Space Law:
Selected Documents 2012
Volume 1: National Space Law Documents

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Dedicated to
Neil Alden Armstrong

August 5, 1930 – August 25, 2012

American NASA astronaut, test pilot, aerospace engineer, university professor, United States Naval Aviator, and the first person to set foot upon the Moon.

“Neil Armstrong was also a reluctant American hero who always believed he was just doing his job,” said a statement from his family.

“That’s one small step for Man, one giant step for Mankind”
Neil Armstrong from the Moon, July 20, 1969

"Law must precede man into space."
- Andrew G. Haley, Space Age Presents Immediate Legal Problems, 1
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# Space Law: Selected Documents 2012

## Volume 1: National Space Law Documents

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This compilation of space law documents for the year 2012 was gathered primarily from postings placed on the aerospace law blog, Res Communis from 1 January through 31 December 2012. Res Communis is hosted by the National Center for Remote Sensing, Air, and Space Law (Center) at the University of Mississippi School of Law. The postings are supplemented with materials from other sources that were published during 2012, but which were not published on Res Communis.

The blog’s name, Res Communis, is taken from the Latin legal term or art that means, in part, “things common to all; that is, those things that are used and enjoyed by everyone.” Res Communis is also a fundamental principle that provides a major part of the foundation of the international space law regime. The name was chosen because of its specific relevance to space law and to express the Center’s intent that the blog provide the aerospace law community with a reliable, timely source of legal materials.

The annual compilation is a special supplement to the Journal of Space Law, the world’s oldest law review dedicated to space law. The Journal of Space Law, beginning with the first volume published in 1973, is available online at the Center’s website, http://spacelaw.olemiss.edu/, and through HeinOnline, http://heinonline.org/.

This year’s compilation is again in two volumes: national space law documents and international documents. The body of space law continues to grow in size and complexity. It can be expected that space law will continue to change for the practitioner, academic, and government lawyer. The reader can find updated material on an on-going basis at http://rescommunis.olemiss.edu/.
SYLVIO LANGEVIN, [...] Ste-Euphémie (Québec) [...]  
Requérant

JUGEMENT

1 Sylvio Langevin réclame la propriété de la planète Terre. Dans un autre dossier entrepris le même jour, il réclame celle des planètes Mercure, Vénus, Jupiter, Saturne et Uranus, ainsi que des quatre grosses lunes de Jupiter.

2 À l'audience, le requérant souhaite amender ce second recours pour y ajouter ses revendications sur Neptune et Pluton, ainsi que sur l'espace entre chaque planète, à la grandeur de la galaxie.

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1 Dossier 200-05-019492-128.
2 Dossier 200-05-019491-120.
I – LES FAITS

[3] Même si monsieur Langevin demande la rédaction de jugements distincts pour chacune de ses requêtes, le Tribunal s'autorise à rendre un jugement unique à l'égard des deux demandes, qui soulèvent des arguments identiques dans la réclamation de biens de même nature : cela se vérifie à la lecture des deux requêtes manuscrites, dont la transcription intégrale se trouve aux Annexes 1 et 2 de ce jugement.


[5] Il y voit une opportunité unique à l'égard de ces planètes, et rapporte qu'il a « pensé d'en faire une collection comme d'autres font une collection de cartes de hockey ». Comme les cinq planètes et les quatre lunes visées sont des astres errants et qu'elles font partie du système solaire⁶, monsieur Langevin est certain qu'elles n'ont pas de propriétaire.

[6] Il agit seul, et sans même un intimé à ses requêtes, puisque « s'il y avait un intimé, ce serait Dieu, mais il n'est pas tangible et pas invitable comme intimé ».

[7] Lors de l'audience, il demande par amendement la permission de réclamer également la propriété de Neptune et Pluton, ainsi que celle de « toutes l'espace qui est sans oxigène et sans pesanteur pour les objets; situé entre chaque planète à la grandeur de notre galaxie… »⁷, et cela – dit-il à l'audience – « pour éviter tout malentendu ».

[8] Il explique cette revendication relative à l'espace en disant qu'il a appris que les Chinois avaient l'intention d'envoyer des stations orbitales dans l'espace : monsieur Langevin ne veut pas qu'il se forme une autre ville chinoise dans l'espace, au-dessus de lui.

***

[9] Dans le dossier connexe, l'idée de réclamer la propriété de la planète Terre, lui est venue « le 07-01-12 vers 18h30, j'avais du temps à perdre et par hasard j'ai eu l'idée de lire quelques définitions du dictionnaire… »⁸, à savoir celles des mots planète et terre.

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⁴ Paragraphe 2 de la requête, au dossier 200-05-019491-120 (transcription intégrale).
⁵ Pièces A et B produites au dossier 200-05-019491-120.
⁶ Selon la définition du mot planète, annexée à la requête au dossier 200-05-019492-128.
⁷ Note 3 (transcription intégrale).
⁸ Paragraphe 2 de la requête, au dossier 200-05-019492-128 (transcription intégrale).
[10] Comme les autres, la planète Terre n'a aucun propriétaire, « donc c'est évident et hors de tout doute c'est un astre errant appartenant au système solaire; certain qu'elle me revient de plein droit à titre de propriétaire possession et administration (seul)… »


[12] Le troisième dossier – faut-il le préciser – est celui où monsieur Langevin a récemment réclamé la propriété de Mars et de la Lune. Lors de notre audience, il ne sait pas si jugement a été rendu en cette affaire, ni n'en a pris connaissance; les officiers du greffe civil lui auraient toutefois mentionné que jugement avait été prononcé en sa défaveur. Il veut en prendre connaissance en même temps qu'il lira les décisions relatives aux deux présentes réclamations, « pour les contester » ajoute-t-il.

[13] Monsieur Langevin dit qu'il n'est pas avocat mais simple citoyen; il mentionne toutefois avoir une bonne expérience dans les requêtes depuis les années 2000, précisant que ces litiges réfèrent entre autres à quatre situations particulières :

   a) le fait qu'il soit tombé dans un piège de mauvaise information, quant à un élevage de sangliers qu'il possédait;

   b) le fait que son frère ait vendu la ferme sans son autorisation d'administrateur;

   c) le fait que des personnes en autorité, pour la Reine, aient mis « six faux psychologue » sur lui et aient essayé de le « faire passer pour délirant »;

   d) le fait qu'il ait découvert un coup d'État du gouvernement du Canada, alors en guerre en Afghanistan.


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9  Paragraphe 3 B de la requête, au dossier 200-05-019492-128 (transcription intégrale).
10  Jugement a été rendu le 19 décembre 2011 par le juge Étienne Parent, rejetant la requête du demandeur, au dossier 200-05-019484-117.
11  Ce frère serait nu-propriétaire d'une ferme dont le requérant est administrateur.
13  Décision du 11 septembre 2009 de la juge Dominique Bélanger, au dossier 300-17-000042-083.
Monsieur Langevin dit attendre le bon moment pour faire annuler les deux décisions en question, qui violent la Charte des droits et libertés de la personne.

II – L’ANALYSE

Sur le fond des deux réclamations ici entreprises par Sylvio Langevin, il n’est pas nécessaire d’en dire davantage que ce qu’écrivait le juge Étienne Parent le 19 décembre 2011, dans le dossier visant la planète Mars et la Lune : « À sa face même, la requête du demandeur n’a aucun fondement juridique et doit être rejetée »14.

La réclamation de la planète Terre est donc rejetée, tout comme celle visant les autres planètes du système solaire.

III – LE COMPORTEMENT QUÉRULENT DE SYLVIO LANGEVIN

1 – Les antécédents du requérant

Un inventaire probablement incomplet des litiges initiés par le requérant indique que ce dernier a entrepris depuis 2001 au moins 29 recours en Cour supérieure, en même temps qu’il s’adressait à 12 reprises à la Cour d’appel, ainsi que 4 fois à la Cour suprême du Canada.

Parmi ces litiges, monsieur Langevin a poursuivi le PGQ à 12 reprises – en injonction ou en dommages – pour une valeur totale de 74.5 M $. Il a aussi utilisé ces deux formes de recours en poursuivant le PGC pour une valeur totale originale de 4 M $; par amendement, il a porté sa réclamation en dommages à plus d’un milliard de dollars.

Tous les recours ainsi entrepris par monsieur Langevin, sous six prénoms ou présentations de prénoms différents15, ont été rejetés et ont mené à la constitution d’importants mémoires de frais qui n’ont – à peu de choses près – jamais été récupérés par les procureurs et parties adverses.


14 Paragraphe 1 du jugement du 19 décembre 2011, au dossier 200-05-019484-117.
15 Les réclamations du requérant sont entreprises le plus souvent sous le prénom de Martin ou celui de Sylvio, mais également par Martin Sylvio, Sylvio Martin, Martin (Sylvio) ou Sylvio (Martin).
22 C'est ici que le Tribunal doit intervenir.

2 – La notion de quérulence

23 Le juge Yves-Marie Morissette, alors professeur à l'Université McGill, s'est intéressé à la notion de quérulence, et rapportait en 2004 les principales caractéristiques que la jurisprudence associe au justiciable quérulent :

– Premièrement, le justiciable quérulent fait montre d'opiniâtreté et de narcissisme;
– Deuxièmement, le justiciable quérulent se manifeste en demande plutôt qu'en défense;
– Troisièmement, le justiciable quérulent multiplie les recours vexatoires, y compris contre les auxiliaires de la justice. Il n'est pas rare, en effet, que ces procédures et ces plaintes soient dirigées contre les avocats, le personnel judiciaire ou même les juges personnellement, qui font l'objet d'allégations de partialité et de plaintes déontologiques;
– Quatrièmement, la réitération des mêmes questions par des recours successifs et ampliatifs, et la recherche des mêmes résultats malgré les échecs répétés de demandes antérieures, sont fréquentes;
– Cinquièmement, les arguments de droit mis de l'avant par le justiciable quérulent se signalent à la fois par leur inventivité et leur incongruité. Ils ont une forme juridique, certes, mais sont à la limite du rationnel;
– Sixièmement, les échecs répétés des recours ainsi exercés par la partie quérulente entraînent à plus ou moins longue échéance son incapacité à payer les dépens et frais de justice auxquels elle est condamnée;
– Septièmement, la plupart des décisions adverses, sinon toutes, sont portées en appel par la partie quérulente, ou font l'objet de demandes de révision ou de rétractation;
– Enfin, huitièmement, comme on l'a déjà noté, le justiciable quérulent se représente seul.16

24 Le même texte cite le portrait que fait la psychiatre française Sandrine Maillet de ce syndrome : « les quérulents processifs [...] affirmant qu’ils ont été lésés, que leurs biens ont été spoliés : ils multiplient les procès, font appel, refusent toute conciliation, suspectent la corruption des juges, la complicité ou la mauvaise foi des témoins »17.

17 Id., par. 9.
Dans une décision très étayée sur la question, le juge en chef adjoint André Wery reprend cette étude du juge Morissette et ajoute :

Comme on le voit, la quérulence constitue une problématique fondée sur la pensée paranoïaque où les croyances de la personne sont disproportionnées par rapport à la réalité et ces incessantes croisades judiciaires sont issues d'un délire imaginaire.\(^\text{18}\)

Les articles 84 et 85 du Règlement de procédure civile de la Cour supérieure\(^\text{19}\) ont ainsi été adoptés pour contrer les excès de certains citoyens qui abusent de leur droit d'ester en justice :

84. Interdiction sauf autorisation. Si une personne fait preuve d'un comportement quérulent, c'est-à-dire si elle exerce son droit d'ester en justice de manière excessive ou déraisonnable, le tribunal peut lui interdire une demande de justice sans autorisation préalable.

85. L'ordonnance. L'ordonnance est générale ou limitée à un ou plusieurs districts ou en égard à une ou plusieurs personnes. Dans un cas extrême elle peut même interdire l'accès à un palais de justice.

Ces dispositions vont dans le sens de l'article 4.1 du Code de procédure civile et des articles 6 et 7 du Code civil du Québec, qui prévoient expressément qu'une partie ne peut agir de manière excessive ou déraisonnable, et doit exercer ses droits civils selon les exigences de la bonne foi.

Le système judiciaire canadien fait l'envie de plusieurs autres juridictions à travers le monde, mais – on peut s'en douter – il coûte cher. Comme le mentionne le juge Wery :

Il doit donc être utilisé par les justiciables de façon raisonnable et responsable. On ne peut se servir du système judiciaire uniquement pour harceler, intimider ou épuiser financièrement, psychologiquement ou physiquement son adversaire.\(^\text{20}\)

Compte tenu de ces paramètres, il faut donc nous demander si le comportement de Sylvio Langevin justifie l'application des articles 84 et 85 du règlement, adoptés en vertu des pouvoirs généraux inhérents à l'exercice de la compétence de la Cour supérieure\(^\text{21}\).


\(^{20}\) Id. par. 15.

\(^{21}\) Art. 46 et 47 C.p.c.
3 – La décision

[30] Lorsqu'il déclare au Tribunal avoir entrepris 51 requêtes contre le PGQ, Sylvio Langevin manifeste une fierté qui apparaît difficilement conciliable avec les objectifs du Code de procédure civile. C'est ainsi que le juge Babin, à sa décision du 29 janvier 2008, fait étalage des nombreuses raisons le justifiant de déclarer le requérant plaideur quérulent, en regard du PGQ. La juge Bélanger fera la même démonstration de quérulence l'année suivante, en regard des réclamations instituées cette fois contre le PGC.

