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Office of Aviation Policy and Plans

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**PRELIMINARY REGULATORY EVALUATION,
INITIAL REGULATORY FLEXIBILITY DETERMINATION, TRADE IMPACT
ASSESSMENT, AND UNFUNDED MANDATE REFORM ACT ASSESSMENT**

**NOTICE OF PROPOSED RULEMAKING
LICENSING AND SAFETY REQUIREMENTS FOR OPERATION OF A LAUNCH
SITE
(14 CFR PART 417,420)**

**OFFICE OF AVIATION POLICY AND PLANS
OPERATIONS REGULATORY ANALYSIS BRANCH, APO-310
GARY BECKER
MARCH 24, 1998**

TABLE OF CONTENTS

	<u>Page</u>
Table of Contents	1
1. Executive Summary	1
2. Background and Industry Profile	3
3. Existing Guidelines (Current Practice) and Proposal	10
4. Costs and Benefits	19
5. Conclusion	41
6. Initial Regulatory Flexibility Determination	42
7. International Trade Impact Assessment	47
8. Unfunded Mandates Reform Act Assessment	48
Appendix	50

1. EXECUTIVE SUMMARY

The Federal Aviation Administration (FAA) proposes to amend its commercial space licensing regulations to add licensing requirements for the operation of a launch site. The proposal would provide launch site operators with licensing and operating requirements to protect the public from the risks associated with operations at a launch site. The FAA currently issues licenses to launch site operators on a case-by case- approach. Elements of that approach are reflected in the guidelines, “ Site Operators License Guidelines for Applicants, ” which describe the information that applicants provide the FAA for a license to operate a launch site. The FAA’s interpretation and implementation of the guidelines constitute another element of the case-by-case approach and additional elements, such as policy review, not reflected in the guidelines.

The proposal represents quantifiable changes in costs compared to the guidelines (current practice) in the following two areas -- the launch site location review and approval and the launch site operations review and approval. The FAA has estimated the costs and cost savings of these changes under two different cost scenarios over a 10-year period discounted at 7 percent in 1997 dollars. The total 10-year undiscounted cost savings is estimated to be between \$84,000 and \$160,000 (or between \$53,000 and \$105,000, discounted). The most burdensome cost scenario (where net cost savings is the least) to the industry would result in the costs to the launch site operators of \$23,000 (or \$19,000, discounted) for the

launch site location reviews and approval provisions resulting in only a cost savings of \$3,000 (or \$2,000, discounted) for the launch site operations reviews and approval provisions. Although there would be no cost impact to the FAA, there would be a cost savings to the FAA from the most burdensome cost scenario of \$104,000 (or \$70,000, discounted).

There are significant nonquantifiable benefits in two areas. First, the proposal eliminates overlapping responsibilities. Second, the proposal provides increased details and specificity, which are not present in the guidelines.

The proposal is not expected to have a significant impact on international trade nor is it expected to have a significant impact on a substantial number of small entities. This proposal does not contain any Federal intergovernmental or private sector mandate. Therefore, the requirements of Title II of the Unfunded Mandates Reform Act of 1995 do not apply.

2. BACKGROUND AND INDUSTRY PROFILE

2.1 Background

The Commercial Space Launch Act of 1984, as amended, and codified at 49 U.S.C. Subtitle IX, ch. 701, Commercial Space Launch Activities, 49 U.S.C. 70101-70119 (1994) (the Act) authorizes the Secretary of Transportation to oversee, license, and regulate launches and the operation of a launch site as carried out by a U.S. citizen or within the United States.¹ The Act directs the Secretary to exercise this responsibility consistent with public health and safety, safety of property, and the national security and foreign policy interests of the United States.²

On August 4, 1994, President Clinton announced a new National Space Transportation Policy **reaffirming** the government's commitment to the commercial space transportation industry and the critical role of the Department of Transportation (DOT) in encouraging and facilitating private sector launch activities.

¹49 U.S.C. 70104, 70105.

² 49 U.S.C. 70105.

On November 15, 1995, the Secretary's responsibilities, which had been within the Office of the Secretary in the Department of Transportation, became those of the Associate Administrator for Commercial Space Transportation (AST) within the Federal Aviation Administration. The Associate Administrator for Commercial Space Transportation now carries out the Secretary's responsibilities for licensing launches and the operation of launch sites, and for encouraging, facilitating and promoting commercial space launches by the private sector.³

The current regulations governing the issuance of a launch site operator license state that "requests for licenses authorizing the operation of a launch site are reviewed on the basis of the applicant's capability to operate a facility where safety operations are conducted on a continuing basis as support for the launching of a specified class of launch vehicles."⁴ In August 1995, the FAA released information guidelines that describe the information that a launch site operator applicant should provide the FAA in order to receive a license to operate a launch site.

Only recently has a commercial launch site sector emerged. Previously only launch ranges operated by the Federal government provided commercial launch operators with facilities and launch support. Four licenses have been issued to launch site operators: one to Spaceport Systems International to operate California Spaceport, one to the Spaceport Florida Authority to operate Spaceport Florida,

³ 49 U.S.C. Sec. 70103

one to the Virginia Commercial Space Flight Authority to operate Virginia Commercial Space Flight Center, and one to Alaska Aerospace Development Corporation to operate the Kodiak Launch Complex. One commercial launch has already taken place from Spaceport Florida. The first three launch sites are located on federal launch ranges.⁵ The fourth launch site is the first not operated by the Federal government. The Alaska site will focus on small to medium-sized rockets for launch of low earth orbit (LEO) spacecraft. One government launch has already taken place from the Kodiak Launch Complex.

A launch site is currently being planned in New Mexico [Southwest Regional Spaceport]. This proposed launch site is not located on a federal launch range.

Figure 2.1 Launch Site Operators, Launch Sites, Locations and License Status

<u>Launch site operator</u>	<u>Launch Site</u>	<u>Location</u>	<u>License Status</u>
Spaceport Systems International [SSI] California	Spaceport (CSP)	On fed launch range	Licensed
Spaceport Florida Authority (SFA)	Spaceport Florida (SPF)	On fed launch range	Licensed
Virginia Commercial Space Flight Authority (VCSFA)	Virginia Commercial Space Flight Center (VCSFC)	On fed launch range	Licensed
Alaska Aerospace Development Corporation (AADC)	Kodiak Launch Complex (KLC)	Not on fed launch range	Licensed
New Mexico Office of Space Commercialization (NMOSC)	Southwest Regional Spaceport (SRS)	Not on fed launch range	Pre-application

⁴ 14 CFR § 411.3(b)

⁵ A federal launch range is an installation, from which launches routinely take place, that is owned and operated by the government of the United States.

2.2 Industry Profile

The FAA has issued licenses to operate launch sites to four of the organizations indicated in Figure 2.1. Figure 2.1 also describes the licensing status of proposed launch sites.

Launch sites may be located either within the confines of federal launch ranges [such as the California Spaceport within Vandenberg Air Force Base], or outside of federal launch ranges [such as the Kodiak Launch Complex in Alaska].

This analysis quantifies the economic impact of four license situations. They are shown in Figure 2.2. The four situations shown were selected because the costs of licensing each situation would be similar for all licenses within that situation. The examples shown in Figure 2.2 represent two additional application situations that are not shown in Figure 2.1. They are an application to renew a license issued for a launch site on a federal launch range and an application to renew a license for a launch site not located on a federal launch range.

Figure 2.2 Four Basic License Situations

<u>License Type</u>	<u>Site Location</u>	<u>Launch Site</u>
First time license	Launch Site on federal launch range	CSP, SPF, VCSFC
First time license	Launch Site off federal launch range	KLC, SRS
Renewal ⁶	Launch Site on federal launch range	CSP, SPF, VCSFC
Renewal ⁶	Launch Site off federal launch range	KLC, SRS

Estimates of the costs associated with each of the four situations can be made based on the FAA's experience issuing licenses and estimates of the time required to perform analyses required by the proposal. Once an estimate is made for each license situation these estimates can be applied to forecasts of future launch site applications to derive an estimate of the costs of the proposal relative to current practice.

