proposed spaceports. Figure 1 shows a map of active U.S. spaceports and launch sites. Non-federal and federal U.S. spaceports capable of supporting launch and landing activities are described. A subsection detailing state and private proposals for future spaceports is also included.

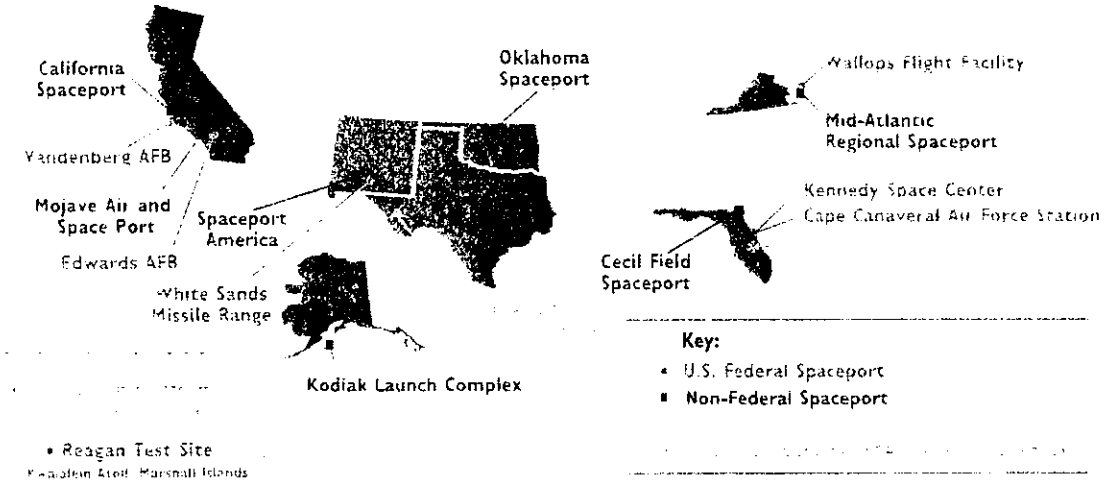

Figure 1: US spaceports and launch sites

Space Florida entered into a joint venture agreement in March 2009 with Astrotech, a provider of payload integration services for the military, NASA, and commercial markets. This agreement provides the framework for Space Florida and Astrotech to engage in collaborative ventures that will result in more space-related business for Florida. Possibilities include:

- A "turn-key" type service for commercial satellite operators, allowing the operator to procure payload integration and launch services in one bundled package;
- Outsourcing operation of commercial satellites on orbit; and
- A mechanism to use Space Florida's status as an Independent Special District of the state to procure/provide some type of secondary reinsurance for commercial payloads launched from Florida.

Spaceport Hawaii

Location	Kona International Airport, Keahole, Hawaii
Owner/Operator	Hawaiian Office of Aerospace Development
License Status	State legislature has allocated $250,000 to fund license application
Description	Spaceport Hawaii is exploring two options: a commercial suborbital space tourism launch site; and/or a suborbital point-to-point transportation service connecting two Hawaiian islands
Infrastructure	A main runway at Kona International Airport; possibly a secondary takeoff and landing runway at Kalaeloa Airport on the island of Oahu featuring a visitor's center, space camp, and flight simulators

In July 2009, Hawaiian lawmakers approved $250,000 in funding to develop a launch site.[49] This marked the first step in what is expected to be a multi-year process of environmental impact analyses and community impact surveys that spaceport proponents hope will result in establishing Spaceport Hawaii.[50] Spaceport planners are currently considering two main options. The first would be a commercial suborbital space tourism site, where space vehicles would lift off and land on the same runway, most likely a converted airstrip at Kona International Airport in Keahole, Hawaii (on the "Big Island"). The second option would be the world's first infrastructure for suborbital point-to-point travel. Vehicles would depart from Kona International Airport, ascend to a suborbital altitude of 105 kilometers (65 miles), and land approximately 550 kilometers (340 miles) to the west at Kalaeloa Airport on the island of O'ahu 45 minutes later.[51] This second option is seen as a possible prelude to regular trans-Pacific suborbital point-to-point travel—for instance, flights from Hawaii to Tokyo with greatly reduced travel times.