[31] Maintenant qu'il a été déclaré plaideur quérulent à l'endroit de ces deux adversaires « naturels », monsieur Langevin entreprend aujourd'hui une nouvelle séquence de poursuites, usant d'imagination pour revendiquer la propriété des planètes de notre système solaire. Où cela s'arrêtera-t-il?

[32] À l'examen du procès-verbal de la première demande de ce genre de monsieur Langevin – celle visant Marc et la Lune – on constate que seulement douze minutes de présentation ont suffi au requérant pour embarrasser le système judiciaire de façon significative.

[33] La lecture des deux requêtes suivantes – ici reproduites comme Annexes 1 et 2 – apporte la démonstration d'une continuité dans ce dérèglement et dans la contamination par le requérant du système judiciaire, qui durera tant que le statut de plaideur quérulent de monsieur Langevin n'aura pas été généralisé.

[34] De la même façon, les déclarations du requérant rapportées au premier chapitre de ce jugement illustrent bien qu'aucune réclamation n'est à son épreuve, et que tous les biens errants ou sans propriétaire apparent – matériels ou immatériels – sont susceptibles de faire l'objet d'une prochaine collection par lui.

[35] Il est bien sûr inacceptable que monsieur Langevin utilise le système de justice à mauvais escient en gaspillant de cette façon le temps et les énergies des divers intervenants judiciaires, alors que l'ensemble des justiciables a besoin du plein accès à ces précieuses ressources.

[36] Sur une base plus particulière visant sa propre protection, le Tribunal ne peut pas davantage tolérer que le requérant épuise ses maigres ressources à payer les timbres judiciaires associés à l'ouverture de ses nombreuses poursuites, ou encore les mémoires de frais qui se constituent inévitablement à leur fermeture : quelques centaines de milliers de dollars sont déjà dus par monsieur Langevin sous ce chef.

22 Voir en particulier les motifs exposés aux paragraphes 10 à 29 de la décision (note 12).
23 Voir en particulier les motifs exposés aux paragraphes 13 à 30 de la décision (note 13).
[37] Dans ces circonstances, le Tribunal n'a pas d'hésitation à conclure que le requérant rencontre par son comportement les principales caractéristiques de la quérulence; dès lors, la décision s'impose d'élargir son statut de plaideur quérulent à l'ensemble des recours qu'il pourrait entreprendre en Cour supérieure du Québec.

POUR CES MOTIFS, LE TRIBUNAL :

[38] REJETTE les deux réclamations entreprises par le requérant dans les dossiers portant les numéros 200-05-019491-120 et 200-05-019492-128;

[39] DÉCLARE plaideur quérulent le requérant Sylvio Langevin, alias Martin Langevin, alias Martin Sylvio Langevin, alias Sylvio Martin Langevin, alias Martin (Sylvio) Langevin, alias Sylvio (Martin) Langevin;

[40] INTERDIT au requérant d'introduire ou de déposer, directement ou indirectement, toute procédure – qu'elle soit introductive d'instance ou en cours d'instance – au greffe de la Cour supérieure de tout Palais de justice de la province de Québec, à moins d'avoir obtenu au préalable l'autorisation écrite du juge en chef, du juge en chef associé ou du juge en chef adjoint de la Cour supérieure du Québec, ou de tout autre juge désigné par l'un d'eux;

[41] INTERDIT aux greffiers, fonctionnaires et officiers de justice de la province de Québec de recevoir, timbrer, délivrer, signifier, enregistrer au plumitif, assermenter ou inscrire sur le rôle d'audience, toute procédure judiciaire qui aurait été intentée, initiée ou préparée par le requérant, à l'exception de celles qui auront été préalablement autorisées par écrit, conformément au paragraphe précédent;

[42] ORDONNE au greffier de la Cour supérieure du district de Québec de procéder à la signification du présent jugement au requérant Sylvio Langevin;

[43] AUTORISE la signification du présent jugement aux greffiers et huissiers de la province de Québec, par voie de télécopie;

[44] ORDONNE l'exécution provisoire du présent jugement, nonobstant appel;

______________________ ____________

ALAIN MICHAUD, j.c.s.

M. Sylvio Langevin
[...]. Ste-Euphémie (Québec)
Pour lui-même

Date d'audience : 13 janvier 2012
ANNEXE 1
(transcription intégrale)

Canada
Province de Québec
District de Québec
No 200-05-019491-120

1. Bonjour! Honorable Juge cour supérieur

2. Les faits

Vers le 27-12-2011, par hasard en fesant le ménage dans m'est documents divers dans mon armoire; j'ai trouvé 2 coupures de journal la Presse et leurs gros titre ce lit comme suit :

A. Mercure se dévoile :
B. En route pour Jupiter;

WOW : Je venais de mettre la main sur un véritable trésor! soit les détails de l'exploration spacial de la NASA depuis l'an ± 1970 en plus la découverte de Galilée l'astronome italien .... vous avez compris!

C'est évident j'ai fait un lien immédiat a l'effet que pour mon dossier précédent 200-05-019484-117 l'honorable juge la pris en délibération le 16-12-11 et je suis certain que son jugement promis d'être rendu avant la fin de janvier 2012 me sera favorable me donnant l'autorisation de devenir d'être propriétaire possession et administration (seul) de la planète mars et mon amendement verbal a l'audition de la lune (de la terre);

je me suis dit intérieurement oui c'est ca aujourd'hui avec ma présente requête j'ai seulement a ajouté les autres planète et les autres lune, et je vais être l'heureux humain a possédé la collection complète de l'exploration spacial qui a été réalisé et réalisable et même leur surface exploitable le touts accessible situé prêt de nous la terre;

3. Aujourd'hui avec ma présente requête je veux avoir l'autorisation du Tribunal pour devenir être propriétaire possession et administration (seul) des planètes et des lune qui ce détail comme suit :

A. la planète Mercure;
B. la planète Vénus;
C. la planète Jupiter;
D. la planète Saturne;
E. la planète Uranus
F. les 4 grosses lune et Jupiter
4. Le droit.

A. Entendu je suis un requérant seul sans aucun intimé;

B. les planètes Mercure, Vénus, Jupiter, Saturne, Uranus, et les 4 grosses lune de Jupiter; elle ons aucun propriétaire; donc c'est evident et hors de touts doute les 5 planètes et les 4 grosses lune de Jupiter ils me revienne toutes de plein droit a titre de propriétaire possession et administration (seul) suite a ma présente demande légitime d'autorisation du Tribunal article 885 – C.p.c.Q.;

C. et les 2 principals articles de loi pour la gérance de m'est 9 propriétés sont les articles 1 et 947 du Code civil du Québec;

D. Je dénonce une situation de force majeur en effet : le 12-12-2011 vers 11 heures au Palais de justice de Montmagny; (mon district de Montmagny) la greffière Johanne Lamarre et le directeur François Paré ils ons refusé de mouvrir un dossier civil d'autorisation art. 885 C.P.C.Q. soit de prendre ma requête précédente pour mars et la lune; alors j'ai téléphoné le 911 et 2 policiers S.Q. Gaudrau et Choinard son venu au greffe résultat sa rien changé leurs refus a continué; ce qui ma obligé de la faire a Québec au n/d 200-05-019484-117;

Donc Montmagny a refusé ma requête précédente, alors certain qu'il refuseras ma présente requête d'aujourd'hui c'est une semblable, donc la force majeur je suis tenu obligé de faire valoir m'est droit d'agir dans le district de Québec; Merci!

E. Je dénonce que ma ferme d'usage de donation parental de ma mère et de mon père légitime acte notarier 93159 est en crise depuis le 28 oct. 2004 il y a continuité du refus d'admettre ma possession administration par sa majesté la Reine;

Résultat ma boîte au lettre rural et mon numéro civic de porte 124 son en prison dans une cellule dans le sous-sol du Palais de justice de Montmagny;

Donc Honorable juge siégeant pour ma présente requête veiller déposé votre jugement au greffe civil de Québec ou je vais en prendre possession en main propre au moment opportun;

F. Je dénonce avoir recu un cadeau Merci! a ma précédente requête n/d 200-05-019484-117 au greffe civil de Québec le 12-12-11 En effet la greffière Claudia Bellavance ma exempter de payé 116.00 $ et le directeur du greffe civil M. Brassard la approuvé acépter verbal devant moi et le juge siégeant a mon audition de présentation le 16-12-11 la approuvé acépter lui aussi en me confirmant verbal que la gratuité n'avais aucune incidence sur la validité de ma requête pour l'avenir. Merci!

Donc aujourd'hui j'espère (d'avoir droit) a la même gratuité au même cadeau de 116.00 $ pour l'ouverture du dossier civil de ma présente requête;
Je vais le confirmer à cocher la case appropriée d’un X ci-dessous :

X  Le greffe civil m’a fait un 2e cadeau soit de m’exempter de payer 116.00 $ pour l’ouverture du dossier de ma présente requête…. Merci !

□  Le greffe m’a fait payer le prix de 116.00 $ pour l’ouverture de mon dossier civil de ma présente requête;

5. J’inclus annexé à ma présente requête les 2 pièces ci-dessous;
   A. La coupure du journal la Presse intitulé Mercure se dévoile;
   B. La coupure du journal la Presse intitulé En route pour Jupiter;

6. Ma présente requête est bien fondé en fait et en droit;

7. Pour c’est motif, plaise au Tribunal d’acceuillir ma présente requête, Merci !

8. ordonner par le Tribunal qui acceuille la présente requête et donne l’autorisation au requérant art. 885 C.P.C.Q. d’être le propriétaire possession et administration (seul) de la planète Mercure; donc la propriété de Mercure devient légalement et juridiquement un genre d’extension de la planète terre, alors les lois valide de la terre ils s’applique pour la gestion de Mercure incluant plus particulièrement l’art. 1 et 947 du C.C.Q.; considérant que le requérant propriétaire actuel c’est un québécois canadien;

… [paragraphes 9 à 13 : conclusions identiques à celles du paragraphe 8, mais cette fois pour Vénus (9), Jupiter (10), Saturne (11), Uranus (12) et les 4 grosses lunes de Jupiter (13)] …

14. Le tous sans frais. Merci !

Sainte-Euphémie ce 05 janvier 2012

Sylvio Langevin

requérant et avocat personnellement
ANNEXE 2
(transcription intégrale)

Canada
Province de Québec
District de Québec
No 200-05-019492-128

1. Bonjour! Honorable juge cour supérieur

2. Les faits :
Le 07-01-2012 vers 18h30, j'avais du temp a perdre et par hasard j'ai eu l'idée de lire quelques définition du dictionnaire qui ce détail comme suit :

A. Planète : astre errant, la terre fait partie d'un système de corps dits planète; voir pièce A annexé;

B. Terre : appartenant au système solaire et habitée par l'homme, voir pièce B annexé;

3. Le droit :
A. Entendu je suis un requérant (seul) sans aucun intimé;

B. La planète terre elle a aucun propriétaire, donc c'est évident et hors de tout doute c'est un astre errant appartenant au système solaire, certain qu'elle me revient de plein droit a titre de propriétaire possession et administration (seul) suite a ma présente demande légitime d'autorisation du Tribunal art. 885 C.P.C.Q;

note : cepandant je veux y ajouté une condition de sécurité de bonne entente qui va s'appliquè; a supposé que je veux utilisé la surface de ma planète terre soit mon sol mon fond, mon tréfond, je suis tenu d'avoir l'autorisation du Tribunal art. 885 C.P.C.Q de faire approuvé mon/m'est projet(s) par jugement afin d'être certain que je viole pas la/les loi(s) établie(s) des humains qui ons des droits acquis divers d'y habitée et ils aurons en même temp le droit de contester a titre d'intimé;

C. et les 2 principals article de loi pour la gérance de ma planète terre sont les articles 1 et 947 du C.C.Q;

D. Je denonce une situation de force majeur en effet : le 12-12-2011 vers 11 heures au Palais de justice de Montmagny; (mon district de Montmagny) la greffière Johanne Lamarre et le directeur François Paré ils ons refusé de mouvrir un dossier civil d'autorisation art. 885 C.P.C.Q soit de prendre ma requête précédente pour mars et la lune; alors jai téléphoné le 911 et 2 policiers S.Q. Gaudreau et Choinard son venu au greffe résultat sa rien changé leurs refus a continué; ce qui ma obligé de la faire a Québec au n/d 200-05-019484-117;

Donc Montmagny a refusé ma requête précédente alors certain qu'ils refuserais ma présente requête d'aujourd'hui c'est une semblable; donc la force majeur je suis tenu obligé de faire valoir m'est droit d'agir dans le district de Québec; Merci!
E. Je dénonce que ma ferme d'usage de donation parental de ma mère et de mon père légitime acte notarial 93159 est en crise depuis le 28 oct. 2004;

il y a continuité du refus d'admettre ma possession et administration par sa majesté la reine; résultat ma boîte au lettre rural et mon numéro civic de porte 124 son en prison dans une cellule dans le sous-sol du Palais de justice de Montmagny;

Donc Honorable juge siégeant pour ma présente requête veiller déposé votre jugement au greffe civil de Québec ou je vais en prendre possession en main propre au moment opportun;

F. Je dénonce que pour m'est 2 dossiers précédant 200-05-019484-117 aussi 200-05-019491-120, j'ai pas payé cétains gratuit pour ouvrir m'est 2 dossiers au greffe civil de Québec, donc aujourd'hui j'espère avoir mon 3e cadeau que sa soit gratuit pour ouvrir mon dossier de ma présente requête, et je le dénonce ci-dessous