Launch Site Operator License

For those launch sites that are located within a federal launch range, launch site operators generally lease land and facilities from the federal launch range operator. Under the existing guidelines (current practice), an applicant develops a Launch Site Safety Operations Document (LSSOD) based in part on federal launch range requirements, such as Eastern and Western Range Requirement 127-1 (October 1997).⁷ The FAA's acceptance of the LSSOD is based on the fact that the federal launch range approves the ground safety plan, the approval is within

⁶ License originally issued under current practice.

⁷ United States Air Force, Patrick Air Force Base, Eastern and Western Range 127-1, Range Safety Requirements (EWR 127-1), Florida, October 1997.

the Federal launch range's experience, and the plan contains the elements listed in the information guidelines.

For those sites that are not located within a federal launch range, an applicant is not obligated to comply with federal launch range procedures nor does an applicant have continuing oversight of a federal launch range.

Launch Sites Located on a Federal Launch Range

The first launch site operator license was issued on September 19, 1996 to Spaceport Systems International, L.P. (SSI). The license authorizes SSI to operate California Spaceport (CSP) as a launch site at Vandenberg Air Force Base, California. This license will serve as one example of a license issued under current practice for a commercial launch site located on a federal launch range.,

Two other commercial launch site operator licenses (located on federal launch ranges) have been issued. A license was issued to Spaceport Florida Authority to operate Complex 46, on Cape Canaveral Air Station, Florida. Another license was issued to Virginia Commercial Space Flight Authority to operate a launch site on NASA's Wallops Flight Facility, Virginia. In addition to California Spaceport, Spaceport Florida and Virginia Commercial Spaceflight Center will serve in the analysis to represent commercial launch sites that are located on federal launch ranges.

However, these three launch sites located on federal launch ranges are not representative of all possible launch sites. As mentioned earlier, the analysis will consider launch site operator licenses for two types of launch sites: one for launch sites located on a federal launch range and one for launch sites not located on a federal launch range. The analysis will also consider the renewal of each of these types of licenses.

Launch Sites not Located on a Federal Launch Range

At this time, the Kodiak Launch Complex in Alaska has recently received a license and the Southwest Space Complex located adjacent to White Sands Missile Range in New Mexico is in the preapplication phase.⁸ These are commercial launch sites that are not located on federal launch ranges.

3. EXISTING GUIDELINES (CURRENT PRACTICE) AND PROPOSAL

3.1 Overview of Differences Between Existing Guidelines (Current Practice) and Proposal

⁸ As opposed to being in the preapplication phase, when an applicant is in the application phase, the Act requires the FAA to complete the license review of an application within 180 days after it has all the information necessary to complete evaluations. At the preapplication phase, the prospective applicant is still discussing application requirements.

The costs and benefits of this proposed rulemaking are determined by comparing operations under the proposal with a base case. The base case is referred to as the existing guidelines (current practice)' scenario in this report.

The requirements for an applicant to obtain a license are changed under the proposal as compared to the guidelines (current practice). The environmental review is the only requirement that does not change. The launch site location review is more specific, and the launch site operations review is no longer required. Under the proposal, an applicant must submit an explosive site plan. A new policy review is explicitly added which covers the non-environmental/non-safety portion of the application process. Lastly, the proposal separates the requirements for an applicant to obtain a launch site operator license from the responsibilities of a launch site operator after he was licensed.

3.2 Guidelines (Current Practice) Versus Proposal

3.2.1 Environmental Review and Determination

The requirements are the same under the proposal and the guidelines (current practice).

⁹ FAA current practice requires that an applicant adhere to the Site Operator License Guidelines supplemented by FAA guidance.

3.4.2 Launch Site Location Review and Approval

Guidelines (Current Practice) : Under the guidelines (current practice), an applicant provides information to AST such as the launch site location, size, and topographic and geological characteristics; proximity to populated areas; and any local commercial and recreational activities that may be affected by launches. An applicant would also be required to describe the planned possible flight paths and general impact areas designated for future launches, and climate and meteorological data that may affect the safety of launch site operations. In addition, the applicant would have to provide safety analyses for generic sets of launch vehicles. The FAA then assesses the adequacy of the launch site location to support safe launches. The guidelines, however, do not provide explicit criteria for approval or specify types or classes of launch vehicles.

Proposed: Under the proposal, an applicant would be required to conduct an analysis that **objectively** determines whether the location of a proposed launch site can support the launch of a suborbital launch vehicle or including orbital, guided sub-orbital, or unguided suborbital expendable launch vehicles, and reusable launch vehicles. Each prepared launch point on the launch site must be evaluated for each type of launch vehicle that the applicant wishes to have launched from a launch point. The license would be limited to vehicle types and classes (no larger or different than) that selected by the applicant in the

application analysis. A license would have to be amended in the future if the applicant proposes using the site for larger or different classes of vehicles.

Difference: The guidelines (current practice) and proposed rules differ in breadth and specificity. The proposal is narrower in scope because an applicant is only required to demonstrate that one launch for each type of launch vehicle can take place safely. Additionally, the FAA does not require an applicant to analyze the risks posed by the planned impact of normally jettisoned stages from a guided launch vehicle, except for the final stage of a guided suborbital launch vehicle. This assumption is made because the trajectory for a guided launch vehicle can be designed so that the risks from nominally jettisoned stages can be kept to acceptable levels. It is supported by risk calculations performed for launches from the federal launch ranges that demonstrate a relatively low risk posed by controlled disposition of stages in comparison to the risk posed by wide-spread dispersion of debris due to vehicle failure.

It should be noted **that the** focus of FAA's launch site location review methods is on expendable launch vehicles with a launch history. The reusable launch vehicles (RLV) currently proposed by industry vary significantly. Accordingly, the FAA believes that it should define a detailed analytical method for determining the suitability of a launch site location for **RLV's**. An applicant proposing a launch site limited to the launch of reusable launch vehicles would still need to define a flight corridor and conduct a risk analysis if population

were present in the flight corridor, but the FAA will review such an analysis on a case-by-case basis like under the current guidelines.

3.4.3 Launch Site Operations Review and Approval

Current: An applicant performs a hazard analysis and submits an LSSOD under current practice to obtain a license. A licensee would be responsible for complying with its Launch Site Safety Operations Document (LSSOD)¹⁰. The LSSOD includes all of the recurring annual responsibilities under the proposal.

Proposed: The launch site operator is no longer required to submit a LSSOD or perform a hazard analysis. Instead, the proposal defines licensee responsibilities, as discussed in 3.4.6 below.

Difference: An LSSOD and a hazard analysis would no longer be required of the launch site operator under the proposal. Moreover, the safety of preparing a launch vehicle for flight would primarily be the responsibility of the launch operator under the proposal.

3.4.4 Explosive Site Plan Review and Approval

Current: No Q-D requirements are explicitly included in the current practice guidelines. However, an applicant must conduct a hazard analysis to demonstrate that the applicant fully understands and has plans to handle the hazards that launch site operations might pose to the public. This analysis must identify each foreseeable launch site hazard, including explosive hazards, and identify mitigation measures to control or reduce the risks associated with those hazards, particularly as they relate to site layout and facility design, etc. The standard industry and federal launch range approach to mitigating risks associated with liquid and solid propellants, and other explosives, is to separate them from the public and each other by prescribed distances based on quantity of explosive material and the explosive potential of that material. The proposal essentially codifies current industry federal launch range practice. Other hazards such as toxic materials and electromagnetic radiation (RF) would be addressed in the hazard analysis along with specific mitigation measures.

Proposed: Under the proposal, an applicant would be required to submit an explosive site plan that complies with Quantity-Distance (Q-D)^{10*} relationships defined in the proposal. These Q-D requirements apply to areas on a launch site where liquid and solid propellants are located. There is no requirement to

¹⁰ Includes details of safety policies and procedures, safety organization and personnel qualifications, facility layout, facilities **and** equipment, facility users, facility access/security, emergency response plans and accident investigation plans.

¹¹ The quantity of explosives material and distance separation relationships that provide defined types of protection. These relationships are based on levels of risk considered acceptable for the stipulated exposure and are tabulated in quantity-distance tables.

consider the siting of toxic materials, or separation requirements for sources that emit RF.