HAWAI'I ACADEMY OF SCIENCE
Educational Programs Office
c/o College of Education, UHM • 1776 University Avenue • Honolulu, HI 96822
Phone: (808) 956-7930 • Fax: (808) 956-5183 • E-mail: acadsci@hawaii.edu
Website: www.hawaii.edu/acadsci

February 9, 2011

Testimony in Support of SB112, SB165, SB1496
Hawai'i State Legislature – 2011 Session

Aloha,

On behalf of the Hawai'i Academy of Science, we are providing testimony in strong support of bills **SB112, SB165 and SB1496,** which offers our state viable avenues for employment, growth and sustainability.

As sponsors and coordinators for the annual State Science and Engineering Fairs since 1957, the Academy has witnessed the potential of thousands of Hawaii's top students in the science and engineering fields, and has seen many of these students go on to excellent universities and careers. However, many of those high-level technical and research jobs remain on the mainland, leaving our young professionals to make the decision to live and work away from home, or come back to compete for a smaller pool of desired careers.

Hawai'i needs sources of industry not only for the sake of our future generations, but for the sustainability of our islands as well. The aerospace industry is a tremendous opportunity for our children and a "high-tech" bridge between east and west that also secures Hawai'i as an integral part of the U.S. economy. Please join with us in our effort to build Hawaii's future.

Mahalo,

Carolyn Kaichi
Director
Hawai'i State Science and Engineering Fair

Gareth Wynn-Williams
Past-President
Hawai'i Academy of Science
University of Hawai'i Institute for Astronomy

HAWAI'I AEROSPACE
ADVISORY COMMITTEE

Elliot Holokauahi Pulham, Chair

March 29, 2011

Representative Marcus R. Oshiro, Chair
House Committee on Finance
Hawai'i State Legislature

Representative Marilyn B. Lee, Vice Chair
House Committee on Finance
Hawai'i State Legislature

Members of the House Finance Committee (FIN)

SUBJECT: Senate Bill No. 112

Dear Representative Oshiro, Representative Lee, and Members of the House Finance Committee:

On behalf of the Hawai'i State Aerospace Advisory Committee, I am writing to encourage your strongest possible support for S.B. No. 112, which would appropriate funding for the Office of Aerospace Development, DBEDT, to pursue a commercial spaceport license from the Federal Aviation Administration (FAA) for the State of Hawai'i.

As you know, the creation of the Hawai'i Aerospace Advisory Committee was authorized by the Legislature (Act 52, 2009 Session) and approved by the Governor on May 6, 2009. Our purpose, per this Act, is to advise and assist the Legislature and State agencies in monitoring, assessing and promoting aerospace development statewide. The Committee is comprised of leading aerospace industry executives, distinguished academicians from across the state, and economic development executives from Oahu, Kauai, Maui and Hawai'i – all united with a common purpose to help the State diversify its economy and promote innovative education and employment opportunities for the people of Hawai'i.

The Hawai'i Aerospace Advisory Committee met in Honolulu on January 11, 2011 to explore these opportunities and ways to realize them. During this meeting, we discussed the merits of obtaining a commercial spaceport license for the State, and are unanimously in favor of doing so.

The commercial space transportation industry is taking root quickly, and poised to grow dramatically in the years ahead. Companies like Space Exploration Technologies (SpaceX) and Orbital Sciences Corporation are successfully demonstrating the ability to provide space transportation services to the government on a commercial basis. Other companies, like Sir Richard Branson's Virgin Galactic, are preparing to launch commercial, suborbital tourism enterprises.