– gratuit Merci! 0. $

– j'ai payé;

4. J'inclus annexé a ma présente requête les 2 pièces ci-dessous;

A. Définition du dictionnaire le mot planète

B. Définition du dictionnaire le mot terre

5. Ma présente requête est bien fondé en fait et en droit;

6. Pour c'est motif : plaise au Tribunal d'acceullir ma présente requête; Merci!

7. Ordonner par le Tribunal qui acceuil ma présente requête et donne l'autorisation au requérant art. 885 C.P.C.Q d'être le propriétaire, possession et administration (seul) de la planète terre, alors les lois valides de la terre s'applique pour sa gestion plus particulièrement l'art. 1 et 947 C.C.Q considérant que le requérant propriétaire actuel c'est un québécois canadien; cepandant pour utilisé le sol, le fond et le tréfond de la planète (terre) pour y faire un/des projet(s) divers sa prend un autre requête fait par le propriétaire d'autorisation du tribunal art. 885 C.P.C.Q afin d'avoir un jugement qui a pour effet de respecté le lieu des droits acquis des humains qui y habite, en même temp il y a possibilité d'avoir un/des intimés qui auront le droit d'intervenir pour ou contre?; le projet;

8. Le tout sans frais Merci!

Sainte-Euphémie ce 09 janvier 2012
Sylvio Langevin
requérant et
avocat personnellement
平成24年6月27日 水曜日 官報
（号外第139号）

5
第一条　前条第十八条及び第二十五条第二項の規定の適用については、これらの同規定を改定する法律を指して、これを指すぐに改定する法律を制定する。この法律は、平成二十三年七月一日の前後において本条により行う法律である。本条の規定は、これらの法律の施行日から適用する。この法律は、これらの法律に改定する法律の一部を改定する法律を指して、これを指すぐに改定する法律を制定する。この法律は、平成二十三年七月一日の前後において本条により行う法律である。本条の規定は、これらの法律の施行日から適用する。本条の規定は、これらの法律に改定する法律の一部を改定する法律を指して、これを指すぐに改定する法律を制定する。この法律は、平成二十三年七月一日の前後において本条により行う法律である。本条の規定は、これらの法律の施行日から適用する。本条の規定は、これらの法律に改定する法律の一部を改定する法律を指して、これを指すぐに改定する法律を制定する。この法律は、平成二十三年七月一日の前後において本条により行う法律である。本条の規定は、これらの法律の施行日から適用する。本条の規定は、これらの法律に改定する法律の一部を改定する法律を指して、これを指すぐに改定する法律を制定する。この法律は、平成二十三年七月一日の前後において本条により行う法律である。本条の規定は、これらの法律の施行日から適用する。本条の規定は、これらの法律に改定する法律の一部を改定する法律を指して、これを指すぐに改定する法律を制定する。この法律は、平成二十三年七月一日の前後において本条により行う法律である。本条の規定は、これらの法律の施行日から適用する。
О космической деятельности
Закон Республики Казахстан от 6 января 2012 года № 528-IV Настоящий Закон регулирует общественные отношения по осуществлению космической деятельности в Республике Казахстан.

Глава 1. ОБЩИЕ ПОЛОЖЕНИЯ

Статья 1. Основные понятия, используемые в настоящем Законе

В настоящем Законе используются следующие основные понятия:

1) космодром – комплекс технических средств, устройств, зданий, сооружений и земельных участков, предназначенный для обеспечения подготовки и осуществления запусков космических объектов;

2) космический аппарат – техническое устройство, предназначенное для вывода в космическое пространство с целью исследования и (или) использования космического пространства;

3) национальные операторы космических систем – юридические лица, осуществляющие управление космическими системами и их эксплуатацию;

4) космическая система – совокупность функционально-взаимосвязанных орбитальных и наземных технических средств, предназначенных для решения задач в космическом пространстве;

5) космический ракетный комплекс – совокупность ракеты-носителя и технических средств, сооружений, технологического оборудования и коммуникаций, обеспечивающих прием, хранение, подготовку к пуску и пуск ракеты-носителя с космическим аппаратом;

6) космическое пространство – пространство, простирающееся за пределами воздушного пространства на высоте свыше ста километров над уровнем моря;

7) космическая деятельность – деятельность, направленная на исследование и использование космического пространства для достижения научных, экономических, экологических, оборонных, информационных и коммерческих целей;

8) участники космической деятельности – физические и (или) юридические лица, осуществляющие космическую деятельность на территории Республики Казахстан, а также в космическом пространстве в соответствии с настоящим Законом;
9) проект в области космической деятельности – совокупность мероприятий по созданию космической техники и технологий, направленных на осуществление космической деятельности;

10) проект в области космической деятельности двойного назначения – проект в области космической деятельности, реализуемый как для решения социально-экономических задач, так и для целей обеспечения обороны и безопасности;

11) уполномоченный орган в области космической деятельности – центральный исполнительный орган, осуществляющий руководство в области космической деятельности, а также в пределах, предусмотренных законодательством Республики Казахстан, – межотраслевую координацию;

12) космический объект – космический аппарат и (или) средство его выведения в космическое пространство и их составные части;

13) объекты космической отрасли – производственные объекты, здания, сооружения и другое недвижимое имущество участников космической деятельности, используемые при осуществлении космической деятельности;

14) космические услуги – услуги, оказываемые с использованием космической техники и технологий;

15) система высокоточной спутниковой навигации функциональные дополнения глобальной навигационной спутниковой системы, включающие технические средства наземного и (или) космического базирования;

16) глобальная навигационная спутниковая система – космическая система, предназначенная для определения координатно-временных параметров (географических координат и высот, скорости и направления движения, времени) наземных, водных и воздушных объектов;

17) дистанционное зондирование Земли – процесс получения информации о поверхности Земли путем наблюдения и измерения из космического пространства собственного и отраженного излучения элементов сушки, океана и атмосферы;

18) кандидат в космонавты Республики Казахстан (далее – кандидат в космонавты) – гражданин Республики Казахстан, прошедший предварительный отбор и направленный на подготовку для получения квалификации космонавта;

19) космонавт Республики Казахстан (далее – космонавт) – гражданин Республики Казахстан, прошедший подготовку, получивший документы о присвоении квалификации космонавта (космонавта-испытателя, космонавта-исследователя, инструктора-космонавта) и статуса космонавта;
20) спутниковая навигация – процесс решения задач навигации с использованием глобальной навигационной спутниковой системы для определения координатно-временных параметров объектов;

21) спутниковые навигационные услуги – деятельность, направленная на удовлетворение потребностей в дополнительных (относительно стандартно предоставляемых глобальными навигационными спутниковыми системами) услугах по определению координатно-временных параметров объектов;

22) ракета-носитель – техническое устройство, предназначенное для вывода космических аппаратов в космическое пространство;

23) район падения отделяющихся частей ракет-носителей – земельный участок, на который падают (приземляются) отработавшие и отделившиеся в полете элементы и (или) фрагменты ракет-носителей;

24) транспондер космического аппарата – совокупность радиопередающих устройств, установленных на космическом аппарате и предназначенных для ретрансляции сигналов Земля – космос – Земля;

25) пусковые услуги – совокупность мероприятий по организации и осуществлению пусков ракет-носителей с целью вывода в космическое пространство космических аппаратов;

26) средство выведения – ракета-носитель, разгонный блок, авиационная ракетно-космическая система, предназначенные для вывода космических аппаратов в космическое пространство.

Статья 2. Законодательство Республики Казахстан в области космической деятельности

1. Законодательство Республики Казахстан в области космической деятельности основывается на Конституции Республики Казахстан и состоит из настоящего Закона и иных нормативных правовых актов Республики Казахстан.

2. Если международным договором, ратифицированным Республикой Казахстан, установлены иные правила, чем те, которые содержатся в настоящем Законе, то применяются правила международного договора.

Статья 3. Принципы осуществления космической деятельности

Принципами осуществления космической деятельности являются:

1) соблюдение национальных интересов, обеспечение обороны и национальной безопасности Республики Казахстан при осуществлении космической деятельности;

2) поддержка приоритетных направлений развития космической деятельности;
3) экономическое стимулирование космической деятельности;

4) возмещение вреда здоровью физических лиц, ущерба окружающей среде, имуществу физических и юридических лиц, государства, возникшего вследствие осуществления космической деятельности;

5) соблюдение экологических требований, требований в области технического регулирования и обеспечения санитарно-эпидемиологического благополучия населения;

6) соблюдение норм международного права в области космической деятельности;

7) эффективное и рациональное использование космического пространства и космической инфраструктуры Республики Казахстан;

8) стимулирование привлечения инвестиций в развитие космической деятельности при соблюдении государственных интересов Республики Казахстан.

Статья 4. Направления космической деятельности

Космическая деятельность в Республике Казахстан осуществляется по следующим направлениям:

1) создание и использование объектов космической отрасли;

2) исследование космического пространства, планет и солнечно-земных связей;

3) дистанционное зондирование Земли;

4) координатно-временное и навигационное обеспечение;

5) создание и использование космических систем связи;

6) осуществление запусков космических объектов;

7) развитие национального рынка космических услуг и расширение космических услуг на мировом рынке;

8) международное сотрудничество Республики Казахстан в области исследования и использования космического пространства в мирных целях.

Статья 5. Виды космической деятельности по созданию и использованию космической инфраструктуры
В целях создания и использования космической инфраструктуры в Республике Казахстан осуществляются следующие виды космической деятельности:

1) научно-исследовательские разработки;
2) проектно-конструкторские и технологические разработки;
3) изготовление и испытание экспериментальных, опытных и коммерческих образцов космической техники;
4) техническая эксплуатация, ремонт и модернизация космической техники;
5) утилизация космических объектов и технических средств;
6) оказание космических услуг конечным потребителям.

Статья 6. Материальная и кадровая основы космической деятельности

Материальной и кадровой основами космической деятельности Республики Казахстан являются:

1) научная, научно-технологическая и научно-экспериментальная базы;
2) проектно-конструкторская и производственная базы;
3) база по эксплуатации космической техники;
4) база по оказанию космических услуг конечным потребителям;
5) кадровый состав участников космической деятельности.

Статья 7. Финансирование космической деятельности

Финансирование космической деятельности осуществляется за счет бюджетных средств и иных источников, не запрещенных законодательством Республики Казахстан.

Глава 2. ГОСУДАРСТВЕННОЕ РЕГУЛИРОВАНИЕ И КОНТРОЛЬ В ОБЛАСТИ КОСМИЧЕСКОЙ ДЕЯТЕЛЬНОСТИ

Статья 8. Компетенция Правительства Республики Казахстан в области космической деятельности
Правительство Республики Казахстан:

1) разрабатывает основные направления государственной политики в области космической деятельности и организует их осуществление;

2) координирует вопросы международного сотрудничества Республики Казахстан в области космической деятельности;

3) утверждает порядок согласования и принятия решений о запусках космических объектов с территории Республики Казахстан, а также за ее пределами в случае их осуществления казахстанскими участниками космической деятельности;

4) утверждает порядок отбора кандидатов в космонавты и присвоения статуса кандидата в космонавты, космонавта;

5) принимает решения о запусках космических объектов с территории Республики Казахстан, а также за ее пределами в случае их осуществления казахстанскими участниками космической деятельности;

6) определяет порядок выплаты единовременной компенсации кандидату в космонавты, космонавту при установлении инвалидности, наступившей в результате травмы, увечья, заболевания, полученных при исполнении служебных обязанностей, а также в случае его гибели (смерти) в связи с исполнением служебных обязанностей;

7) утверждает технические регламенты в области космической деятельности;

8) определяет мероприятия по развитию и экономической поддержке космодрома «Байконур»;

9) утверждает порядок предоставления транспондеров космических аппаратов физическим и (или) юридическим лицам;

10) определяет порядок планирования космических съемок, получения, обработки и распространения данных дистанционного зондирования Земли национальным оператором космической системы дистанционного зондирования Земли;

11) определяет порядок организации и предоставления спутниковых навигационных услуг национальным оператором системы высокоточной спутниковой навигации;

12) определяет по представлению уполномоченного органа национальных операторов космических систем, а также их задачи и функции;

13) утверждает правила создания и эксплуатации (применения) космических систем на территории Республики Казахстан, а также в космическом пространстве, правила создания и
эксплуатации (применения) космических ракетных комплексов на территории Республики Казахстан;

14) определяет порядок утилизации космических объектов и технических средств, выведенных из эксплуатации;

15) утверждает квалификационные требования, предъявляемые к деятельности в сфере использования космического пространства;

16) определяет порядок осуществления уполномоченным органом в области космической деятельности отраслевой экспертизы проектов в области космической деятельности;

17) утверждает порядок государственной регистрации космических объектов и прав на них;

18) утверждает форму регистра космических объектов;

19) выполняет иные функции, возложенные на него Конституцией, настоящим Законом, иными законами Республики Казахстан и актами Президента Республики Казахстан.