Difference: One difference is that the proposal provides a standard for mitigating explosive risks. The scope of safety issues relating to site layout and facility design/limitations is far more extensive under current practice. Another difference is that under the proposal, the applicant is not required to consider the siting of toxic materials or separation requirements for sources that emit RF. These hazards are addressed in the hazard analysis under current practice, and through scheduling under the proposal.

3.4.5 Policy Review and Approval

Current: The policy review and approval are not specified in the guidelines. However, the FAA does consider the same policy issues under current practice.

Proposed: An applicant would be required to submit information identifying foreign ownership of the applicant, and the FAA would determine, before issuing a license, if issuance of such a license would jeopardize the foreign policy or national security interests of the U.S.

Difference. Since the FAA does look at those same policy issues, the only difference would be that the proposal explicitly states that a formal review and approval will occur.

3.4.6 Licensee Responsibilities for Operations

Current: Under current practice a launch site operator performs a number of activities to protect the public from all ground operations on the launch site, much the same way the range commander at a federal range is responsible for the day to day activities that he/she permit on their property. However, a launch operator's license holds the launch operator responsible for activities that involve preparing the launch vehicle for launch and launching the vehicle. Under current practice and the proposal, launch operators are responsible for complying with the launch site operator's rules and FAA requirements.

Proposed: The following operational safety elements are requirements of a license under the proposal:

- a. Controlling public access
- b. Scheduling launch site operations
- c. Notifying the public
- d. Investigating mishaps
- e. Maintaining records

Activities associated with the preparation of a launch vehicle for launch and the launch itself are the responsibilities of a launch operator under a launch license, under other commercial practices and the proposal. A launch site operator can contractually provide these services for a launch operator but it is the launch operator who bears the ultimate responsibility for these activities under an FAA license.

Difference: The launch site operator would only be responsible for the five operational safety elements listed above, whereas under current practice the launch site operator is responsible for protecting the public “ from the day-to-day hazards that exist at an industrial facility designed to support the launch of launch vehicles. ”¹²

All hazardous operations not performed for a specific mission by or for a specific launch operator are not addressed in the proposal. For this analysis, the safety of any such operations are presumed to be adequately covered by other regulatory agencies. Equipment testing, operational limits, qualifications of safety personnel, and other safety elements are the responsibility of launch licensees.

¹² Site Operators License Guidelines for Applicants, August 1995, U.S. Department of Transportation.

4. COSTS AND BENEFITS

4.1 Comparison of Benefits and Costs

The proposal represents quantifiable changes in costs compared to the current practice guidelines in the following two areas: the launch site location review and approval and the launch site operations review and approval. The FAA has estimated the costs and cost savings of these changes under two different cost scenarios over a 10-year period, discounted at 7 percent in 1997 dollars.¹³ The most burdensome cost scenario (where net cost savings is the least) to the industry would result in the costs to the launch site operators of \$23,000 (or \$19,000, discounted) for the launch site location review provisions. As a result, there would also be a cost savings of \$3,000 (or \$2,000, discounted) for the launch site operations reviews and approval provisions. There would be no cost impact to the FAA, however, there would be a cost savings from the most burdensome cost scenario of \$104,000 (or \$70,000, discounted). The estimated net cost savings of compliance to both **the FAA** and the launch site operator is \$84,000 (or \$53,000, discounted) under the most burdensome cost scenario.

Table 4.1 summarizes the quantifiable 10-year undiscounted and discounted costs and cost savings of the proposal.

¹³ Some provisions may result in significant costs to launch site operators beyond the ten-year time horizon of this analysis. For example, in certain instances, launch site operators may have to

Table 4.1 Summary of Quantifiable Costs and Cost Savings of the Proposal for Launch Site Operators and the FAA (1997 dollars)*

Proposed Section	Description	10-Year Undiscounted Costs or (Cost Savings)	10-Year Discounted Costs or (Cost Savings)
4 19.2 1 & Appendices A - D	Launch Site Location Review and Approval	\$18,000	\$16,000
Not Required by Proposal	Launch Site Operations Review and Approval	(\$102,000 - \$178,000) ¹⁴	(\$69,000 - \$121,000) ¹³
Total		(\$84,000 - \$160,000)	(\$53,000-\$105,000)

- See Table A. 11 for a more detailed explanation.

The other topics in the proposal are: Policy Review and Approval, the Explosive Site Plan Review and Approval, and Operational Responsibilities.

The first two (Policy Review and Approval, and Explosive Site Plan Review and Approval) are effectively the same under current practice and under the proposal, except that the proposal more clearly state the requirements.

Therefore, there would be no quantifiable costs or cost savings. The third (Operational Responsibilities) is expected to eliminate duplication and confusion as will be explained further in Sections 4.3.3 and 4.4.3.

show the absence of people in the overflight exclusion zone. The FAA is not able to estimate these costs or when these costs would occur.

¹⁴ The indicated range is the result of using low and average cost estimates. Estimates of the cost to complete the launch site operations review and approval for three licenses were provided by both the FAA and launch site operators. The “average cost estimate” is the average of cost data obtained on the three licenses. The lowest cost estimate was the lowest of the three license cost estimates. Since these costs will no longer be incurred under the proposal, they are being used in the analysis to represent cost savings of the proposal. Therefore, using the lowest cost estimate will give the smallest cost savings.

4.2 General Methodology, Overview and Assumptions

The FAA considered a 10-year time horizon from 1999 to 2008. Costs were discounted at 7 percent using 1997 dollars. Table A. 1 in the Appendix provides a summary of the wage rates used in the analysis. Table A.2 in the Appendix shows a forecast of licenses issued and renewed. It is assumed that the licenses would be issued in the same year as the application costs are incurred. When costs and benefits are mentioned it would be relative to current practice, which includes the guidelines.

There are two types of launch sites: those located on a federal launch range and those located off of a federal launch range. For launch sites that are located on federal launch ranges, an applicant, in most cases, does not have to do a launch site location analysis under either current practice, which includes the guidelines, or the proposal.¹⁵ Applicants proposing a launch site not on a federal launch range would have to use very specific methods provided in the proposal to demonstrate the suitability of the launch site location for launching at least one type (orbital, guided suborbital, or unguided suborbital) of launch vehicle.

¹⁵ However, a small amount of time for both the FAA and applicants was spent assessing the launch site location under current practice, which includes the guidelines.

New Licenses

A launch site license is valid for a period of five years, both under current practice and under the proposal. In the analysis it is assumed that all licenses would be renewed after five years.

Costs and cost savings would be incurred for each license application. All costs and cost savings are due to changes in paperwork. The applicant would incur costs supplying information to the FAA and the FAA would incur costs analyzing and accepting the license information. This analysis quantifies the differences in cost between current practice, which includes the guidelines, and the proposal in those areas in which there are quantifiable differences between the two: the launch site location review and approval and the launch site operations review and approval.

The FAA estimated the number of hours to review and accept the documentation supplied by previous applicants as part of both the launch site operations review and approval and the launch site location review and approval. The estimated hours range from 300 to 720 for each license for the launch site operations review and approval. These hours along with the estimated loaded hourly wage rates and total costs are presented in Table A.3 of the Appendix. These hours **would be** hours saved by the FAA under the proposal and would result in cost savings to the FAA. A low estimate

(representing the smallest cost savings ¹⁶) and an average estimate of cost savings are provided.

Launch site operators” provided estimates of the time needed for each current requirement assuming that the requirements would no longer be necessary under the proposal: the LSSOD, the hazard analyses and the description of daily operations. The estimated number of hours ranges from 40 to 500. These hours would be the time saved under the proposal and would result in cost savings to the launch site operator. These hours along with the estimated loaded hourly wage rates and total cost savings per license are presented in detail in Table A.4 of the Appendix. A low estimate of 40 hours (conservative ¹⁴) and an average estimate of 280 hours $((500 + 40 + 240)/3)$ are indicated.