Many states and nations are investing substantial sums to attract this burgeoning industry – yet Hawai'i has unique advantages that would allow it to successfully compete for this industry with minimal investment of public funds. These competitive advantages include a world class tourism infrastructure, an international aviation hub, and several airport runways (including those Honolulu and Kona International Airports, as well as Keahole Airport in West Oahu) that are long enough to accommodate suborbital spaceflight operations, as well as proximal to the ocean (so that operations can be conducted without overflying populated areas).

The commercial space transportation industry accounted for more than $1 billion in revenue in 2009, and will grow many fold over the years ahead. The key enabler for Hawai'i to compete for the prestige, jobs, and tourism revenue at stake is a commercial spaceport license, to be issued by the FAA's Office of Commercial Space Transportation. Funding appropriated through SB 112 would enable the State to conduct the environmental assessment studies required to obtain this crucial permit and open new aerospace development opportunities for Hawai'i – including space tourism!

As such, and on behalf of the Hawai'i Aerospace Advisory Committee, I strongly encourage your support of S.B. No. 112.

Me ka ha'aha'a,

Elliot Holokauahi Pulham

STRATEGIC THEORIES
unlimited, LLC

9 February 2011

Testimony in Support of SB112

Dear Members of the Twenty-Sixth Legislature:

I support SB112 because the State of Hawaii is the perfect place for a spaceport. The location in the middle of the Pacific, the closeness to the equator and the cleanness of the atmosphere are benefits for a spaceport. Even the reef runway at the Will Rogers International Airport is an added benefit.

The 2009 Session of the Legislature recognized the benefits for Hawaii when they passed a similar bill, but, unfortunately, the funds were never released. It is now time for the present Legislature to "step-to-the-plate" and approve/release funds for an environmental assessment, considering risk management ideals, to help put Hawaii on the World map of Spaceports.

Mahalo!

Stewart V. Burley

Stewart V. Burley
President
www.stu@stukauai.com

ECONOMIC DEVELOPMENT
ISLAND OF OAHU

March 29, 2011

Hawaii State Legislature
State Capital
Honolulu, Hawaii 96813

COMMITTEE ON FINANCE
Rep. Marcus R. Oshiro, Chair
Rep. Marilyn B. Lee, Vice Chair

Thursday, March 31, 2011
5:00 p.m.
Conference Room 308
State Capitol, 415 South Beretania Street

SUPPORTING TESTIMONY RELATING TO TOURISM: SB 112-SD1-HD1
Tourism; Space Industry; Federal Aviation Administration; Spaceport License

Aloha Chair Oshiro, Vice Chair Lee and Members of the Committees:

Enterprise Honolulu, the O'ahu Economic Development Board, **strongly supports the passage of SB 112-SD1-HD1** enabling the State's Office of Aerospace Development to conduct environmental and safety assessment studies required for this license to be applied for, approved and issued from the Federal Aviation Administration (FAA).

As the FAA is expected to issue a limited amount of spaceport licenses, it is timely that this legislation be approved now, to further enhance our economic vitality and diversify the visitor industry with new opportunities derived from space tourism.

The advent of commercial space transportation has arrived - the Hawaiian Islands are uniquely positioned strategically and geographically. To secure a commercial space port license will further enhance our economic advantages with companies such as Space X and Virgin Galactic.

During the twenty-fifth legislature, 2009 Session, there was a similar bill passed, however, the past administration did not release the funds to start the process. Please let us move forward on this important initiative and ensure a brighter future for Hawai'i and our generations to come.

Thank you for allowing this testimony to be included at this hearing.

Mark McGuffie
Managing Director

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735 Bishop Street, Suite 412, Honolulu, Hawaii 96813 • 808-521-3611
Fax: 808-536-2281 • www.enterprisehonolulu.com

MARS INSTITUTE

10 Feb 2011

Attn: 26th Legislature of the State of Hawaii

RE: Mars Institute Testimony to the State of Hawaii Legislature in Support of Senate Bills 112, 165 and 1496.