Статья 9. Компетенция уполномоченного органа в области космической деятельности

1. Уполномоченный орган в области космической деятельности (далее — уполномоченный орган):

1) обеспечивает реализацию государственной политики в области космической деятельности;

2) обеспечивает реализацию проектов и программ в области космической деятельности, включая проведение научно-исследовательских и опытно-конструкторских работ;

3) осуществляет государственное регулирование в области космической деятельности;

4) разрабатывает порядок согласования и принятия решений о запусках космических объектов с территории Республики Казахстан, а также за ее пределами в случае их осуществления космическими участниками космической деятельности;

5) разрабатывает порядок отбора кандидатов в космонавты и присвоения статуса кандидата в космонавты, космонавта;

6) разрабатывает порядок выплаты единовременной компенсации кандидату в космонавты, космонавту при установлении инвалидности, наступившей в резуль‌та‌те травмы, увечья, заболевания, полученных при исполнении служебных обязанностей, а также в случае его гибели (смерти) в связи с исполнением служебных обязанностей;
7) осуществляет лицензирование в сфере использования космического пространства;

8) разрабатывает квалификационные требования, предъявляемые к деятельности в сфере использования космического пространства;

9) осуществляет государственный контроль в области космической деятельности;

10) осуществляет отраслевую экспертизу проектов в области космической деятельности;

11) разрабатывает порядок государственной регистрации космических объектов и прав на них;

12) осуществляет государственную регистрацию космических объектов и прав на них;

13) ведет регистр космических объектов;

14) осуществляет организацию и координацию деятельности по подготовке, переподготовке и повышению квалификации космонавтов, а также по переподготовке и повышению квалификации специалистов в области космической деятельности;

15) разрабатывает и утверждает положение об отряде космонавтов Республики Казахстан;

16) разрабатывает и принимает в пределах своей компетенции нормативные правовые акты в области космической деятельности;

17) осуществляет международное сотрудничество в области космической деятельности и представляет интересы Республики Казахстан в международных организациях и иностранных государствах;

18) организует разработку технических регламентов и государственных стандартов в области космической деятельности в соответствии с законодательством Республики Казахстан о техническом регулировании;

19) разрабатывает порядок предоставления транспондеров космических аппаратов физическим и (или) юридическим лицам;

20) разрабатывает порядок планирования космических съемок, получения, обработки и распространения данных дистанционного зондирования Земли национальным оператором космической системы дистанционного зондирования Земли;

21) разрабатывает порядок организации и предоставления спутниковых навигационных услуг национальным оператором системы высокоточной спутниковой навигации;
22) представляет Правительству Республики Казахстан перечень юридических лиц для определения национальных операторов космических систем, а также их задач и функций;

23) разрабатывает правила создания и эксплуатации (применения) космических систем на территории Республики Казахстан, а также в космическом пространстве, правила создания и эксплуатации (применения) космических ракетных комплексов на территории Республики Казахстан;

24) разрабатывает порядок утилизации космических объектов и технических средств, выведенных из эксплуатации;

25) устанавливает порядок приемки результатов по завершенным проектам в области космической деятельности;

26) участвует в пределах своей компетенции в организации поисковых, аварийно-спасательных работ, а также в расследовании аварий при осуществлении космической деятельности;

27) осуществляет иные полномочия, предусмотренные настоящим Законом, иными законами Республики Казахстан, актами Президента Республики Казахстан и Правительства Республики Казахстан.

2. Функции уполномоченного органа по реализации проектов в области космической деятельности двойного назначения реализуются совместно с Министерством обороны Республики Казахстан.

Статья 10. Отраслевая экспертиза проектов в области космической деятельности

1. Проекты в области космической деятельности подлежат обязательной отраслевой экспертизе.

2. Отраслевая экспертиза проектов в области космической деятельности осуществляется уполномоченным органом в целях определения целесообразности, технической возможности, экономической эффективности, а также соответствия законодательству Республики Казахстан, техническим регламентам и стандартам в области космической деятельности.

3. Отраслевая экспертиза проектов в области космической деятельности проводится в сроки, не превышающие тридцать рабочих дней со дня представления в уполномоченный орган материалов по проекту.

Повторная отраслевая экспертиза проектов в области космической деятельности, проводимая после устранения замечаний уполномоченного органа, выявленных при проведении первоначальной экспертизы, проводится в сроки, не превышающие двадцать рабочих дней.
4. Запрещается реализация проектов в области космической деятельности без положительного заключения отраслевой экспертизы в области космической деятельности.

Статья 11. Государственная регистрация космических объектов и прав на них

1. Государственной регистрации подлежат космические объекты:

1) принадлежащие физическим или юридическим лицам Республики Казахстан, а также права на данные космические объекты;

2) принадлежащие иностранным физическим или юридическим лицам, запускаемые в космическое пространство с территории Республики Казахстан.

2. Под государственной регистрацией космических объектов и прав на них, указанных в подпункте 1) пункта 1 настоящей статьи, понимается учет космических объектов, акт признания и подтверждения государством возникновения, изменения или прекращения прав (обременения прав) на космический объект в соответствии с гражданским законодательством Республики Казахстан.

Под государственной регистрацией космических объектов, указанных в подпункте 2) пункта 1 настоящей статьи, понимается запись в регистре космических объектов без государственной регистрации прав на них.

3. Космические объекты, указанные в пункте 1 настоящей статьи, подлежат государственной регистрации в соответствии с порядком государственной регистрации космических объектов и прав на них.

Государственная регистрация осуществляется в течение пятнадцати рабочих дней со дня поступления заявления в уполномоченный орган.

4. Права на космические объекты возникают с момента их государственной регистрации и подтверждаются свидетельством о государственной регистрации, выданным уполномоченным органом.

В случае утраты свидетельства о государственной регистрации уполномоченный орган выдает заявителю дубликат указанного документа. Дубликат свидетельства о государственной регистрации выдается в соответствии с порядком государственной регистрации космических объектов и прав на них.

5. За государственную регистрацию и выдачу дубликата свидетельства о государственной регистрации взимается сбор в порядке и размерах, определяемых налоговым законодательством Республики Казахстан.

6. Для государственной регистрации космического объекта и прав на него в уполномоченный орган представляются следующие документы:
1) заявление;

2) копия правоустанавливающего документа на космический объект (нотариально засвидетельствованная в случае непредставления оригинала для сверки);

3) копия лицензии на право осуществления деятельности в сфере использования космического пространства (нотариально засвидетельствованная в случае непредставления оригинала для сверки);

4) документ, подтверждающий уплату в бюджет суммы сбора за государственную регистрацию космического объекта и прав на него.

7. Основаниями для отказа в государственной регистрации космического объекта и прав на него являются:

1) представление заявителем неполного пакета документов, необходимых для государственной регистрации;

2) представление заявителем документов, не соответствующих требованиям законодательства Республики Казахстан;

3) наличие обременения прав на космический объект, ограничивающих или исключающих распоряжение космическим объектом;

4) решение суда, вступившее в законную силу, ограничивающее или исключающее право распоряжения космическим объектом.

8. При отказе в государственной регистрации уполномоченный орган не позднее пятнадцати рабочих дней со дня поступления заявления направляет заявителю письменный мотивированный ответ с указанием причин отказа.

9. Отказ в государственной регистрации космического объекта и прав на него может быть обжалован в суд в порядке, установленном законодательством Республики Казахстан.

10. При устранении оснований для отказа в государственной регистрации заявление на государственную регистрацию может быть подано повторно.

11. После осуществления государственной регистрации, а также при представлении уполномоченному органу заявителем документов, подтверждающих факт уничтожения или утилизации космического объекта, уполномоченным органом производится соответствующая запись в регистре космических объектов.

Статья 12. Государственный контроль в области космической деятельности
Государственный контроль в области космической деятельности осуществляется уполномоченным органом в форме проверки в соответствии с Законом Республики Казахстан «О государственном контроле и надзоре в Республике Казахстан».

Глава 3. ОСУЩЕСТВЛЕНИЕ КОСМИЧЕСКОЙ ДЕЯТЕЛЬНОСТИ

Статья 13. Лицензирование деятельности в сфере использования космического пространства

Деятельность физических и юридических лиц в сфере использования космического пространства осуществляется на основании лицензии, выдаваемой в соответствии с законодательством Республики Казахстан о лицензировании.

Статья 14. Научные исследования в области космической деятельности

1. Научные исследования в области космической деятельности включают фундаментальные и прикладные научные исследования и космические эксперименты, направленные на обеспечение научного сопровождения космической деятельности и разработку новых образцов космической техники и технологий.

Научные исследования в области космической деятельности выполняются в рамках научных, научно-технических проектов и программ, которые координируются уполномоченным органом в области науки. Научные, научно-технические проекты и программы разрабатываются и реализуются под руководством уполномоченного органа с привлечением ученых, высококвалифицированных специалистов и научных работников, научных и общественных организаций, высших учебных заведений Республики Казахстан.

2. Правовая охрана объектов интеллектуальной собственности, полученных при разработке космической техники и технологий, осуществляется в порядке, определяемом Гражданским кодексом Республики Казахстан и иными законами Республики Казахстан.

Статья 15. Создание космических систем и космических ракетных комплексов

Создание космических систем и космических ракетных комплексов включает научные разработки, проектирование, изготовление, монтаж, строительство, испытание космических систем и космических ракетных комплексов, их составных частей, а также ввод в эксплуатацию.

Статья 16. Использование космической системы связи

1. Регулирование использования космической системы связи представляет собой комплекс правовых, экономических, организационных и технических мер, направленных на ее эффективное использование.
2. Космическая система связи предназначена для предоставления транспондеров космических аппаратов для нужд физических и (или) юридических лиц.

3. Национальный оператор космической системы связи обеспечивает техническую эксплуатацию космической системы связи и оказывает услуги по предоставлению транспондеров космических аппаратов физическим и (или) юридическим лицам в порядке, утверждаемом Правительством Республики Казахстан.

4. Национальный оператор космической системы связи по согласованию с уполномоченным органом в области связи взаимодействует с иностранными операторами космической связи в целях резервирования транспондеров национальных космических аппаратов, а также расширения зон покрытия национальными космическими аппаратами за пределами Республики Казахстан.

Статья 17. Использование космической системы дистанционного зондирования Земли

1. Космическая система дистанционного зондирования Земли предназначена для сбора пространственных данных о поверхности и структуре поверхности Земли, описания характера и временной изменчивости естественных природных параметров и явлений, природных ресурсов, окружающей среды, а также антропогенных факторов и образований в целях решения научных, социально-экономических, экологических и оборонных задач посредством космических съемок.

2. Национальный оператор космической системы дистанционного зондирования Земли планирует космические съемки, получает, обрабатывает и распространяет данные дистанционного зондирования Земли физическим и (или) юридическим лицам, государственным органам Республики Казахстан в порядке, определяемом Правительством Республики Казахстан.

Статья 18. Использование системы высокоточной спутниковой навигации

1. Система высокоточной спутниковой навигации предназначена для предоставления потребителям информации о целостности глобальной навигационной спутниковой системы, а также информации, позволяющей повысить точность определения координатно-временных параметров.

2. Национальный оператор системы высокоточной спутниковой навигации предоставляет спутниковые навигационные услуги на всей территории Республики Казахстан в порядке, определяемом Правительством Республики Казахстан.

Статья 19. Использование космических ракетных комплексов

1. Космические ракетные комплексы предназначены для запуска космических объектов в космическое пространство.
2. Запуски космических объектов с применением космических ракетных комплексов осуществляются при наличии положительного решения Правительства Республики Казахстан, принятого в соответствии с порядком согласования и принятия решений о запусках космических объектов с территории Республики Казахстан, а также за ее пределами в случае их осуществления казахстанскими участниками космической деятельности.

Глава 4. КОСМИЧЕСКАЯ ИНФРАСТРУКТУРА

Статья 20. Объекты космической инфраструктуры Республики Казахстан

1. Объекты космической инфраструктуры Республики Казахстан составляют основу ее космической отрасли и включают:

1) объекты наземной космической инфраструктуры;

2) космические объекты.

2. Объекты космической инфраструктуры являются стратегическими объектами.

Статья 21. Объекты наземной космической инфраструктуры

К объектам наземной космической инфраструктуры относятся:

1) научно-экспериментальная база космических исследований;

2) средства производства космической техники и космических ракетных комплексов, предназначенных для обеспечения космической деятельности;

3) космодромы;

4) районы падения отделяющихся частей ракет-носителей;

5) наземные комплексы управления космическими объектами;

6) наземные целевые комплексы для приема информации от космических объектов, ее обработки и распространения.

В целях сохранности и безопасной эксплуатации объектов наземной космической инфраструктуры устанавливаются охранные зоны земельные участки, за исключением районов падения отделяющихся частей ракет-носителей, в пределах которых ограничивается или запрещается деятельность, несовместимая с целями установления зон.
Статья 22. Средства производства космической техники

1. К средствам производства космической техники относятся специальные конструкторско-технологические бюро космической техники и сборочно-испытательный комплекс.

2. Перечень государственных заданий на производство космической техники, создаваемой для Республики Казахстан, утверждается Правительством Республики Казахстан по представлению уполномоченного органа.

Статья 23. Космодром «Байконур»

1. Космодром «Байконур» является составной частью космической инфраструктуры и включает технические, стартовые, посадочные комплексы, земельные участки, предназначенные для подготовки и осуществления запусков космических объектов.

2. Космодром «Байконур» является стратегическим объектом и представляет собой имущественный комплекс, не подлежащий приватизации.

Статья 24. Маркировка космических объектов Республики Казахстан

Космические объекты Республики Казахстан, запускаемые в космическое пространство, должны иметь маркировку, определяемую уполномоченным органом в соответствии с международными стандартами и законодательством Республики Казахстан.

Статья 25. Утилизация космических объектов и технических средств

Космические объекты и технические средства, выведенные из эксплуатации, подлежат утилизации в порядке, определяемом Правительством Республики Казахстан и международными договорами.