However, the FAA believes that launch site operators would not be fully relieved of the responsibilities. Although data are not available, the FAA believes that operator costs (primarily paperwork) will decline by only 75 percent as a result of this change (See Table A-4). Other requirements such as existing section 420.15(c) would still require operators to comply with requirements that are being deleted. The FAA requests comments on the above assumptions.

Renewals

¹⁶ Represents the greatest cost impact (smallest cost savings) to the industry.

There are three situations to consider with respect to a license renewal:

1. A license originally issued under the guidelines and renewed under the guidelines;
2. A license originally issued under the guidelines and renewed under the proposal;
3. A license originally issued under the proposal and renewed under the proposal.

The FAA expects that the costs associated with 1 and 3 would be negligible and have not been quantified. The costs should be negligible because a licensee is required to amend its license whenever the operation of the launch site differs from that represented in its application. Therefore, a renewal should not entail any new material. Two possible exceptions are if the population near the launch site or downrange from the launch site changes significantly during the term of the license. The FAA assumes for the analysis that this will not occur within the ten-year time frame.

The only renewal scenario that might show a differential would be associated with situation number 2, i.e., licenses that were originally issued under current

¹⁷ Princeton Synergetics, Inc. and Jones Technologies, Inc. contacted Spaceport Florida Authority, Virginia Commonwealth Space Flight Authority and Spaceport Systems International, L.P. several times during February and March, 1998.

practice and renewed under the proposal. However, as discussed below these costs are also expected to be negligible and have not been quantified.

A licensee must keep its license up-to-date, and therefore the costs associated with a renewal in situation 2 should be due only to the difference between the guidelines (current practice), and the environmental requirements have not changed. The costs of the Environmental Review and the Policy Review should be negligible because they are nearly identical to the guidelines (current practice). The costs of meeting Operational Responsibilities for renewal should also be negligible, because the renewal applicant's LSSOD should already include the responsibilities specified in the proposal. A renewal applicant's explosive site plan should also be similar under the current practice, which includes the guidelines, and the proposal. The only provision that might result in a cost impact is the launch site location review.

An applicant for a renewal will only need to conduct an analysis under the launch site location review if the applicant wishes its launch site to support the launch of launch vehicles larger or different than supported at that launch site under the old license. Under the terms of a launch site operator license, launch vehicles may only be launched from a launch site that is within the size and type specified in the license.

This restriction may be broadened in one of two ways: the first way is for a launch site operator to apply for an amendment, and perform a new launch site location analysis. The second way, which may be easier, is for launch operators to apply to launch from launch sites regardless of the terms of particular launch site operator licenses. If a launch licensee is granted a license to launch from a particular launch site, that launch site automatically qualifies to support the size and type of launch vehicle in the launch license with the resulting change in the launch site operator license dealt with via modification of that license. Thus, it is unlikely that a launch site operator would need to be approved to support larger or different launch vehicles in its license renewals. The differential in costs for all license renewals between the proposal and current practice, which includes the guidelines, are expected to be negligible and have not been quantified.

4.3 Costs of the Proposal by Major Provision

The following is organized by subpart found in the NPRM.

4.3.1 Subpart B: Criteria and Information Requirements for Obtaining a License:

The cost of complying with the criteria and information requirements section of the proposal for each type of license and for each party was estimated based on

data provided by launch site operators and FAA. Data on the time required to complete the application process [from both the standpoint of the applicant and that of the FAA] is available for the three currently licensed launch sites located on federal launch ranges. Estimates of the time required to license a launch site off a federal launch range were made based on the two license applications that are in the application or pre-application phase (at the time of this analysis) and internal FAA data available on the launch site location review. This data is used to establish an estimate of the differential in costs of applying for a license under the proposal compared to current practice, which includes the guidelines. The details of the estimates are provided in the Appendix.

4.3.1.1 Information Requirements of Application

Launch Site Location Review and Approval:

costs ¹⁸

Launch sites located on Federal launch ranges. The cost difference between the guidelines, which includes current practice, and the proposal, for applicants proposing to operate launch sites located on federal launch ranges is negligible and has not been quantified. In most cases, an applicant would not have to do a launch site location analysis under either the guidelines or the proposal.

However, the guidelines are more ambiguous and past application reviews, which also constitute a component of current practice, shows that a small amount of time for both the FAA and applicants was spent assessing the launch site location, as shown in the empirical data. This confusion does not exist under the proposal. The only time under the proposal that a launch site location review must be conducted for launch sites located on a federal launch range is when the applicant is proposing to use a different launch point than used in the past, or to use a launch point differently from how it was used in the past (i.e. for a different type or class of launch vehicle). However, this situation is not expected to occur within the time horizon of the analysis. Therefore, it is assumed that there is no difference between the guidelines and the proposal for licenses for launch sites located on federal launch ranges. Accordingly, the estimates of the costs and cost savings of the proposal did not include estimates of any time spent assessing the launch site location for launch sites located on federal ranges.

Launch sites not located on Federal launch ranges. Although the guidelines broadly state that an applicant should provide all planned possible flight paths and general impact areas designated for future launch operations, the lack of specificity makes it difficult to assess the actual costs. The guidelines are broad because they were written for a case-by-case licensing approach. Because no available empirical data exists for the costs under the guidelines to an applicant,

¹⁸ All costs and costs savings are those associated with the proposal relative to current practice,

a worst case approach will be taken. This analysis assumed negligible costs under the guidelines, thereby providing a high estimate of the costs of the proposal.

The proposal is estimated to cost the industry about \$23,000 (or \$19,000, discounted). It is expected to result in a cost savings to the FAA of about \$5,000 (or \$3,000, discounted), to administer these requirements under the proposal than it did under current practice. The costs/cost savings are summarized in Table 4.2 and presented in detail in Table A. 10.

Table 4.2 Launch Site Location Review and Approval - Undiscounted and Discounted Cost and Cost Savings – 1997 Dollars

Year	Launch Site Operator Total Costs		FAA Total Cost Savings	
	Undiscounted	Discounted	Undiscounted	Discounted
1999	\$10,467	\$9,142	(\$750)	(\$655)
2000	\$10,324	\$8,428	(\$750)	(\$612)
2001	\$0	\$0	\$0	\$0
2002	\$1,138	\$811	(\$750)	(\$535)
2003	\$0	\$0	\$0	\$0
2004	\$85	\$53	(\$750)	(\$467)
2005	\$0	\$0	\$0	\$0
2006	\$597	\$325	(\$750)	(\$408)
2007	\$0	\$0	\$0	\$0
2008	\$28	\$14	(\$750)	(\$356)
Total	\$22,640	\$18,772	(\$4,501)	(\$3,034)

which includes the guidelines.

Launch Site Operations Review and Approval:

Under the guidelines (current practice), an applicant submits a hazard analysis and a Launch Site Safety Operations Document (LSSOD). The hazard analysis is required to demonstrate that the applicant fully understands and has plans to deal with all hazards that launch site operations might pose to the public. An applicant would also develop a LSSOD that contains detailed, specific means for addressing safety issues in the operation of the launch site.¹⁹ The LSSOD governs how the launch site will be operated on a day-by-day basis. In order to issue a license, the FAA must review and approve the hazard analysis and LSSOD in a Launch Site Operations Review and Approval.

The proposed rules eliminate the need for an applicant to develop a hazard analysis and develop a LSSOD. Under the proposal, the FAA would not conduct a launch site operations review. The FAA is changing this to eliminate the redundancy of having both a launch site operator under its license and a launch operator²⁰ under its license be responsible for managing many of the same risks associated with preparing and launching a launch vehicle.

¹⁹ An LSSOD has the following elements: a) Safety Policies and Procedures, b) Safety Organization and Personnel Qualification, c) Facility Layout, d) Facilities and Equipment, e) Facility Users, f) Facility Access/Security, g) Emergency Response Plans, and h) accident Investigation Plans.

²⁰ A launch operator is responsible under its license for the hazards associated with preparing a launch vehicle for flight and for the flight of the vehicle.

Although the proposed rules do not require an LSSOD, the proposed rules enumerate a set of responsibilities. These include the control of public access, scheduling launch site operations, notifications²¹, mishap investigation and recordkeeping. An applicant must state in its operation how it intends to meet these responsibilities.