Dear Members of the Twenty-Sixth Legislature,

I am happy to provide testimony in strong support of Hawaii State Senate Bills 112, 165, and 1496, scheduled for consideration today.

I am chairman of the Mars Institute, a 501 c3 non-profit research organization whose mission is the advance the scientific study, exploration, and public understanding of the planet Mars. The Mars Institute is a world leader in space research, with focus on not just Mars itself, but also on the stepping stones that will allow humans to explore Mars: the Moon, near-Earth asteroids, and Mars's moons, Phobos and Deimos.

The Mars Institute has collaborations and partnerships with academia and industry across the nation and internationally, including with emerging space-faring nations of the Pacific Belt, particularly Australia and Japan. The Mars Institute is internationally recognized for its expertise in planetary analog research (research at sites on Earth that resemble the Moon or Mars and allow simulations of their exploration), and is the organization operating the *Haughton-Mars Project Research Station*, the world's largest privately operated polar research station (on Devon Island, in the Arctic). The Mars Institute collaborates with PISCES in Hawaii to advance Moon and Mars exploration, and views Hawaii potential in helping advance space exploration as critical and of strategic importance, for scientific, economic, and national security reasons.

We are 100% behind Senate Bills 112, 165, and 1496.

Pascal Lee, Ph.D.
Chairman, Mars Institute
NASA Research Park
Moffett Field, CA 94035-0006
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PTC®

Real World Design Challenge

11710 Plaza America Drive
Suite 2000
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Phone: 703-298-6630
Fax: 703-871-5111
Email: rcoppola@ptc.com

February 8, 2011

Dear Members of the Twenty-Sixth Legislature:

On behalf of the 40 Real World Design Challenge partner organizations in government, industry and academia, I am pleased to provide testimony in strong support of SB112, SB165 and SB1496, which collectively advocate aerospace as a strategic and timely growth industry for Hawai'i.

The aerospace industry is a vital part of the economy of the United States and the State of Hawaii. It is critical for both national security and global economic competitiveness. Space tourism can provide an additional dimension to Hawaii's economy and enhance the existing tourist industry with billions of dollars in revenue. Lunar research and development also has the potential to stimulate the state's economy through industry contracts and tourism (a lunar research center is likely to become an exciting tourist destination!). For the past half century, Hawaii has been a leader in aerospace, and should consider this sector as a key part of the state's strategic economic development portfolio as you reach for the future.

We are delighted that Hawaii has been a partner in the Real World Design Challenge since its inception – with exceptional results (Iolani School on Oahu won the 2008/2009 National Championship and placed second in the 2009/2010 national competition!). The Real World Design Challenge in "green aviation", along with other educational initiatives, is enabling Hawaii to build the education and workforce pipeline needed to support the aerospace industry and other Science Technology. Engineering and Mathematics (STEM) disciplines. Much of the innovation in our society emanates from aerospace research and development and related spinoff technologies. These technologies are spawning new industries, which students in Hawaii (as"innovators of tomorrow") can help develop to grow the "innovation economy" of the 21st Century.

Innovation is a key driver of the economy. SB112, SB165 and SB1496 collectively afford substantial opportunities to help catalyze and sustain innovation in Hawaii. As such, I hope all of these measures will receive strong bi-partisan support during the 2011 Session.

Thank you for the opportunity to testify on this legislation.

Sincerely,

Dr. Ralph K. Coppola
Director, Real World Design Challenge &
Senior Director of Global Government & Strategic Education Programs at PTC

PISCES | Pacific International Space Center for Exploration Systems

TESTIMONY

Date: February 9, 2011
To: Members of the Twenty-Sixth Hawaii State Legislature
From: Dr. Frank Schowengerdt
Subj: Testimony in Support of SB112, SB165 and SB1496

I write in strong support of the aerospace-related bills SB112, SB165 and SB1496. These bills deal with a commercial spaceport license for Hawaii from the FAA; funding for the Office of Aerospace Development (OAD), the Pacific International Space Center for Exploration Systems (PISCES) and the Pacific International Space Alliance (PISA); and inclusion of space exploration and lunar research activities as eligible business activities for enterprise zones in Hawaii.