Статья 26. Передача объекта космической отрасли в аренду

Порядок передачи объекта космической отрасли в аренду международному или иностранному участнику космической деятельности регулируется законодательством Республики Казахстан, если иное не предусмотрено международным договором, ратифицированным Республикой Казахстан.

Глава 5. БЕЗОПАСНОСТЬ КОСМИЧЕСКОЙ ДЕЯТЕЛЬНОСТИ

Статья 27. Обеспечение безопасности космической деятельности

1. Космическая деятельность осуществляется при условии обеспечения охраны здоровья людей и окружающей среды, защищенности имущества физических и юридических лиц.
Безопасность космической деятельности обеспечивается уполномоченным органом в соответствии с установленными правилами безопасности, а также другими государственными органами в пределах компетенции, установленной законодательством Республики Казахстан.

2. Возмещение вреда здоровью физических лиц, ущерба окружающей среде, имуществу физических и юридических лиц, государства, возникшего вследствие осуществления космической деятельности, производится добровольно или по решению суда в соответствии с законами Республики Казахстан.

Вред подлежит возмещению в полном объеме с учетом степени потери трудоспособности потерпевшего, затрат на его лечение и восстановление здоровья, затрат по уходу за больным.

3. До произведения штатного запуска космического объекта участники космической деятельности направляют в уполномоченный орган в области охраны окружающей среды координаты районов падения отделяющихся частей ракеты-носителя, расположенных на территории Республики Казахстан.

4. В случае гибели людей или животных, а также причинения ущерба гражданам и окружающей среде в результате произведенного запуска космического объекта участники космической деятельности должны возместить нанесенный ущерб в соответствии с пунктом 2 настоящей статьи.

5. Космический объект, принадлежащий иностранному физическому или юридическому лицу, может осуществлять безопасный пролет через воздушное пространство Республики Казахстан в процессе его выведения в космическое пространство или возвращения на Землю при условии предварительного согласования с Министерством обороны Республики Казахстан, уполномоченными органами в области чрезвычайных ситуаций природного и техногенного характера, охраны окружающей среды.

Статья 28. Расследование аварий при осуществлении космической деятельности

Аварии, приведшие к возникновению чрезвычайных ситуаций техногенного характера, подлежат расследованию в порядке, установленном законодательством Республики Казахстан в области чрезвычайных ситуаций природного и техногенного характера.

Статья 29. Экологический контроль окружающей среды и состояния здоровья населения в регионах, подверженных воздействию космической деятельности

1. Государственный мониторинг окружающей среды и природных ресурсов при осуществлении космической деятельности проводится уполномоченными государственными органами в области охраны окружающей среды, управления земельными ресурсами в рамках Единой государственной системы мониторинга окружающей среды и природных ресурсов совместно со специально уполномоченными государственными органами.
2. Участники космической деятельности обязаны осуществлять производственный экологический контроль окружающей среды в порядке, установленном экологическим законодательством Республики Казахстан.

3. Государственный контроль в области охраны окружающей среды и здоровья населения при осуществлении космической деятельности осуществляется уполномоченными органами в области охраны окружающей среды и здравоохранения.

4. Информация в области охраны окружающей среды и чрезвычайных ситуаций в связи с осуществлением космической деятельности на территории Республики Казахстан является открытой, подлежит распространению через средства массовой информации с использованием системы оповещения и связи.

Статья 30. Запреты и ограничения в космической деятельности

1. При осуществлении космической деятельности запрещается:

1) создание непосредственной угрозы жизни и здоровью людей;

2) выведение на орбиту, размещение в космическом пространстве оружия массового поражения;

3) использование космической техники и (или) небесных тел для негативного воздействия на окружающую среду;

4) нарушение международных норм и стандартов по загрязнению космического пространства.

2. Космическая деятельность в рамках отдельного проекта при наступлении угрозы жизни и здоровью людей, причинении материальных убытков или ущерба окружающей среде ограничивается или запрещается в соответствии с экологическим законодательством Республики Казахстан.

Глава 6. ПРАВОВОЕ ПОЛОЖЕНИЕ И МЕРЫ СОЦИАЛЬНОГО ОБЕСПЕЧЕНИЯ КАНДИДАТА В КОСМОНАВТЫ, КОСМОНАВТА

Статья 31. Статус кандидата в космонавты, космонавта.

Подготовка кандидата в космонавты, космонавта

1. Статус кандидата в космонавты, космонавта присваивается Правительством Республики Казахстан по представлению уполномоченного органа.
2. Космонавты формируются в отряд космонавтов Республики Казахстан. Отряд космонавтов Республики Казахстан действует на основании положения об отряде космонавтов Республики Казахстан.

3. Государство обеспечивает подготовку, переподготовку кандидатов в космонавты, космонавтов.

4. Подготовка и выполнение космического полета космонавтом осуществляются на основе контракта, заключаемого с соответствующим участником космической деятельности (заказчиком проведения летно-космических испытаний и (или) научных исследований и экспериментов в случае осуществления космического полета), в котором определяются обязательства сторон.

5. Время нахождения кандидата в космонавты, космонавта на подготовке, переподготовке, а также время его работы в области космической деятельности включаются в стаж работы кандидата в космонавты, космонавта.

Статья 32. Гарантии в случае получения увечья, заболевания или гибели (смерти) кандидата в космонавты, космонавта

1. При установлении инвалидности, наступившей в результате травмы, увечья, заболевания, полученных при исполнении служебных обязанностей, кандидату в космонавты, космонавту за счет бюджетных средств выплачивается единовременная компенсация в размерах:

1) инвалиду I группы – 3000 месячных расчетных показателей;

2) инвалиду II группы – 2000 месячных расчетных показателей;

3) инвалиду III группы – 1000 месячных расчетных показателей.

2. В случае гибели (смерти) кандидата в космонавты, космонавта при исполнении служебных обязанностей его наследникам из бюджетных средств выплачивается единовременная компенсация в размере 6000 месячных расчетных показателей.

3. Выплата единовременной компенсации, предусмотренной пунктами 1 или 2 настоящей статьи, осуществляется в порядке, определяемом Правительством Республики Казахстан.

4. Единовременная компенсация не выплачивается, если в установленном порядке доказано, что гибель (смерть), увечье или заболевание кандидата в космонавты, космонавта наступили в связи с обстоятельствами, не связанными с исполнением служебных обязанностей.

5. В случае гибели (смерти) кандидата в космонавты, космонавта при исполнении служебных обязанностей государство не позднее шести месяцев со дня гибели (смерти)
указанного лица обеспечивает выделение в собственность наследников погибшего (умершего) одного жилища из государственного жилищного фонда или безвозмездную передачу ранее предоставленного кандидату в космонавты, космонавту служебного жилища в собственность наследников погибшего (умершего) либо предоставление аналогичного жилища из государственного жилищного фонда в населенном пункте Республики Казахстан на усмотрение наследников погибшего (умершего), если ранее предоставленное кандидату в космонавты, космонавту служебное жилище находится на территории другого государства.

6. Положение пункта 5 настоящей статьи применяется при условии отсутствия на территории Республики Казахстан у кандидата в космонавты, космонавта и его наследников в собственности жилища.

Статья 33. Компенсация расходов на погребение

Погребение погибшего (умершего) кандидата в космонавты, космонавта производится по месту жительства либо по желанию его родственников в другом месте Республики Казахстан. Расходы, связанные с подготовкой к перевозке тела, перевозкой тела, погребением, изготовлением и установкой надгробного памятника, компенсируются за счет бюджетных средств в размере 80 месячных расчетных показателей.

Статья 34. Медицинское и санаторно-курортное обслуживание кандидата в космонавты, космонавта

1. Кандидат в космонавты, космонавт при условии его постоянного проживания на территории Республики Казахстан в установленном Правительством Республики Казахстан порядке обеспечивается ежегодными профилактическими осмотрами, медицинским и санаторно-курортным лечением.

2. Положения пункта 1 настоящей статьи распространяются на совместно проживающих членов семьи кандидата в космонавты, космонавта.

3. Положения пункта 1 настоящей статьи не распространяются на кандидата в космонавты, космонавта, утратившего гражданство Республики Казахстан.

Статья 35. Материальное обеспечение космонавтов, удостоенных почетного звания «Қазақстанның ғарышкер-ұшқышы» (Летчик-космонавт Казахстана)

Космонавтам, удостоенным почетного звания Қазақстанның ғарышкер-ұшқышы» (Летчик-космонавт Казахстана), устанавливается повышающий коэффициент в размере 2,9 к должностному окладу.

Глава 7. ЗАКЛЮЧИТЕЛЬНЫЕ ПОЛОЖЕНИЯ

Статья 36. Ответственность за нарушение законодательства Республики Казахстан в области космической деятельности
Нарушение законодательства Республики Казахстан в области космической деятельности влечет ответственность в соответствии с законами Республики Казахстан.

Статья 37. Порядок введения в действие настоящего Закона

Настоящий Закон вводится в действие по истечении десяти календарных дней после его первого официального опубликования.

Президент

Республики Казахстан  

Н. НАЗАРБАЕВ
UK Space Agency
Civil Space Strategy
2012 -2016
Foreword

A strategy is more than simply words.

A strategy demonstrates that we are carefully considering the options available to us; that we have an eye on the long-term, and most importantly, that we are committed to action.

We are currently celebrating the 50th anniversary of the UK’s first foray into space, recognizing the pioneers who first ventured into unknown scientific territory with the Ariel-1 satellite.

In the intervening half-century, space has become part of our lives. We use its technology to navigate our streets, access the internet and communicate around the globe. And UK space expertise has cemented Britain at the forefront of the exploration of our Universe. We have landed the Huygens probe on Titan, flown by Halley’s comet with the Giotto mission, probed the mysteries of the Universe with Herschel and Planck, and advanced our understanding of planet Earth through the Envisat and Cryosat missions.

Today, space continues to be a key sector for Britain’s future.

Its economic contribution to the UK economy is impressive. Total space-related turnover was £9.1 billion in 2010/11 (compared to £7.5 billion in 2008/09). This represents a real growth of 15.6% since 2008/09. The average annual growth rate over the last two years surveyed has been 7.5%. Together these growth rates suggest that the UK space industry has performed extremely well in difficult economic circumstances.

The UK Space Agency is tasked with fostering the growth of the UK space sector. I have no doubt it will continue to succeed. The UK model is well situated for the future, it has a substantial commercial sector, access to the City of London for finance, close links to academics and business and a nimble space agency. Promoting collaboration the UK Space Agency will work with the expertise of industry and researchers directly. Making those direct connections is important for unlocking new innovative services and technologies. We can use the Harwell cluster of ESA, ISIC, the business incubator and Satellite Application Catapult to foster drive new and innovative services, products and technologies. We will also continue to work with our partners in the European Space Agency and around the world.

The possibilities of the next fifty years represent something very inspiring for this country. Our pragmatic approach to private and public sector partnerships has helped pave the way for a new era of space activity in Britain, with the UK Space Agency leading the way.

So, a strategy is more than simply words. A strategy can shape the future.

That is why I am extremely pleased to be able to present this strategy for the UK’s future in space.

The Rt. Hon. David Willetts MP
Minister for Universities and Science
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UK Civil Space Policy

Challenges and Changes

Today our everyday lives depend on space technology: it is woven into the economy in a way unimaginable at the dawn of the space age, and still the global space scene is rapidly changing. The challenge now for UK civil space policy is to anticipate and react to developments being driven both by the emergence of ground-breaking technologies and by the needs of society.

The creation of the UK Space Agency allows the UK to embrace these changes and provide the leadership needed to take full advantage of the opportunities for the economy that will follow from the increasing commercial application of space.

The sector is already showing it can react quickly to change. Many more users are gaining access to space as small satellites deliver cost-effective services. Broadcast and communications satellites are becoming more powerful and flexible. New funding models are allowing businesses to be developed with shared private and government funding. Space can provide the tools needed to manage global challenges such as climate change; and the UK has the opportunity to be a leader in turning these tools into practical solutions. This strategy provides a framework for the Space community to contribute to UK growth as set out in the government Growth Review.

By satisfying demand in global markets that need space-based infrastructure, the UK’s space industry provides important economic and social benefits for UK citizens. The UK’s space sector already has strength in core space markets such as telecommunications, weather forecasting, navigation, and observation imagery. The UK also has a strong space research community, able to respond to the new scientific challenges, such as mapping the mysterious dark energy across the Universe and searching for places beyond Earth that could support life. These scientific challenges will help drive innovation and develop new skills.

UK companies manufacture and operate satellites, collect space data and provide services that generate high value. Continuing economic growth will depend on a strong UK presence in the fast-growing markets of the future - for example: satellite broadband; Earth observation; and applications that integrate space and terrestrial data for new high-value uses. The UK’s space industry set out its determination to grow the UK’s space sector in its Space Innovation and Growth Strategy. In particular, it set out an ambitious vision to seize 10% of the global market by 2030.

Our industry has been challenged to find new market opportunities and customer segments at home in the UK, within the European Union and around the world. With new opportunities from the increasing number of active space-faring nations, also comes new competition from the space industries that are developing in those same countries - many are receiving active support from their Governments.

These dynamics require the UK to continue to develop strategies and policies appropriate to its own circumstances if it is to work effectively in the changing international landscape. Complicating this ambition is the fact that more and more attention must be paid to the security and sustainability of space assets. Issues such as the impact of extreme space weather and space debris must be understood and addressed.