Costs

The proposal would not result in any added costs for launch site operations review and approval. There would be a small cost savings.

Table 4.3 summarizes the per license cost to perform the activities that were required under the guidelines for the launch site operations review and approval. These activities, to the extent that they existed under the guidelines, would no longer be required under the proposal. Table 4.3 shows the average cost savings²² and the smallest cost savings of the three. More detail is shown in Tables A. 3 and A.4 of the Appendix.

²¹ These include notifying users of the launch site of various safety-related limitations of the launch site and facilities provided by the launch site operator. An example is weight limitation on cranes. The lifting capability of a crane must be tested prior to its use in a hazardous operation.

²² Based on the costs of the three launch site operators that provided data.

Table 4.3 Per License Cost Differential to the Launch Site Operator and the FAA of Licenses Issued Under the Proposal for Launch Site Operations Review and Approval - 1997 Dollars

	<u>Launch Site Operator</u>		<u>FAA</u>	
	<u>Average cost Saving Per License</u>	<u>Lowest cost Saving Per License</u>	<u>Average cost Saving Per License</u>	<u>Lowest cost Saving Per License</u>
Launch Site Operations Review and Approval				
Describe Daily Operations	(\$484)	(\$379)	NA	NA
LSSOD ²⁴	(\$562)	\$0	(\$17,832)	(\$8,308)
Hazard Analyses ²⁵	(\$562)	\$0	(\$6,034)	(\$5,846)
Total Cost Saved Per License	(\$1,608)	(\$379)	(\$23,866)	(\$14,154)

Estimates of the cost to complete the launch site operations review and approval for three licenses were estimated by both the launch site operators and the FAA.²⁶ The average cost estimate is the mean of cost data obtained on the three licenses. Since some of these costs would no longer be incurred under the proposal, they are being used in the analysis to represent cost savings of the proposal. Therefore, using the lowest cost estimate would result in the smallest cost savings.

²³ Based on lowest overall license cost, separate analyses may not be lowest cost.

²⁴ Expected costs associated with launch site operator preparing and FAA reviewing the LSSOD.

²⁵ Expected costs associated with launch site operator preparing and FAA reviewing hazard analyses.

²⁶ Princeton Synergetics, Inc. and Jones Technologies, Inc. contacted Spaceport Florida Authority, Virginia Commonwealth Space Flight Authority and Spaceport Systems International, L.P.

The FAA estimates that each launch site operator would incur a cost savings of between \$400²⁷ and \$1,600²⁸ per license to meet its requirements under the proposal. The FAA would also incur a cost savings between \$14,000²⁵ and \$24,000²⁶ per license to administer these requirements. These estimates are based on estimates of hours saved by the FAA and by industry as described in the Appendix.

The cost savings per license is then used in the schedule of forecasted launch licenses to obtain an annual and total undiscounted and discounted cost savings estimate. The total cost savings attributable to the launch site operations review and approval are presented in Table 4.4.

Assuming the smallest cost savings to the industry, the FAA estimates that the total cost savings over 10 years would be about \$102,000 (or \$69,000, discounted).

Explosive Site Plan Review and Approval

While no Q-D requirements are specified in the guidelines, an applicant would have to conduct a hazard analysis to identify hazards, including explosive hazards, and mitigation measures to eliminate or control the risks associated with each foreseeable launch site hazard. Therefore, the guidelines call for an

several times during February and March, 1998. At that time, only three licenses had been issued. A fourth license has since been issued.

²⁷ Based on lowest cost.

²⁸ Based on average cost.

explosive site plan. There would be no additional quantifiable costs under the proposal associated with this provision.

Information for Policy Review and Approval.

Although not specified in the guidelines, under current practice, the FAA reviews and approves the policy issues associated with a launch site operator license. The proposal would make this review explicit. There would therefore, be no new costs under the proposal associated with this provision.

**Table 4.4 Launch Site Operations Review and Approval -
Cost and Cost Savings -1999-2008
1997 Dollars**

	Total Costs		Total Cost Savings	
	<u>Undis.</u>	<u>Disc.</u>	<u>Undis.</u>	<u>Disc.</u>
Low Estimate				
<i>Launch Site Operator</i>	\$0	\$0	(\$2,653)	(\$1,803)
<i>FAA</i>	\$0	\$0	(\$99,081)	(\$67,340)
Total			(\$101,731)	(\$69,143)
Average Estimate				
<i>Launch Site Operator</i>	\$0	\$0	(\$11,256)	(\$7,651)
<i>FAA</i>	\$0	\$0	(\$167,061)	(\$113,542)
Total			(\$178,318)	(\$121,192)

4.3.1.2 Clarification of Reuirements of Licensing Process

The licensing process under the proposal would provide increased details and specificity compared to the guidelines. Consequently, the FAA expects

applicants will spend less time interpreting the requirements. The actual amount of time saved cannot be quantified. The FAA requests that companies supply information on how much time they might save due to the clarification of the requirements.

Costs

There will be cost savings because the proposal will save some time over current practice. These costs savings are nonquantifiable.

4.3.2 Subpart C - License Terms and Conditions

There is no difference between current practice and the proposal other than that the proposal codifies the license terms and conditions and therefore offer more clarity and certainty.

Costs

There are no quantifiable costs or cost savings under the proposal.

4.3.3 Subpart D - Licensee Responsibilities for Operations

Responsibilities - Under the guidelines (current practice) a licensee is responsible for operating the launch site in accordance with its LSSOD. Under the proposal, a launch site operator would be responsible for the following:

1. Controlling public access,
2. Scheduling launch site operations,
3. Notifying the public,
4. Investigating mishaps,
5. Maintaining records.

Other than the responsibilities listed above, the responsibility for hazards on the launch site associated with the preparation of a launch vehicle for flight and the flight itself are assigned to a launch operator in a launch license. Under the guidelines (current practice), the LSSOD is more extensive.

Costs

The proposal should not result in any quantifiable costs. There may be some nonquantifiable costs savings because the provisions under Subpart B appear to be less burdensome than the guidelines (current practice). The FAA requests any cost information to quantify this annual cost savings.

4.4 Benefits of the Proposal by Major Provision

4.4.1 Subpart B: Criteria and Information Requirements for Obtaining a License - Benefits

4.4.1.1 Information Requirements of Application

Launch Site Location Review and Approval:

There are at least two non-quantifiable benefits. First, the proposal provides in some cases more certainty as to the suitability of the launch site for launch than the guidelines. Second, the applicant would be conducting a more clearly defined analysis, so there would be increased certainty compared to current practice where the information and analysis requirements are less specific.

Launch Site Operations Review and Approval:

The launch site operator is expected to incur fewer costs (cost savings), relative to current practice, which includes the guidelines. The launch site operator would no longer be required to prepare an LSSOD or perform hazard analyses. Launch safety related to the preparation of a launch vehicle for flight is to be assigned to the launch operator under a launch operator license.

Explosive Site Plan Review and Approval

While no Q-D requirements are specified in the guidelines, an explosive site plan could be done under the guidelines as part of the hazard analysis. The proposal provides a clear standard for mitigating explosive risks by defining Q-D relationships.

Information for Policy Review and Approval:

The proposal explicitly states that a formal review and approval would occur, although under the current practice, which includes the guidelines, the FAA currently does this. However, under the proposal, the requirements regarding the policy review and approval are clearer than they are under current practice. The benefit of improved clarity is non-quantifiable.

4.4.1.2 Clarification of Requirements of Licensing Process

The proposal would add clarity and increase industry's certainty that license requirements would not likely change. Clarity also reduces misinterpretations by the applicant.

Because the proposal is clearer than current practice, the regulatory environment might provide new incentives to establish launch sites that might

not otherwise come into existence. The effect of this is most likely small since the number of expected new launch sites is small. The FAA requests additional information on this issue.

4.4.2 Subpart C - License Terms and Conditions

There is little difference between current practice and the proposal. However, the proposal codifies various terms and conditions, which provides more clarity and certainty to both the launch site operator and the FAA.

4.4.3 Subpart D - Licensee Responsibilities for Operations

Responsibilities

The benefit of the proposal is that responsibilities are clearly spelled out and duplication of responsibilities is eliminated. This should result in less confusion.