A measure similar to SB112 was passed in the 2009 legislature, but Hawaii's former Administration did not release funding appropriated through this bill. While commercial space transportation represents a long-range economic development opportunity, it is important that the licensing process begin now so that your state will be ready to launch (literally!) when the technology for sub-orbital point-to-point transportation matures. Other states are much further along in this process than Hawaii, even though your State has many demonstrable advantages over the others. In addition, private investors critical to developing the commercial space transportation network will send their dollars to states that have demonstrated both an interest in and commitment to grow this industry. The best way Hawaii can evidence this interest and commitment is by funding the environmental studies required to obtain a commercial spaceport license from the Federal Aviation Administration. SB 112 will provide the critical funds needed for this purpose.

For the past four years, your State Office of Aerospace Development (OAD), created through State statute, has been working to promote Hawaii's future in aerospace. Hawaii clearly has significant advantages in terms of location, geographical resources and international connectivity that well position aerospace as a strategic growth industry for your State. This is one of the most progressive and forward-looking industries in the world, and Hawaii can play a leadership role, both for our nation and the global space community, in pioneering new vistas for aviation, aeronautics, and space exploration. But to succeed in this endeavor, OAD needs adequate funding and staff support, and SB 165 would provide what I feel is the minimum amount of support this office requires to responsibly carry out its mandate - especially when other states, with significantly fewer advantages than Hawaii, are moving aggressively to expand their aerospace programs as drivers for economic development.

PISCES is one of the unqualified success stories of OAD's efforts to make a mark in space exploration. Through its testing, research, education and public outreach activities, PISCES has put Hawaii on the map in a way that no other activity has in this area. Tests at our site on the lower slopes of Mauna Kea have brought hundreds of scientists, engineers, technicians, government officials, public figures and members of the news media to the Big Island in recent years, and have injected millions of dollars into Hawaii's economy. The tests at PISCES also have demonstrated many new technologies that can help sustain life on the Moon and beyond, but again, which will also benefit the local economy.

For example, during the 2010 tests powerful solar concentrators were used to process the lunar-like soil at the PISCES test site in the same way that they will be used on the Moon to extract oxygen and water for life support. This and similar technology can help make Hawaii more energy-independent through widespread application of solar power in residential and commercial buildings. In addition, technologies tested at PISCES involving communication, robotics, and materials processing can help provide sustainable, high-paying jobs in non-polluting industries that are crucial to economic development in the State. We are also currently planning a robotics challenge involving students and a ground-penetrating radar study at our test site, in addition to a proposed life-support habitat for a human-factors study of interest to NASA.

Support of PISCES through SB165 will also enable us to move forward on developing the International Lunar Research Park (ILRP) initiative on the University of Hawaii at Hilo campus. The prototype ILRP to be developed on the Big Island (simulating one to eventually be deployed on the lunar surface) will provide the space, infrastructure and field areas needed to develop and test technologies for sustaining life on the Moon and beyond, while spinning off technologies to benefit the local economy.

The ILRP will be built in or adjacent to the existing Science and Technology Park at the university, where the base facilities for many of the Mauna Kea telescopes are located, and would be part of the enterprise zone as requested in SB1496. With this designation, companies could lease space in the park to conduct research with government and university personnel, developing and validating technologies that will figure prominently in their business plans for space commerce. The ILRP has received enthusiastic response both inside and outside of NASA, and will be the subject of a workshop at NASA Ames Research Center on April 5th of this year involving such space luminaries as Buzz Aldrin and high-ranking officials from space companies and international space agencies.