The UK Space Agency will continue to work nationally and internationally to represent the interests of civil space users in these issues, and to uphold the Government’s obligations under the Outer Space Act.
The UK Space Agency
How We Will Deliver

Almost everything the UK does in space is cooperative.

We work in partnership with other countries, agencies or organisations to achieve our goals. By working with international partners, the UK can participate in a wider range of space activities than it could undertake alone.

Following the creation of the UK Space Agency as an Executive Agency of the Department for Business, Innovation and Skills (BIS), it was given a clear mandate to lead a new strategic approach to the management and funding of civil space activity. The Agency will continue to broaden and deepen its relationships with the key organisations involved in space.

The Agency will work closely with its partners in industry, the Research Councils and with the Technology Strategy Board (TSB) to deliver economic growth and social benefits for the UK. It will offer clear lines of ownership and accountability for capturing issues important to industry, including working across sectors to take forward the Government’s Growth Review objectives in the space sector.

The Space Leadership Council provides top level advice to Minister. It helps him to shape a view on the work plan and future direction of the Agency activities. Identifying those opportunities that will enable the UK to develop and maintain global leadership, in novel technologies, operations and exploitation is the key goal of the SLC.

Much of the investment made by the Agency is channelled through the European Space Agency (ESA) to enable UK industry and academia to work in collaboration with Europe to develop world leading technologies, services and science missions. ESA will remain our main delivery mechanism but we will continue to support bilateral space missions where this is in the UK’s interest.

The Agency will strengthen the role of the ESA Centre at Harwell in order to anchor the UK in ESA; and ESA in the UK. We will reinforce the Centre’s links with the wider UK space infrastructure particularly in key growth areas like space applications. The Agency will use the hub-and-spoke model of the International Space Innovation Centre as a key route to facilitate our growth objectives and we will support the community in exploiting the TSB’s decision to develop a Satellite Applications Catapult.
Following the Lisbon Treaty the European Union is taking an increasing role in space policy. On behalf of Member States, the European Commission already manages the Galileo and GMES programmes. In response to these changes, the Agency has established a new EU focused team working to ensure that developments in European space policy and the EU space programmes have real synergy with UK national interests. We will work with Member States and the European Commission to ensure that the EU’s programmes are managed effectively with the costs controlled, and that they are complementary to the activities of ESA.

The Agency will work with the Met Office, maximising benefits from EUMETSAT satellite programme and ensuring sustained access to data from observation systems servicing operational meteorology, climate monitoring and oceanography. The Agency will work together with the Natural Environment Research Council, the Met Office and with other Government Departments and public sector users to plan and exploit the opportunities arising from space-based monitoring of our planet. These partnerships will ensure that civil, security and military space strategies and activities are developed in a coherent and proactive way.

The UK already collaborates with many of the world’s space agencies. We will continue to forge new international partnerships that provide access to launch opportunities, deliver science or develop new technology and services, while strengthening existing relationships. The Agency will be an active member of the Committee on Earth Observation Satellites and will support the Group on Earth Observation. The UK will remain active in the United Nations Committee for Peaceful Uses of Outer Space and with entities such as the UN Office for Outer Space Affairs promoting the peaceful exploitation of outer space, and will support actions to ensure the long term sustainability of space activities.

As a founding member, the Agency will participate in the International Space Exploration Coordination Group of space agencies. It will work with important professional and scientific bodies such as the International Academy of Astronautics, the International Astronautics Federation and the Committee on Space Research. The Agency will also strengthen links with UK trade associations, professional bodies and the general public through its outreach programme.

The Agency will work with Government, education organisations and experts to exploit the inspirational effect of space in delivering education and capturing and shaping the skills and imagination of the next generation of innovators and scientists. The European Space Education Resource Office (ESERO-UK) will help us deliver this vital goal.
The following chapters set out the Agency’s strategy for delivering growth as reflected in six themes:

- GROWTH THROUGH NEW OPPORTUNITIES
- GROWTH FROM EXPORT
- INNOVATION SUPPORTING GROWTH
- SCIENCE TO UNDERPIN GROWTH
- EDUCATION FOR GROWTH
- GROWTH THROUGH SMARTER GOVERNMENT

This document presents the approach the Agency will take, while detailed actions will be defined in our corporate plan and an annual delivery statement.
Growth from New Opportunities

Opportunities are open to offer space-based services to an increasing range of customers from individual consumers to international organisations.

New areas are likely to include the growth of:
- international telecommunications and navigation services and applications;
- provision of information systems to support carbon trading;
- systems for space surveillance to alert us to natural and man-made hazards which threaten critical space infrastructure;
- innovative launch systems; services to support space exploration; and space tourism.

Countries which recognise these new markets and invest early will reap the rewards.

Working with its partners at home and abroad, the UK Space Agency will:
- assist industry to build the new markets in line with the Government’s Growth Review objectives;
- identify, and invest in, strategic opportunities to grow the UK’s industrial capabilities and economic impact;
- carry out horizon-scanning activities with industry and researchers to identify emerging opportunities;
- invest in programmes that demonstrate new services;
- work with industry, the Technology Strategy Board, the European Commission and ESA to translate investment into down-to-Earth applications.

By bringing together industry, academia and government facilities, the Harwell Space Cluster (which includes the ESA Harwell centre, the International Space Innovation Centre and a space Business Incubator) will be a vital tool for delivering growth through new opportunities.
Case Study:
The Facility for Climate and Environmental Monitoring from Space

The Facility for Climate and Environmental Monitoring from Space (CEMS) will provide data and computing services to stimulate growth in earth observation applications and climate services using satellite data. It provides a purpose built facility combining high performance computing, extensive data collections and various user services and software applications. The facility gives academic, government and commercial users, including SMEs, access to internally hosted climate and EO data, alongside a wide range of associated services for data processing, analysis and visualisation.

The CEMS infrastructure will provide a cloud environment, allowing users to build and host applications and core framework services with access to 1.7 petabytes of key satellite data and leading edge high performance computing facilities. CEMS will also provide essential data quality and integrity tools to give users complete confidence in, and transparency of, its data, services and products.

When operational, CEMS will offer a number of services enabling users to process, manage and analyse data. These services will develop and evolve over time to reflect the full CEMS vision and will grow with the CEMS customer base. The initial investment in CEMS came through the UK Space Agency and will be owned and operated by ISIC plc on a not-for-profit basis.

CEMS will build on the UK’s leading position in climate science, technology and services and will support the European Space Agency’s Climate Office at Harwell. It will provide a focus for innovation and support the exploitation of important opportunities such as GMES data and services.
Growth from Export

To realise the UK’s objective to grow its share of the global market to 10% by 2030, new services and products need to be turned into sales.

The UK Space Agency has a role to play in assisting the space sector to capture more business in all areas, but particularly the global commercial and security markets which are forecast to grow most strongly.

To achieve this, the UK Space Agency will promote export opportunities by:

- consulting with industry and academia to lead the definition of a UK space export strategy that fits within the existing overall UK governance framework and legislation for exports;
- working with industry in partnership with the Department for Business, Innovation and Skills, the Foreign and Commonwealth Office, UK Trade and Investment, the Ministry of Defence, the Science and Innovation Network and the Research Councils’ overseas offices to deliver this strategy;
- reducing barriers to export growth such as excessive regulation, regulatory costs and differences in the international cost of capital, and working with industry to identify further regulatory reforms that can stimulate growth and ensure the UK remains and thrives as a competitive location for space companies;
- working with the Ministry of Defence in providing UK industry with clear guidance and signposting on the security aspects of space exports;
- working with the space sector and the City to develop greater awareness of market opportunities and exploit expertise in financing in order to grow existing UK businesses and attract more businesses to set up in the UK;
- by building relationships with other international space agencies to enable collaborative endeavours which can open up markets for business.
Case Study: NovaSAR

In November 2011, Minister for Universities and Science, David Willetts, announced investment in a new British-built satellite constellation able to monitor maritime security, climate change and humanitarian disasters.

NovaSAR will consist of four state-of-the-art Synthetic Aperture Radar (SAR) satellites able to operate day and night in all weather conditions. These instruments can be used for regular monitoring of specific areas which makes them ideal for maritime surveillance of drug-trafficking, piracy and oil spills, and environmental monitoring of deforestation, flooding and glacial melts.

Government will provide £21 million to assist in the development and launch of the first satellite of the constellation. Success will unlock over £150 million of inward investment to the UK. Once NovaSAR is up and running, businesses will be able to use the satellite data to develop a range of Earth observation services and applications.

The first NovaSAR demonstration satellite will be built by UK-based company Surrey Satellite Technology Limited with a payload provided by Astrium UK. This will be a technology demonstration on a much smaller spacecraft than traditional SAR satellites, dramatically reducing cost.

This project will provide the UK with a world-leading constellation of its own and is a clear signal of the Government’s continued commitment to the UK space industry.
Innovation Supporting Growth

Space is at the cutting edge of technology, data processing and analysis. UK academia works in partnership with industry to deliver new missions, instrumentation and data analysis techniques. This innovation underpins the UK space sector growth. Benefits flow out into the commercial sector, for example delivering new types of data processing systems; advanced structures; and electric propulsion.

This know-how can be exploited by other industries from manufacturing to medicine and from energy to information technology. The Agency, working with the Research Councils, industry and the TSB, will lead an integrated approach to technology, stretching from ‘blue skies’ research through to technology demonstration, pulling ideas developed in the science base through to the stage where private sector will invest. The International Space Innovation Centre (ISIC) and the ESA Business Incubation Centre already play an important role in creating an open innovation environment where new technology, applications and services can flourish. A further step forward will see the creation of a national Satellite Applications Catapult.

The UK is playing a pivotal role in nurturing new applications which will assist with many critical global issues including: managing natural resources, understanding and managing our responses to the changing climate, planning and monitoring man-made infrastructure, security and defence. By also fostering innovation in service sectors, the Agency will support the growth of technically superior space applications.

Defining the range of key technologies that need enhancing or developing to improve the UK competitiveness and ability to exploit new opportunities is important.

To this end, the UK space community has developed a technology roadmap setting out key technologies that need to be developed, and the UK Space Agency will:

• use the technology road map to prioritise investment and identify high impact, paradigm-changing technologies;
• continue to invest in key areas for development via the National Space Technology Programme, co-funded with industry to deliver the National Space Technology Strategy;
• develop strategies to take technologies from concept to demonstration using national, ESA, EU or bi-lateral programmes as appropriate;
• partner other public funders to make the most effective use of resources by identifying common requirements;
• selectively join ESA optional programmes, engaging with them at an early stage and contributing at a meaningful level to influence the programme to meet UK priorities;
• facilitate exploitation of technology by encouraging academia-industry collaboration at all stages of the technology development cycle;
• work with partners to ensure transferrable technologies are taken up by other sectors;
• maximise private financing by assisting with risk reduction during the earliest phases of technology development.
Case Study: Hylas-1

HYLAS 1 is the first small geostationary communications satellite of the Old Street-based telecommunications firm Avanti Communications. Launched in November 2010, the satellite is focused on high-speed internet connectivity for the European market.

HYLAS 1 is an innovative mission put together in a new way: it is the UK’s first public–private partnership resulting in a full satellite system.

The UK Space Agency and Technology Strategy Board provided support for the development of HYLAS 1 through the UK subscription to the European Space Agency’s ARTES programme. Avanti has capitalized on the initial investment to build the satellite infrastructure and developed a portfolio of services around the technology.

Operating across Ku- and Ka-band frequencies with advanced communication technology, HYLAS-1 can pipe broadband through the sky to hundreds of thousands of previously underserved users while simultaneously broadcasting multiple standard and high-definition TV channels.

HYLAS 1’s wide Ku-band beam covers the whole of Europe, providing bandwidth for satellite television broadcasting. Its Ka-band antenna generates eight closely focused ‘spot beams’ for optimal frequency reuse, each of which provides coverage to a key European market. Bandwidth and power can be redistributed between beams to fulfil the changing needs of the market.

Joining forces with a commercial operator means that Europe’s advanced telecommunications technologies can reach orbit more rapidly and economically than would be possible otherwise.
Science to Underpin Growth

The Agency believes in the intrinsic value of science as a national endeavour. History shows that sustained investment in basic science aimed at seeking new knowledge delivers tangible benefits. Our Earth observation programme allows us to understand our changing environment, including our own impact upon it. Space science answers questions about the birth and evolution of our Universe and the basic physics that underpins the behaviour of matter. Space exploration informs us about the possibility of life beyond the Earth and the potential to expand into the Solar System. The weightless environment of space offers the possibility of developing new materials, insights into human physiology and a laboratory for basic physics and life sciences.

A strong research community provides a technical and scientific knowledge base that feeds future developments both in the upstream industries (e.g. satellite manufacturers and software companies) and the downstream applications and services that use space data. This latter market, particularly in environmental services is seen as an important growth industry. Investment in science also ensures the UK has a strong academic base able to supply industry with skilled graduates and experienced researchers. And the spin out opportunities for technology developed for a space mission are important, with passive airport scanners being a good example.

To maintain the health of the science-base the UK Space Agency will:

- provide opportunities to participate in world class scientific missions, working primarily through ESA but also in bilateral collaborations;
- work with all the Research Councils to coordinate investments to maximise the scientific exploitation of UK investment in space;
- maintain excellence in Earth observation technologies, techniques and systems to provide the knowledge base to feed into commercial and public applications;
- support actions to foster effective knowledge exchange between academia, government departments, agencies and industry.
Case Study: Herschel Space Observatory

The Herschel Space Observatory is the largest infrared space observatory ever built. Its highly-advanced instruments collect radiation from some of the coldest and most distant objects in the Universe, helping us understand star formation and the origins of the Universe.