5. CONCLUSION

The proposal represents quantifiable changes in costs relative to current practice, which includes the guidelines, in the following two areas: the launch site location review and approval and the launch site operations review and approval. The

FAA has estimated the costs and cost savings of these changes under two different cost scenarios over a 10-year period, discounted at 7 percent in 1997 dollars. The most burdensome cost scenario to the industry would result in a cost to launch site operators of \$23,000 (or \$19,000, discounted) for the launch site location review provisions (and a cost savings of \$3,000 (or \$2,000, discounted) for the launch site operations review and approval provisions). There would be no cost impact to the FAA, however, there would be a cost savings from the most burdensome cost scenario of \$104,000 (or \$70,000, discounted). The estimated net cost savings of compliance to both the FAA and the launch site operators is \$84,000 (or \$53,000, discounted) under the most burdensome cost scenario.

There are significant nonquantifiable benefits in two areas. First, the proposal eliminates overlapping responsibilities. Second, the proposal provides increased details and specificity, which are not present in the guidelines.

The FAA concludes that the proposal is cost beneficial.

6. INITIAL REGULATORY FLEXIBILITY DETERMINATION

The Regulatory Flexibility Act of 1980 establishes “as a principle of regulatory issuance that agencies shall endeavor, consistent with the objective of the rule and of applicable statutes, to fit regulatory and informational requirements to the scale of the business, organizations, and governmental jurisdictions subject to

regulation. " To achieve that principal, the Act requires agencies to solicit and consider flexible regulatory proposals and to explain the rationale for their actions. The Act covers a wide-range of small entities, including small businesses, not-for-profit organizations and small governmental jurisdictions.

Agencies must perform a review to determine whether a proposed or final rule will have a significant economic impact on a substantial number of small entities. If the determination is that it will, the agency must prepare a regulatory flexibility analysis (WA) as described in the Act.

However, if an agency determines that a proposed or final rule is not expected to have a significant economic impact on a substantial number of small entities, section 605(b) of the 1980 act provides that the head of the agency must so certify and an RFA is not required. The certification must include a statement providing the factual basis for this determination, and the reasoning should be clear.

The FAA conducted the required review of this proposal and determined that it would not have a significant economic impact on a substantial number of small entities. Accordingly, pursuant to the regulatory Flexibility Act, U. S .C. 605(b), the Federal Aviation Administration certifies that this rule will not have a significant economic impact on a substantial number of small entities.

6.1 Potentially Affected Entities

Entities who are licensed, or have begun the licensing process, were contacted to determine their size and to gain insight into the impacts of the proposed regulations on the licensing process. Spaceport Florida Authority (SFA), Spaceport Systems International, L. P. (SSI), the Virginia Commonwealth Space Flight Authority (VCSFA), and the Alaska Aerospace Development Corporation (AADC) are all licensed to operate launch sites. The New Mexico Office of Space Commercialization (NMOSC) is mentioned briefly below although it is only in the pre-application consultation phase.

The Virginia Commonwealth Space Flight Authority (VCSFA) is a **not-for-profit** subdivision of the Commonwealth of Virginia, responsible for oversight of the activities of the Virginia Commercial Space Flight Center (VCSFC). The VCSFC is located within the boundaries of the Wallops Flight Facility (WFF). As a subdivision of the Commonwealth of Virginia, the VCSFA is empowered by the Acts of the General Assembly to do all things necessary to carry out its mission of stimulating economic growth and education through commercial aerospace activities.

The Spaceport Florida Authority (SFA) was created by Florida's Governor and Legislature as the nation's first state government space agency. The authority was established to develop space-related enterprise, including launch activities,

industrial development and education-related projects. SFA operates Spaceport Florida (SPF), located on Cape Canaveral Air Station.

Launch site operator California Spaceport is located on Vandenberg Air Force Base. The launch site is operated and managed by Spaceport Systems International, L.P. who is in partnership with ITT Federal Services Corporation (ITT FSC). ITT FSC is one of the largest U.S.-based technical and support services contractors in the world.

The Kodiak Launch Complex is being built by the Alaska Aerospace Development Corporation. AADC is a public corporation created by the State of Alaska to develop aerospace related economic and technical opportunities for the state.

The Southwest Regional Spaceport (SRS) is to be operated by the New Mexico Office of Space Commercialization (NMOSC). The NMOSC is a division of the State's New Mexico Economic Development Department. Commencement of space flight operations is not expected until early in the next decade.

6.2 Definition of Small Entities

The Small Business Administration has defined small business entities relating to space vehicles [SIC codes 3761, 3764 and 3769] as entities comprising fewer than 1000 employees. Although the above mentioned entities have fewer than 1000 employees in their immediate segment of the business, they are affiliated with/or funded by state governments and large parent companies. The VCSFA is a not-for-profit subdivision of the Commonwealth of Virginia; the SFA is a government space agency; the SSI is affiliated with ITT FSC; and AADC is a government sponsored corporation.

6.3 Conclusion

Under 5 U. S .C. 605, the FAA concludes that this proposal would impose little or no additional cost on this industry and certifies that it will not have a significant economic impact on a substantial number of small entities. The FAA nevertheless requests comments on any potential impacts associated with this proposal.

7. INTERNATIONAL TRADE IMPACT ASSESSMENT

The Licensing and Safety Requirements for Operation of a Launch Site (14 CFR Part 420) would not constitute a barrier to international trade, including the export of U.S. goods and services out of the United States. The proposal affects launch sites that are currently located or being proposed within the United States.

The proposal is not expected to affect trade opportunities for U.S. firms doing business overseas or for foreign firms doing business in the United States. The FAA requests information on the effect that this proposal would have on international trade.

8. UNFUNDED MANDATES REFORM ACT ASSESSMENT

Title II of the Unfunded Mandates Reform Act of 1995 (the Act), enacted as Pub. L. 104-4 on March 22, 1995, requires each Federal agency, to the extent permitted by law, to prepare a written assessment of the effects of any Federal mandate in a proposed or final agency rule that may result in the expenditure by State, local, and tribal governments, in the aggregate, or by the private sector, of \$100 million or more (adjusted annually for inflation) in any one year.

Section 204(a) of the Act, 2 U. S.C. 1534(a), requires the Federal agency to develop an effective process to permit timely input by elected officers (or their designees) of State, local, and tribal governments on a proposed “significant intergovernmental mandate.” A “significant intergovernmental mandate” under the Act is any provision in a Federal agency regulation that will impose an enforceable duty upon State, local, and tribal governments, in the aggregate, of \$100 million (adjusted annually for inflation) in any one year. Section 203 of the Act, 2 U.S.C. 1533, which supplements section 204(a), provides that before establishing any regulatory requirements that might significantly or uniquely affect small governments, the agency shall have developed a plan that, among other things, provides for notice to potentially affected small governments, if

any, and for a meaningful and timely opportunity to provide input in the development of regulatory proposals.

This proposal does not meet the cost thresholds described above. Furthermore, this proposal would not impose a significant cost or uniquely affect small governments. Therefore, the requirements of Title II of the Unfunded Mandates Reform Act of 1995 do not apply.

APPENDIX A
COST ESTIMATES

Table A.1 Summary of Wage Rates Used in the Analysis

FAA Wage Rates	<u>1997</u>	Hourly Wage	Load²⁹ Factor	Loaded Hrly Wage
GS 13 Step 5	\$61,913	\$29.77	1.26	\$37.51
GS 14 Step 5	\$73,163	\$35.17	1.26	\$44.31
GS 15 Step 5	\$86,059	\$41.37	1.26	\$52.13
Industry Hourly Wage Rates				
License #1		\$20.00	1.23	\$24.60
License #2 ³⁰		\$30.81	1.23	\$37.90
License #3 ³¹		\$18.56	1.23	\$22.83
Average Wage of Applicants		\$23.12	1.23	\$28.44
Contractor Wage Rates ³²		\$47.00	1.23	\$57.81
Wage Rates for Relevant FAA Job Functions				
AST Licensing Supervisor ³³		\$52.13		
AST Engineer GS 13		\$37.51		
AST Engineer GS 14		\$44.31		
Legal Counsel ³⁴		\$48.22		

Source for FAA Wage Rates: Pay Schedule, Office of Personnel Management, **1997**.
 Source for Industry Wage Rates: Launch Site Operators, February and March 1998.
 Source for Contractor Wage Rates: Phil Brinkman, AST, FAA. April 1998.