In summary, I believe the State of Hawaii could find no better area for economic development to complement its existing traditional sectors than aerospace. This industry produces jobs that pay roughly twice the U.S. national average, that are clean and attractive, and that cannot be outsourced to other countries. In fact, the space exploration activities in which we are currently engaged and that are supported through this legislation can attract people and businesses from all over the world.

We have already demonstrated this at PISCES by bringing in sustained business from the Canadian and German space agencies, in addition to research support from NASA. Rather than competing with current economic drivers in Hawaii such as tourism and agriculture, aerospace activities will attract more tourists to the Big Island to see what it will be like to live and work on the Moon, and will contribute new technologies to the agriculture sector as spin-offs from the sustainability research to be conducted at the ILRP.

I therefore urge your State Legislature to support these bills for the good of the state, the nation and the world.

Sincerely,

Frank Schowengerdt
Director

University of Hawai`i at Hilo
200 W. Kawili St.
Hilo, HI 96720

Maui Film Festival

P.O. Box 790669 H Paia, HI 96779 H T.808.579.9996 H F.808.579.9552

February 28, 2011

COMMITTEE ON FINANCE
Rep. Marcus R. Oshiro, Chair
Rep. Marilyn B. Lee, Vice Chair

Wednesday, March 2, 2011, 8:30 AM Room 308

Testimony **IN SUPPORT** of HB112 – Relating to Cable Television Systems

I am a resident of Maui County, I offer my testimony in strong support of HB112.

For many years now, it has been more than obvious that commercialized information delivery systems—especially broadcast and cable television in the hands of so few owners—should not be the fundamental organizing principle of a vibrant culture. With rare exception, they cater to the reptilian rather than enlightened realms of human behavior and limit the scope of meaningful debate and discussion on the issues of our times.

Akaku, Maui County's Akaku Community Television, as well as, the community-based public access television providers serving Oahu, Olelo Community Television, the Big Island, Na Leo O Hawaii and Kauai, Hoike Community Television are the antidote to the all-too-often myopic vision of the nation's mass media.

We need all of them to thrive so that together we can turn the glimmer of eclectic programming that they deliver into a brightly shining torch that both inspires open minded creative content and sparks important conversations about the direction of the communities we call home.

I urge you to please support HB112 and know that the strong accountability and performance standards that it mandates will only help to ensure that the right organization (named above) continue to be able to provide their much needed and much appreciated services to their respective communities.

Thanks for you time and consideration.

Sincerely,

Barry Rivers, President
Maui Film Festival, Inc.

These non-profit public access organizations have been a vibrant part of our public discourse throughout the state for more than twenty years and this bill will ensure that they continue to be fully accountable and responsive to the needs of their local communities, the DCCA and the state.

LOCKHEED MARTIN

Lockheed Martin Commercial Launch Services
12257 South Wadsworth Blvd., MS 1003
Littleton, CO 80125, U.S.A.
Telephone: 800.328.1665

In reply, please refer to: CLSB0-1102-0007

February 9, 2011

Members of the Twenty-Sixth State Hawai'i State Legislature

Subject: Senate Bills No. 112, 165 and 1496

Dear Representatives:

President Obama, in the State of the Union address on January 25, challenged America to win the future by creating an environment, through innovation, education, and infrastructure, that will "make America the best place on Earth to do business." By this measure, Hawai'i has been winning its future.

Hawai'i has employed its greatest assets and resources in productive, profitable and sustainable industry to make it the best place on Earth for astronomical research, as well as tourism. With its stunning beauty and idyllic location, Hawai'i is the very definition of "vacation destination." The world's astronomers have established unparalleled observatories on its 14000-foot peaks, standing tall into clean, unobstructed air. The same high, dry peaks offer unmatched opportunity to recreate conditions on other planets we will soon visit, and test our methods and machines where the consequences of failure are not so dire.

Hawai'i cannot rest on these successes if it is to continue to win its future. As the world changes, so must Hawai'i change to address and accommodate new challenges and opportunities.