The UK led the development of one of the three instruments on board. The SPIRE (Spectral and Photometric Imaging Receiver) instrument was developed by an international consortium, and the assembly and testing of SPIRE took place at the STFC Rutherford Appleton Laboratory (RAL) in Oxfordshire. The scientific analysis is led by a Principal Investigator from Cardiff University.

The mission is proving to be a great success in all of these science areas, with over 300 refereed scientific publications in the first two years of operation, and has revolutionised our knowledge of the extragalactic and galactic skies in the far infrared and submillimetre. This observatory has helped understand one of the most iconic images in astronomy: the ‘Pillars of Creation’ an image originally taken by the Hubble Space Telescope in 1995. Herschel has helped to explain the processes occurring within the pillars, and the locations of stars that are forming throughout the surrounding area. The observations reveal how complicated star formation is.
**Education for Growth**

The future wealth of the UK will be dependent on developing a highly skilled technical workforce. Studies have demonstrated the value of space activities in attracting children into science, technology, engineering and mathematics (STEM) and encouraging them to excel.

An expanding space sector needs a supply of graduates and technicians with appropriate skills. The Agency has a role to both encourage the take up of STEM subjects for the benefit of the whole UK economy and to ensure that universities and colleges provide appropriate skills to meet the space sector’s specific requirements. These twin themes of ‘education for space’ and ‘space for education’ are embodied in the Agency’s Education, Skills and Outreach Strategy, which is published separately.

The UK Space Agency will:

- work with the Department for Education, further education and higher education authorities, industry, education organisations and career advisors to deliver the skilled staff that industry needs for growth and promote careers in the space industry;
- work with the Research Councils to maintain the UK’s world leading space research community;
- work with space education and advocacy groups to tell the exciting story of the UK space programme and use it as a tool to encourage children to take up and excel at STEM subjects.
Case Study: National Space Academy

The National Space Academy programme of student masterclasses, teacher CPD and careers events is delivered by a network of outstanding teachers and project scientists that use the context of space to teach physics, chemistry, biology, mathematics, geography and applied science to GCSE, A-level and BTEC students and their teachers.

Part of the objective of the National Space Academy is to improve the size and quality of the UK science and engineering skills pool. Government, industry and academia have all expressed concern about student progression onto both academic and vocational pathways in STEM areas and the impact this will have on future economic growth and prosperity.

A three year pilot Space Academy programme run by the National Space Centre in the north east proved successful in boosting student attainment, teacher effectiveness and influencing course choices at A-level. And now, with a network of schools and teachers across England, the National Space Academy is already starting to make a difference.

Led by the National Space Centre, the programme is funded by the UK Space Agency, European Space Agency, Science and Technology Facilities Council and industrial/academic from the UK space sector.
Growth Through Smarter Government

Government will increasingly rely on satellite-derived services and data, because in many areas information gathered from space enables government to make better informed policy. Space can provide data on the environment, climate, weather, security, agriculture, coastal management and disaster mitigation – effectively utilising these resources will help to meet the current and future policy challenges in these areas.

The UK Space Agency will therefore support the development of ‘smarter’, more efficient government through the use of space data by providing strategic leadership, and by acting as the centre of expertise for government departments; working with them to identify applications and translate their needs into requirements for the space industry. By becoming an anchor customer, the public sector could enable service-providers to attract private investment, develop export markets and stimulate wider market uptake.

The UK Space Agency will work across government:

- to improve their capabilities and efficiency through increased use of space services;
- and with industry to create data services that meet public sector requirements;
- and with international bodies to identify how space services can assist the world’s poorest and most vulnerable people.

The burgeoning entrepreneurial climate within the space sector needs an appropriate regulatory framework that takes account of international obligations and national security. Regulation can be used as a tool to establish a competitive edge in the international arena. It can create an environment which attracts inward investment and encourages industry to develop new systems and services in the UK. It is also important that the Agency ensures that the international regulatory environment for orbit and frequency allocations facilitates growth of UK markets.

A responsibility of the Government is also to put in place strategies to protect important infrastructure. Space is becoming increasingly congested, competitive, and contested. Given the large number of space objects in orbit around the Earth, collisions and radio frequency interference is a real and growing threat. The Agency worked with the Cabinet Office who led a cross cutting project to develop a National Space Security Policy which was launched in summer 2012. The project was Chaired by the Minister for Universities and Science with the Minister for Defence Procurement as a first step towards ensuring the safety, stability and security of the space domain for years to come.

We will also:

- work with the Department for Transport and the Civil Aviation Authority to undertake a substantive review of potential space plane operations and certification in the UK
- consider responses to a public consultation on reforming the Outer Space Act before finalising any changes to the Act.
- work with OFCOM and international bodies to ensure appropriate radio frequencies and orbit slots are available for future space services and new ways of accessing space
Case Study:

International Charter
‘Space and Major Disasters’

The Disaster Monitoring Constellation is a unique international partnership formed by national governments and organisations that recognised the need for coordinated satellite imaging to assess and mitigate natural disasters with more up to date and timely information.

The first satellite in the series, UK-DMC, was jointly funded by the UK Space Agency and SSTL through the £15M MOSAIC programme. All of the Constellation satellites were designed and built by Surrey Satellite Technology Ltd.

By working together, the 5 members of the DMC consortium, run by DMC International Imaging (DMCii) in Surrey, provide a constellation capable of acquiring satellite images of anywhere on Earth at least once a day. This makes it possible to provide recent high-quality images of the affected area within the critical days following a disaster, improving the accuracy of maps and emergency response plans that are made.

The UK Space Agency and DMCii work together with the world’s space agencies and the United Nations (UN) within the International Charter: Space and Major Disasters to provide multi-spectral optical imagery during natural disasters.

The constellation responds to disasters frequently and has played an important role responding to disasters such as Hurricane Katrina, the Japanese earthquake and tsunami in 2011, and the UK floods in recent years.
A New Strategy for a New Era

The role of space technology in the UK has changed dramatically in the last 50 years.

The creation of the UK Space Agency in April 2011; the publication of the Government Growth Review, the establishment of the International Space Innovation Centre, the Space Application Catapult Centre, and the presence of a European Space Agency facility at the Harwell Space Cluster are all part of the dynamic, new environment in which the UK space sector can flourish.

The UK Space Agency will invest in, lead and coordinate the UK's civil space programme. We will ensure that our central goal of growth becomes a reality and the potential of space to the twenty-first century economy will be both recognised and realised.

The Agency's investment in space will be targeted at areas that have the greatest potential for delivering economic benefits, scientific excellence and national security. We recognise that in some instances these benefits may be realised some years downstream. The added value of the Agency will be to provide coherence between investment in long-term basic research and in near-term applications, harnessing the skills and experience of universities, national laboratories and industry to grow a stronger UK strategic space capability.

Through the Agency’s leadership of the space sector, we will build links between industry and the research community and also between Government users of space and organisations that contribute to creating capabilities in space, such as industry, the Technology Strategy Board, the Research Councils and the Harwell Space Cluster.

The Agency’s work of promoting the space industry will assist in selling UK capability abroad in order to increase the UK’s share of the world space market. Furthermore, we will act as champion in Government to provide a regulatory environment that promotes the space sector.

Last, but by no means least, the UK Space Agency will provide inspiration and discovery through its exploration of the Universe and its study of planet Earth. For the next generation, the growth of the UK space sector will create opportunities for rewarding careers and turn their imaginations towards the possibilities of tomorrow.

Through its corporate plan and website, the Agency will provide updates on the actions and timeline for implementation of this strategy.

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URN 12/950 - Civil space strategy
SUBJECT: Space Policy

References: See Enclosure 1

1. PURPOSE. This Directive reissues DoD Directive (DoDD) 3100.10 (Reference (a)) to update established DoD space policy and assigned DoD responsibilities for space-related activities in accordance with the National Space Policy, Presidential Policy Directive-4 (Reference (b)) and the National Security Space Strategy (Reference (c)). It addresses comprehensively the challenges posed in an increasingly congested, contested, and competitive space domain.

2. APPLICABILITY. This Directive applies to OSD, the Military Departments, the Office of the Chairman of the Joint Chiefs of Staff and the Joint Staff, the Combatant Commands, the Office of the Inspector General of the Department of Defense, the Defense Agencies, the DoD Field Activities, and all other organizational entities within DoD (hereinafter referred to collectively as the “DoD Components”).

3. DEFINITIONS. See Glossary

4. POLICY. It is DoD policy that:

   a. DoD space-related activities shall strengthen safety, sustainability, stability, and security in space; maintain and enhance the national security advantages afforded by the use of space; and energize the space industrial base that supports U.S. national security.

   b. The sustainability and stability of the space environment, as well as free access to and use of space, are vital to U.S. national interests. Purposeful interference with U.S. space systems, including their supporting infrastructure, will be considered an infringement of U.S. rights. Such interference, or interference with other space systems upon which the United States relies, is irresponsible in peacetime and may be escalatory during a crisis. The United States will retain the capabilities to respond at the time and place of our choosing.
c. In order to deter attacks on U.S. or allied space systems, DoD will:

(1) Support the development of international norms of responsible behavior that promote the safety, stability, and security of the space domain.

(2) Build coalitions to enhance collective security capabilities.

(3) Mitigate the benefits to an adversary of attacking U.S. space systems by enhancing the resilience of our space enterprise and by ensuring that U.S. forces can operate effectively even when our space-derived capabilities have been degraded.

(4) Possess capabilities, not limited to space, to respond to an attack on U.S. or allied space systems in an asymmetric manner by using any or all elements of national power.

d. DoD will promote the responsible, peaceful, and safe use of space, including following the U.S. Government (USG) Orbital Debris Mitigation Standard Practices (Reference (d)) in accordance with Reference (b).

e. DoD will cooperate with interagency, international, and commercial partners to define and promote safe and responsible space operations. This includes sharing space situational awareness and flight-safety information, as well as supporting the development of transparency and confidence-building measures and behavioral norms promoting responsible space operations.

f. DoD will seek to expand space-related cooperation with international partners, building and sharing space capabilities with these partners to the extent practicable and leading combined space operations, including space-support operations. DoD space-related international cooperation activities will be based on mutual interest and will be conducted to enhance collective security capabilities, forge closer security ties with allies and friends, and advance U.S. policy objectives. In its efforts to expand space-related cooperation, DoD will:

(1) Proactively seek opportunities to cooperate with allies and selected international partners in developing space architectures and in designing, acquiring, and operating military space systems. DoD will pursue interoperable systems in which trusted participants share costs, benefits, and risks.

(2) Extend the battlefield advantages that space systems can provide to allies and coalition partners, to the maximum practicable extent.

(3) Work with international partners to protect mutual security interests related to dual-use technologies and services.

g. DoD will encourage commercial space operators to share their spaceflight safety data as well as relevant plans, schedules, and information on operational status. DoD, in coordination with other USG agencies, will establish agreements with other nations and commercial firms to
maintain and improve space object databases and to disseminate orbital information to enhance spaceflight safety.

h. DoD will promote a robust U.S. defense space industrial base, to the extent consistent with defense objectives as well as DoD funding and authorities.

i. DoD will promote robust quality assurance of space systems, consistent with DoD authorities, policies, and objectives.

j. DoD will develop and integrate into an operational space force structure all appropriate space-related defense capabilities required to support national security objectives and policies established by the President and the Secretary of Defense and, as appropriate, support commercial, civil, and allied users in accordance with References (b) and (c) and consistent with DoDD 7045.20 (Reference (e)) as well as treaty obligations and Presidential policies.

(1) Space situational awareness (SSA) capabilities will support safe operations and protection of U.S. interests in space by providing sufficient knowledge of space objects and activities, and by providing ample warning and timely attribution of hostile and natural events. Modernization efforts will address the Secretary of Defense’s SSA responsibilities in accordance with Reference (b) and Directive-Type Memorandum 09-035 (Reference (f)), and will enable integration of data from commercial and foreign sources.

(2) Space support activities will ensure access to, transport through, operations in, and, as appropriate, return from space through reliable, flexible, resilient, operationally responsive, and safe launch and satellite operations services.

(3) Force enhancement activities will focus on improving the integration and availability of space capabilities to increase the effectiveness of military operations in achieving national and homeland security objectives.

(4) Space force application activities will provide the range of options required to support national security objectives and policies established by the President and the Secretary of Defense.

(5) Space control plans and activities will balance protecting and defending U.S. space capabilities, as well as contributing to the defense of allied space systems, with maintaining capabilities to deter and, if necessary, defeat efforts to interfere with or attack U.S. or allied capabilities. Space control plans and capabilities will enable a broad range of response options and provide for the continued sustainable use of space.

k. Space force planning activities will balance the need for mission continuity, sustaining operations in a harsh and contested environment, and mission enhancements.

(1) The reliability, protection, and resilience of required space capabilities, including information systems and networks and other infrastructure required to support sustained operations, will be considered in all architecture planning and evaluation.
(2) Consideration of risks and threats, consequences of loss, and the availability of alternate means for mission accomplishment will be included in all system planning and development activities for defense space capabilities.

   (a) Risks and threats to be considered include expected hazards, evolving threats, and known or expected system vulnerabilities.

   (b) Alternate means of accomplishing the mission may include rapid restoration of space assets as well as leveraging allied, foreign, and commercial space and non-space capabilities.