²⁹ Load Factors Government Employees = 26% Private Sector = 23%, Source: Economic Analysis, pg. 4-17.

³⁰ Estimate made as to unburdened wage rate from burdened wage rate supplied by industry.

³¹ Wage rate inflated to **1997** dollars from 1996 using GPD Price Deflator, budget for Fiscal Year 1999, Historical tables, Table 10- 1, page 1 **JO**, U.S. Government, Washington, DC 1998.

³² Unloaded hourly wage rate given as \$4.2 - \$52 for contractors involved in safety evaluations, provided by AST, FAA.

³³ GS 14 Step 5.

³⁴ Averaged GS 14 Step 5 and GS 15 Step 5 Wage Rates.

Table A.2 Forecasted Schedule of Launch Site Operator License Issuances and Renewals
1999 - 2008

License Type*	Year									
	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
LSO	1	1		1		1		1		1
LSOFR				1						
RLSO					1	1	1		1	
RLSOFR			1	2				1	3	

***License Type Key**

- LSO Launch site operator license for launch site not located on federal launch range issued for the first time under the proposal.
- LSOFR Launch site operator license for launch site located on federal launch range issued for the first time under the proposal.
- RLSO Renewal of launch site operator license for launch site not located on federal launch range.
- RLSOFR Renewal of launch site operator license for launch site located on federal launch range.

Source: U.S. Department of Transportation, Federal Aviation Administration, Associate Administrator for Commercial Space Transportation, Space Systems Development Division, 1998.

Table A.3 Per License Cost Savings to FAA Resulting from no Longer Having to Complete Portions of First Time Launch Site Operator License Application under the Proposal

Activities that are no longer required under the proposal	Total Hours			Hourly Loaded Wage Rates		Costs of Activities No Longer Required Under Proposal				
	License Number			License Number		License Number			Average	Lowest
	#1	#2	#3	#1	#2/#3	#1	#2	#3		
Location Site Analysis										
<i>AST Engineer</i>	42	20	42	\$37.51	\$44.31	\$1,575	\$886	\$1,861		
<i>Legal Counsel</i>	5		5	\$48.22	\$48.22	\$241	\$0	\$241		
<i>Contractor Support</i>	7	40	7	\$57.81	\$57.81	\$405	\$2,312	\$405		
Total Location Analysis	54	60	54			\$2,221	\$3,199	\$2,507	\$2,642	\$2,507
Launch Site Operations Review and Approval										
A. Review/Acceptance of LSSOD										
<i>AST Engineer</i>	187	80	139	\$37.51	\$44.31	\$7,014	\$3,545	\$6,159		
<i>Legal Counsel</i>			17	\$48.22	\$48.22		\$0	\$820		
<i>Contractor Support</i>	67	532	23	\$57.81	\$57.81	\$3,873	\$30,755	\$1,330		
Total Review/Acceptance of LSSOD	254	612	179			\$10,888	\$34,300	\$8,308	\$17,832	\$8,308
B. Hazard Analyses										
<i>AST Engineer</i>	93	40	98	\$37.51	\$44.31	\$3,488	\$1,772	\$4,342		
<i>Legal Counsel</i>			12	\$48.22	\$48.22		\$0	\$579		
<i>Contractor Support</i>	53	68	16	\$57.81	\$57.81	\$3,064	\$3,931	\$925		
Total Hazard Analyses	146	108	126			\$6,552	\$5,703	\$5,846	\$6,034	\$5,846
Total Launch Site Operations Review and Approval	400	720	305			\$17,440	\$40,003	\$14,154	\$23,866	\$14,154
Total Hours Saved	454	780	359			\$19,661	\$43,202	\$16,661	\$26,508	\$16,661

Source: U.S. Department of Transportation Federal Aviation Administration, Associate Administrator for Commercial Space Transportation, Licensing and Safety Division, 1998.

Table A.4 Cost Savings to Launch Site Operator Resulting from no Longer Having to Complete Portions of First Time Launch Site Operator License Application under the Proposal

Activities that will no longer required <u>required under the Proposal</u>	Hours Per License			Hourly Burdened Wage Rate License			Costs of Fulfilling Requirements License			Per License Cost Average Lowest	
	#1	#2	#3	#1	#2	#3	#1	#2	#3		
	Launch Site Operations Review and Approval										
<i>Describe Daily Operations</i>	100	40	80	\$24.60	\$37.90	\$22.83	\$2,460	\$1,516	\$1,826	\$1,934	\$1,516
<i>Prepare LSSOD for FAA</i>	200	0	80	\$24.60	\$37.90	\$22.83	\$4,920	\$0	\$1,826	\$2,249	\$0
<i>Prepare Hazard Analyses for FAA</i>	200	0	80	\$24.60	\$37.90	\$22.83	\$4,920	\$0	\$1,826	\$2,249	\$0
Total Time Saved	500	40	240				\$12,300	\$1,516	\$5,479	\$6,432	\$1,516
Total Time Saved (25 Percent)	125	10	60				\$3,075	\$379	\$1,370	\$1,608	\$379

Source: Spaceport Systems International, Spaceport Florida Authority, Virginia Commercial Space Flight Authority and U.S. Department of Transportation, Federal Aviation Administration, Office of Aviation Policy and Plans, November 1998.

Launch Site Location Analysis

The estimated hours to perform each of the four types of launch site location analyses (Appendices A through D) are indicated in Table A.5. These analyses would have to be performed by the prospective launch site operator under the proposal for launch sites that are not located on a federal launch range. The FAA estimates that it may receive six license applications for licensees to operate launch sites not located on federal ranges from 1999 through 2008, as indicated in Table A.2. Table A.6 indicates a typical mix of analyses that might be performed for each of the six licenses.

Table A.5 Estimated Hours That Will be Required Under the Proposal for a Launch Site Operator Applicant to Perform Launch Site Location Analyses

<u>Launch Site Location Analysis</u> ³⁵	<u>Estimated Hours</u>
Appendix A - Method A for determining flight corridor and identifying populated areas	
<i>With software</i> ³⁶	3
Appendix B - Method B for determining flight corridor and identifying populated areas	
<i>With software</i> ²	8
Appendix C - Identify populated areas and calculate E c	
<i>Without software</i>	
Part 1 - Within 100 miles of launch site	
<i>Coastal</i> ³⁷ Sites	4
<i>Interior</i> ³⁸ Sites	160
Part 2 - Downrange	
<i>Coastal Sites</i>	8
<i>Interior Sites</i> ³⁹	160
Totals: Parts 1 and 2	
<i>Coastal Sites</i>	12
<i>Interior Sites</i>	320
Appendix D - Suborbital launch vehicles	
<i>Coastal Sites</i>	1
<i>Interior Sites</i>	40

Source: Conversations between Ms. Carole Gaelick, Princeton Synergetics, Inc., Princeton New Jersey and Mr. Clay Smith, Futron Corporation, Washington, D.C., February and March 1998.

³⁵ It is assumed that software will be made available to the applicants for Appendices A & B, but not for Appendices C & D.

³⁶ Without software, it would take significantly longer.

³⁷ A coastal launch site has one end of the launch site boundary on the coast.

³⁸ An interior launch site has no launch site boundary on the coast.

³⁹ Launch Site with over 500 populated areas.