A new concept in tourism – space tourism – is yet in its infancy, but is gaining momentum. Virgin Galactic, Space Exploration Technologies, Orbital Sciences Corporation, Blue Origin, Bigelow Aerospace, and Sierra Nevada Corporation are among the companies developing systems with the goal to offer tourists, as well as scientists and businesses, a means into space. These are the very companies that the President's Administration holds up as examples of the innovative spirit required to win the future. Hawai'i has the opportunity to establish itself as a founding member of this new industry, by helping to develop the infrastructure, spaceports with unique services and capabilities, on which this new industry will be built. Hawai'i can capitalize on its investments and experience in exploration research to encourage the development of new and expanded research and commercialization opportunities, and foster international cooperation for space initiatives, such as the Pacific International Space Center for Exploration Systems (PISCES) and the International Lunar Research Park (ILRP).

As a member of the Hawai'i State Aerospace Advisory Committee, I am writing to encourage your strongest possible support for Senate Bill 112, which would appropriate funding for the Office of Aerospace Development, DBEDT, to pursue a commercial spaceport license from the Federal Aviation Administration (FAA) for the State of Hawai'i; for Senate Bill 165, which would promote the continuing development of the aerospace industry in Hawaii by providing the office of aerospace development with sufficient funding and staff support to effectively carry out its statutory duties; and Senate Bill 1496, which would establish "development and operation of space exploration and lunar research related activities" as "eligible business activities" for enterprise zones in Hawai'i

The President, quoting Robert Kennedy, reminded us that "the future is not a gift. It is an achievement."

Respectfully yours,

Steven J. Skladanek
Director of Marketing, Lockheed Martin Commercial Launch Services
Member, Hawai'i Aerospace Advisory Committee

To: Hawaii Legislators
From: Nancy C. Tashima
RE: Support of SB112, SB165 & SB1496
Date: February 9, 2011

Dear Members of the Twenty-Sixth Legislature

I am pleased to provide testimony in very strong support of SB 112, SB165 and SB1496 advocating support of aerospace related funding.

Considering the current financial situation of Hawaii, it is imperative and prudent that our State seek inventive and innovative methods of improving our economy for all of its citizens. We can no longer depend on the traditional tourist or agriculture industries to provide enough jobs to sustain our economy. As a science teacher for the past forty-one years in Hawaii I envision our students being educated and trained to support aerospace related professions along with the improvement of their Science, Technology, Engineering, and Mathematics skills. Hawaii's youth need the desire to remain in our State and the possibilities afforded by the aerospace industry will allow them to have the vision and inspiration to succeed in professional careers here in Hawaii.

SB 112 will expand our traditional tourism based industry by providing funds for a spaceport license application. This Federal Aviation Administration license will afford the possibility of many new jobs and professions for Hawaii's citizenry. An international commercial spaceport will allow the stabilization and expansion of our economic base.

SB165 will fund several aerospace related possibilities [illegible] As a public teacher, I especially support the public education and community outreach aspects of the bill. Additionally, I strongly support the funding for the Office of Aerospace Development and the NASA [illegible] programs. These programs will undoubtedly benefit our students and the general public by providing the education, skills, and support to allow them to remain in Hawaii rather than moving to other locations to find good jobs.

I also support SB1496 since it makes possible the creation of businesses related to lunar and space exploration which would not only broaden our economic base but motivate our Hawaii residents to succeed in their desires to become business entrepreneurs within [illegible] communities. With opportunities afforded by SB1496, many new space related businesses will be [illegible] sustain Hawaii in the future.

I strongly urge you to support SB112, SB165 and SB1496 [illegible] expand the aerospace related industries and therefore create jobs and careers for Hawaii's population.