**Table A.6 Estimates of Cost to Applicant to Perform Launch Site Location Analyses
That will be Required Under the Proposal - 1997 Dollars**

<u>Type Analyses</u>	<u>Location</u>	<u>Hours</u>	<u>Average Industry Loaded Wage Rate</u>	<u>Undiscounted Total cost</u>	<u>Discounted Total cost</u>	<u>Year</u>
Appendix B & C & D	Interior	368	\$28.44	\$10,467	\$9,142	1999
Appendix A & C & D	Interior	363	\$28.44	\$10324	\$8,428	2000
Appendix D	Interior	40	\$28.44	\$1,138	\$811	2002
Appendix A	Interior	3	\$28.44	\$85	\$53	2004
Appendix B & C & D	Coastal	21	\$28.44	\$597	\$325	2006
Appendix D	Coastal	1	\$28.44	\$28	\$14	2008

Source: U.S. Department of Transportation, Federal Aviation Administration, Associate Administrator for Commercial Space Transportation, Licensing and Safety Division, 1998.

**Table A.7 Launch Site Location Analysis or Review ⁴⁰: Cost Differential to FAA
Between the Proposal and the Guidelines - 1997 Dollars**

	<u>Hours</u>	<u>Loaded Hourly Wage Rate</u>	<u>Difference” in Costs Per License</u>
FAA to perform launch site location review for applicants- Current Practice	80	\$37.5 1	\$3,000
FAA to review and approve launch site location analysis performed by applicants - Proposal	60	\$37.5 1	\$2,250
Difference between Current Practice and Proposal FAA hours devoted to launch site location analysis and review	20	\$37.5 1	(\$750)

Source: U.S. Department of Transportation, Federal Aviation Administration, Associate Administrator for Commercial Space Transportation, Licensing and Safety Division, 1998.

⁴⁰ For launch site not on a federal launch range.

⁴¹ Difference between the proposal and the guidelines.

**Table A.8 Launch Site Operations Review and Approval Discounted and Undiscounted
Cost Savings - Low Estimate 1997 Dollars**

<u>Year</u>	<u>Undiscounted Costs</u>			<u>Discount Factor</u>	<u>Discounted Costs</u>		
	<u>FAA</u>	<u>Launch Site Operator</u>	<u>Total</u>		<u>FAA</u>	<u>Launch Site Operator</u>	<u>Total</u>
1999	(\$14,154)	(\$379)	(\$14,533)	0.873439	(\$12,363)	(\$33 1)	(\$12,694)
2000	(\$14,154)	(\$379)	(\$14,533)	0.8 16298	(\$11,554)	(\$309)	(\$11,863)
200 1	\$0	\$0	\$0	0.762895	\$0	\$0	\$0
2002	(\$28,309)	(\$758)	(\$29,067)	0.7 12986	(\$20,184)	(\$54 1)	(\$20,725)
2003	\$0	\$0	\$0	0.666342	\$0	\$0	\$0
2004	(\$14,154)	(\$379)	(\$14,533)	0.62275	(\$8,815)	(\$236)	(\$9,051)
2005	\$0	\$0	\$0	0.582009	\$0	\$0	\$0
2006	(\$14,154)	(\$379)	(\$14,533)	0.543934	(\$7,699)	(\$206)	(\$7,905)
2007	\$0	\$0	\$0	0.508349	\$0	\$0	\$0
2008	(\$14,154)	(\$379)	(\$14,533)	0.475093	(\$6,725)	(\$180)	(\$6,905)
Total	(\$99,081)	(\$2,653)	(\$101,731)		(\$67,340)	(\$1,803)	(\$69,143)

Source: U.S. Department of Transportation, Federal Aviation Administration, Office of Aviation Policy and Plans. November, 1998.

Table A.9 Launch Site Operations Review and Approval Discounted and Undiscounted Cost Savings - Average Estimate -1997 Dollars

<u>Year</u>	<u>Undiscounted Costs</u>			<u>Discount Factor</u>	<u>Discounted Costs</u>		
	<u>FAA</u>	<u>Launch Site Operator</u>	<u>Total</u>		<u>FAA</u>	<u>Launch Site Operator</u>	<u>Total</u>
1999	(\$23,866)	(\$1,608)	(\$25,474)	0.873439	(\$20,845)	(\$1,405)	(\$22,250)
2000	(\$23,866)	(\$1,608)	(\$25,474)	0.816298	(\$19,482)	(\$1,313)	(\$20,795)
2001	\$0	\$0	\$0	0.762895	\$0	\$0	\$0
2002	(\$47,732)	(\$3,216)	(\$50,948)	0.712986	(\$34,032)	(\$2,293)	(\$36,325)
2003	\$0	\$0	\$0	0.666342	\$0	\$0	\$0
2004	(\$23,866)	(\$1,608)	(\$25,479)	0.62275	(\$14,862)	(\$1,001)	(\$15,863)
2005	\$0	\$0	\$0	0.582009	\$0	\$0	\$0
2006	(\$23,866)	(\$1,608)	(\$25,479)	0.543934	(\$12,981)	(\$875)	(\$13,856)
2007	\$0	\$0	\$0	0.508349	\$0	\$0	\$0
2008	(\$23,866)	(\$1,608)	(\$25,479)	0.475093	(\$11,339)	(\$764)	(\$12,103)
Total	(\$167,062)	(\$11,256)	(\$178,318)		(\$113,542)	(\$7,651)	(\$121,192)

Source: U.S. Department of Transportation, Federal Aviation Administration, Office of Aviation Policy and Plans. November 1998.

Table A.10 Launch Site Location Review and Approval Discounted and Undiscounted Costs and Cost Savings 1997 Dollars

<u>Year</u>	<u>Undiscounted Costs and Cost Savings</u>				<u>Discount Factor</u>	<u>Discounted Costs and Cost Savings</u>		
	<u>Launch Site Operator</u>	<u>FAA</u>	<u>Total</u>			<u>Launch Site Operator</u>	<u>FAA</u>	<u>Total</u>
1999	\$10,467	(\$750)	\$9,716	0.873439	\$9,142	(\$655)	\$8,487	
2000	\$10,324	(\$750)	\$9,574	0.816298	\$8,428	(\$612)	\$7,815	
2001	\$0	\$0	\$0	0.762895	\$0	\$0	\$0	
2002	\$1,138	(\$750)	\$387	0.712986	\$811	(\$535)	\$276	
2003	\$0	\$0	\$0	0.666342	\$0	\$0	\$0	
2004	\$85	(\$750)	(\$665)	0.62275	\$53	(\$467)	(\$414)	
2005	\$0	\$0	\$0	0.582009	\$0	\$0	\$0	
2006	\$597	(\$750)	(\$153)	0.543934	\$325	(\$408)	(\$83)	
2007	\$0	\$0	\$0	0.508349	\$0	\$0	\$0	
2008	\$28	(\$750)	(\$722)	0.475093	\$14	(\$356)	(\$343)	
Total	\$22,640	(\$4,501)	\$18,138		\$18,772	(\$3,034)	\$15,738	

Source: U.S. Department of Transportation, Federal Aviation Administration, Office of Aviation Policy and Plans. May 1998.

**Table A. 11 Total Cost Savings 1997 Dollars
Low and Average by Provision for FAA and Launch Site Operator**

	<u>Undiscounted Cost ⁴² and Cost Savings</u>			<u>Discounted Cost and Cost Savings</u>		
	<u>FAA</u>	<u>Launch Site Operator</u>	<u>Total</u>	<u>FAA</u>	<u>Launch Site Operator</u>	<u>Total</u>
Low Cost Scenario						
Launch Site OP Review & Approval	(\$99,081)	(\$2,653)	(\$101,731)	(\$67,340)	(\$1,803)	(\$69,143)
Launch Site Location Review	(\$4,501)	\$22,640	\$18,138	(\$3,034)	\$18,772	\$15,738
Total Low	(\$103,582)	\$19,987	(\$83,593)	(\$70,374)	\$16,969	(\$53,405)
Average Cost Scenario Provisions						
Launch Site OP Review & Approval	(\$167,062)	(\$11,256)	(\$178,318)	(\$113,542)	(\$7,651)	(\$121,192)
Launch Site Location Review	(\$4,501)	\$22,640	\$18,138	(\$3,034)	\$18,772	\$15,738
Total Average	(\$171,563)	(\$11,384)	(\$160,179)	(\$116,576)	(\$11,121)	(\$105,454)

Source: U.S. Department of Transportation, Federal Aviation Administration, Office of Aviation Policy and Plans. November, 1998.

⁴² Cost savings are indicated in parenthesis.