Respectfully submitted,

Nancy C. Tashima

Nancy C. Tashima
Onizuka Space Center, Curator
Hawaii Resource Science Teacher
NASA Solar System Educator
NASA Messenger Educator Fellow
NASA New Horizons Educator Fellow

February 8, 2011

Hawaii State Legislature
Hawaii State Capitol
415 S. Beretania Street
Honolulu, HI 96813

Re: Support for Senate Bills 112, 165 and 1496

Members of the Twenty-Sixth State Legislature:

As a member of the Hawaii State Aerospace Advisory Committee, I am pleased to provide testimony in strong support of Senate bills 112, 165 and 1496, which, respectively, appropriate funds for a spaceport license from the Federal Aviation Administration, provide the Office of Aerospace Development with funding and staff support, and establish "development and operation of space exploration and lunar research related activities" as "eligible business activities" for enterprise zones in Hawaii.

I firmly believe that a strong aerospace industry in Hawaii is critical to developing an innovative and progressive "knowledge economy" for our state. Just as aviation was the industry of the future at the beginning of the 20th century, aerospace today represents the hopes and dreams of the young scientists, entrepreneurs and innovators being educated right now for the brightest jobs of the future.

Moreover, the state of Hawaii possesses attributes and resources found nowhere else on Earth which, if appropriately developed and used, will establish an important niche for the state in the aerospace industry.

This is an industry that can help sustain and keep our talented, well educated youth at home, help stabilize and diversify our state's economy, and help improve the quality of life in our state. Support for an aerospace industry today will provide a substantial return of investment for many years to come.

Sincerely,

Rose Tseng

Rose Y. Tseng
Professor and Chancellor Emerita
University of Hawaii at Hilo

Testimony in Support of SB 112, SB 165, SB 1496

Date: 10 February 2011

Submitted by: Joseph E. Ciotti, PhD
Director, Center for Aerospace Education
Hawai'i Teacher-in-Space/NASA Ambassador
Windward Community College

Dear Members of the Twenty-Sixth Legislature:

I am pleased to provide testimony in strong support of SB 112, SB 165 and SB 1496—all three of which address the strategic and timely growth of aerospace industry in the State of Hawai'i.

I've been intimately involved with space education in Hawai'i for over 40 years and can personally testify to the significant impact that past and recent commitments to this endeavor have had on our youth and the welfare of our State. I've witnessed this through my decades of teaching astronomy and space science at both the secondary and college level, through my extensive K-12 and community outreach efforts at Windward Community College's Center for Aerospace Education which has reached over 300,000 people, through the rocketry projects my Hawai'i Space Grant students continue to undertake, and through over forty years of experience I enjoyed at all three planetariums in Hawai'i—including designing and constructing two of them.

Following in the wake of its rich seafaring heritage, Hawai'i has already undertaken bold spacefaring ventures. From world-class astronomical observatories ... to NASA-sponsored *in situ* rehearsals of manned and robotic space missions ... to its role in international airline transportation and potential future space tourism, Hawai'i is uniquely poised for significant economic growth through the leadership choices it makes regarding the aerospace industry.

Hawai'i is currently perched to assume a prominent role in aerospace research and technology. The decisions made today by the Twenty-Sixth Legislature will determine the flight path our State will follow in a field that has potential for major positive impact on its economy. By committing to the development of a spaceplane launch/landing facilities in Hawai'i (SB 112), operation of space exploration and lunar research related activities as eligible local business (SR 1496), and support for the Office of Aerospace Development to carry out this bold and far-reaching vision (SR165), Hawai'i will have laid its claim as the crossroads along this major space highway.

By recognizing aerospace as a strategic industry in Hawai'i, passage of these Senate Bills will provide the urgently needed support and boost to DBEDT's Office of Aerospace Development in fulfilling its responsibility to oversee the economic growth of this fast-paced and strategically important industry in Hawai'i.

I strongly support SB 112, SB 165 and SB 1496.

Sincerely,

Joseph E. Ciotti

Joseph E. Ciotti, PhD

Professor, Physics, Astronomy & Mathematics
Director, Center for Aerospace Education
Hawai'i-Teacher-in-Space/NASA Space Ambassador
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