(3) Consistent with national security requirements, proven commercial systems and technologies will be used to the maximum practical extent, and commercial capabilities will be modified to meet those requirements when doing so is more cost-effective and timely for the USG, in accordance with References (b) and (c). Science and technology efforts, and research and development investments, will focus on leading-edge technologies that address mission-area deficiencies.

1. DoD will serve as the launch agent for both the defense and intelligence space sectors, in accordance with Reference (b).

    m. DoD will recruit and sustain a cadre of highly skilled military and civilian space professionals. A total force approach will be used in structuring space force capabilities and, as appropriate, ensuring interoperability among U.S., allied, and coalition forces.

    n. Space forces, missions, and applications will be incorporated into joint and Service doctrine, professional military education, professional continuing education, and training. Space missions and capabilities, the ability to operate against an adversary enhanced by space capabilities, and the ability to compensate for loss of space capabilities will be integrated into joint and Military Department wargames, simulations, scenario development, experiments, and exercises.

    o. Enhanced cooperation with the intelligence, civil, and commercial space sectors will be pursued to maximize assured access to mission capabilities, infrastructure protection, and interoperability, and to ensure all U.S. space sectors benefit from space technologies, facilities, and support services. Improved coordination and, as appropriate, integration of defense and intelligence space activities, including acquisition and research and development efforts, will be a priority.

    p. Priority will be given to the integrated and synchronized tasking, collection, processing, exploitation, and dissemination of intelligence information to support SSA and space-related policy-making, requirements generation, research, development, testing, evaluation, acquisition, operations, protection, and employment. Requirements for such intelligence support will be identified, prioritized, and submitted through established processes to produce timely, useful
intelligence products, in accordance with DoDD 5240.01 (Reference (g)) and DoDD 5105.21 (Reference (h)).

q. Public outreach and international engagement are essential to achieving DoD’s space policy goals. Public affairs and public diplomacy activities will provide clear and consistent information to the public about space and space-related activities, consistent with the need to protect national security information in accordance with DoDD 5122.05 (Reference (i)).

5. RESPONSIBILITIES. See Enclosure 2.

6. RELEASABILITY. UNLIMITED. This Directive is approved for public release and is available on the Internet from the DoD Issuances Website at http://www.dtic.mil/whs/directives.

7. EFFECTIVE DATE. This Directive:


   b. Must be reissued, cancelled, or certified current within 5 years of its publication in accordance with DoD Instruction 5025.01 (Reference (j)). If not, it will expire effective October 18, 2022 and be removed from the DoD Issuances Website.

   

   Ashton B. Carter
   Deputy Secretary of Defense

Enclosures
  1. References
  2. Responsibilities
Glossary
ENCLOSURE 1

REFERENCES

(a) DoD Directive 3100.10, “Space Policy,” July 9, 1999 (hereby cancelled)
(c) National Security Space Strategy, January 2011
(d) U.S. Government Orbital Debris Mitigation Standard Practices
(g) DoD Directive 5240.01, “DoD Intelligence Activities,” August 27, 2007
(i) DoD Directive 5122.05, “Assistant Secretary of Defense for Public Affairs (ASD(PA)),” September 5, 2008
(j) DoD Instruction 5025.01, “DoD Directives Program,” September 26, 2012
(o) DoD Directive 5143.01, “Under Secretary of Defense for Intelligence (USD(I)),” November 23, 2005
(s) DoD Directive 5144.1, “Assistant Secretary of Defense for Networks and Information Integration/DoD Chief Information Officer (ASD(NII)/DoD CIO),” May 2, 2005
(t) Deputy Secretary of Defense Memorandum, “Disestablishment of the Assistant Secretary of Defense for Networks and Information Integration (ASD(NII)) and Related Matters,” January 11, 2012
(x) Unified Command Plan, September 12, 2011
(y) Joint Strategic Capabilities Plan, June 10, 2011

1 Document is classified with limited distribution. Contact OSD Space Policy for additional information.
2 Document is classified. Contact OSD Space Policy for additional information.
3 Document is “For Official Use Only.” Contact Joint Staff, J-5, for additional information.
(z) Joint Publication 1-02, “Department of Defense Dictionary of Military and Associated Terms,” as amended
ENCLOSURE 2

RESPONSIBILITIES

1. UNDER SECRETARY OF DEFENSE FOR POLICY (USD(P)). The USD(P) shall carry out the space-related duties assigned in DoDD 5111.1 (Reference (k)), including:

   a. Leading DoD efforts to form and coordinate space-related national security and Defense policy as well as to integrate and oversee space-related DoD policy and plans to achieve national security objectives.

   b. Representing DoD, unless otherwise directed, on space matters involving the National Security Council, the Department of State, and other Federal departments, agencies, and interagency groups with responsibility for space-related national security policy.

   c. Developing DoD policy on the conduct of alliances and defense relationships with foreign governments, their military establishments, and international organizations; integrating and overseeing plans and programs undertaken with those alliances or foreign defense establishments.

2. ASSISTANT SECRETARY OF DEFENSE FOR GLOBAL SECURITY AFFAIRS (ASD(GSA)). The ASD(GSA), under the authority, direction, and control of the USD(P), shall carry out the space-related duties and responsibilities assigned in DoDD 5111.18 (Reference (l)), including serving as the DoD lead for developing, coordinating, and monitoring implementation of overarching DoD policy related to space.

3. UNDER SECRETARY OF DEFENSE FOR ACQUISITION, TECHNOLOGY, AND LOGISTICS (USD(AT&L)). The USD(AT&L) shall carry out the space-related duties and responsibilities assigned in DoDD 5134.01 (Reference (m)) and Deputy Secretary of Defense memorandum (Reference (n)), including:

   a. Serving as the OSD focal point for DoD space programs, in coordination with other OSD stakeholders. In that capacity, collaborating with the DoD Executive Agent (DoD EA) for Space in the operation of the Defense Space Council; providing oversight of the Space Virtual Major Force Program and architecture development; advocating DoD Space acquisition programs before Congress; and coordinating with the other OSD Principal Staff Assistants (PSAs) whose duties and responsibilities include space matters, in order to improve the coherence and efficiency of DoD space programs.

   b. Promoting a robust space industrial base, in accordance with References (b) and (c).
4. **UNDER SECRETARY OF DEFENSE FOR INTELLIGENCE (USD(I))**. The USD(I) shall carry out the space-related duties and responsibilities assigned in DoDD 5143.01 (Reference (o)), including:

   a. Serving as the DoD lead for Defense intelligence and intelligence-related space matters.

   b. Formulating and implementing intelligence and intelligence-related space policies and procedures that support national security objectives and policies.

   c. Coordinating intelligence and intelligence-related space matters with appropriate PSAs, capability portfolio managers (CPMs), the Office of the Director of National Intelligence, and others, as needed, to promote the integration of intelligence and intelligence-related space activities across the DoD and the Intelligence Community (IC), as well as to facilitate the integration of DoD and IC space capabilities, as appropriate.

   d. Representing the DoD on intelligence and intelligence-related space matters to the Office of the Director of National Intelligence and other members of the IC.

5. **DIRECTOR OF THE DEFENSE INTELLIGENCE AGENCY**. The Director of the Defense Intelligence Agency, under the authority, direction, and control of the USD(I), shall carry out the space-related duties and responsibilities assigned in Reference (h).

6. **DIRECTOR OF THE NATIONAL GEOSPATIAL-INTELLIGENCE AGENCY**. The Director of the National Geospatial-Intelligence Agency, under the authority, direction, and control of the USD(I), shall carry out the space-related duties and responsibilities assigned in DoDD 5105.60 (Reference (p)).

7. **DIRECTOR OF THE NATIONAL RECONNAISSANCE OFFICE**. The Director of the National Reconnaissance Office, under the authority, direction, and control of the USD(I), shall carry out the duties and responsibilities assigned in DoDD 5105.23 (Reference (q)), including serving as the principal advisor on overhead reconnaissance.

8. **DIRECTOR OF THE NATIONAL SECURITY AGENCY**. The Director of the National Security Agency, under the authority, direction, and control of the USD(I), shall carry out the space-related duties and responsibilities assigned in DoDD 5100.20 (Reference (r)).

9. **DoD CHIEF INFORMATION OFFICER (CIO)**. The DoD CIO shall carry out space-related duties and responsibilities assigned in DoDD 5144.1 (Reference (s)) and Deputy Secretary of Defense memorandums (References (t) and (u)), including leading the development and coordination of DoD strategy and policy related to positioning, navigation, and timing (PNT) as part of the DoD Information Enterprise.
10. **SECRETARIES OF THE MILITARY DEPARTMENTS.** The Secretaries of the Military Departments shall:

   a. Formulate and implement Military Department-level space-related policies and programs that support national security objectives and policies established by the President and the Secretary of Defense and this Directive.

   b. Integrate space capabilities and applications into appropriate facets of their Department’s strategy, doctrine, education, training, exercises, wargames, experiments, and operations.

   c. Organize, train, equip, and provide forces for space operations, including operating in a contested environment, in accordance with DoDD 5100.01 (Reference (v)).

11. **SECRETARY OF THE AIR FORCE.** The Secretary of the Air Force, in addition to the responsibilities in section 10 of this enclosure and in his or her capacity as the DoD EA for Space, shall:

   a. Carry out the duties and responsibilities assigned in DoDD 5101.2 (Reference (w)).

   b. Carry out the duties and responsibilities assigned in Reference (n), including serving as the Chair of the Defense Space Council, which shall serve as the principal advisory forum on all space matters for the DoD EA for Space, DoD Component Heads, and the OSD PSAs to facilitate the fulfillment of their collective space program functions and responsibilities.

12. **CHAIRMAN OF THE JOINT CHIEFS OF STAFF.** The Chairman of the Joint Chiefs of Staff shall, in coordination with the USD(P), collaborate with the Director of Administration and Management to reflect the integration of space-related activities into the responsibilities assigned in Reference (v).

13. **COMBATANT COMMANDERS.** The Combatant Commanders shall:

   a. Plan and implement space-related activities that support national security objectives and policies established by the President, the Secretary of Defense, and this Directive.

   b. Ensure space-related activities are considered and integrated when performing functions assigned in Reference (v) and the Unified Command Plan (Reference (x)).

   c. Provide baseline space capability needs and prioritized Combatant Commander space-based mission needs and effects based on operational/contingency plans in coordination with the Commander, United States Strategic Command (CDRUSSTRATCOM), to ensure effective advocacy.
d. Integrate space capabilities and applications into training, exercises, wargames, experiments, contingency plans, and operations plans and plan for the employment of space capabilities within their areas of responsibility. Develop and exercise operational concepts as well as tactics, techniques, and procedures to continue operations and achieve assigned national security objectives in an environment in which space capabilities have been degraded or denied.

e. Plan for and provide force protection, in coordination with the CDRUSSTRATCOM, for space forces assigned, deployed, and operating in their area of responsibility, in accordance with the Joint Strategic Capabilities Plan (Reference (y)).

14. CDRUSSTRATCOM. The CDRUSSTRATCOM, in addition to the responsibilities in section 13 of this enclosure, shall:

a. Execute space-related responsibilities in accordance with Reference (y).

b. Formulate, implement, and conduct space-related activities that support national security objectives and policies established by the President, the Secretary of Defense, and this Directive.

c. Conduct SSA in support of the USG, U.S. commercial space entities, civil space capabilities and operations, and, as appropriate, other space entities in accordance with References (b), (f), and (y).

d. Conduct space control operations and serve as the focal point for space control requirements of the other Combatant Commanders. Coordinate indications, warning, and response to interference with U.S. space systems or the use of space for non-peaceful purposes.

e. In conjunction with the Chairman of the Joint Chiefs of Staff, coordinate space matters with appropriate PSAs, CPMs, and others, as needed, to promote integration of space activities across DoD and to ensure consistency with DoD and national space policy.
GLOSSARY

PART I. ABBREVIATIONS AND ACRONYMS

CDRUSSTRATCOM Commander, United States Strategic Command
CPMs capability portfolio managers
DoD CIO DoD Chief Information Officer
DoDD DoD Directive
DoD EA DoD Executive Agent
IC Intelligence Community
PSA Principal Staff Assistant
SSA space situational awareness
USD(AT&L) Under Secretary of Defense for Acquisition, Technology, and Logistics
USD(I) Under Secretary of Defense for Intelligence
USD(P) Under Secretary of Defense for Policy
USG U.S. Government

PART II. DEFINITIONS

national security space. The space-related systems, services, capabilities, and associated information networks of the Department of Defense and the national intelligence community, or other space-related systems that the Secretary of Defense may designate as national security space systems in coordination with the system owner, that support U.S. national security and enable defense and intelligence operations during times of peace, crisis, or conflict. This term and its definition are proposed for inclusion in the next edition of Joint Publication 1-02 (Reference (z)).

resilience. The ability of an architecture to support the functions necessary for mission success with higher probability, shorter periods of reduced capability, and across a wider range of scenarios, conditions, and threats, in spite of hostile action or adverse conditions. Resilience may leverage cross-domain or alternative government, commercial, or international capabilities. This term and its definition are proposed for inclusion in the next edition of Reference (z).

space force application. Defined in Reference (z).
Departments of Defense and State

Report to Congress
Section 1248 of the National Defense Authorization Act for Fiscal Year 2010 (Public Law 111 - 84)

RISK ASSESSMENT OF UNITED STATES SPACE EXPORT CONTROL POLICY

Preparation of this report/study cost the Department of Defense a total of approximately $876,000 in Fiscal Years 2010 - 2012.

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Executive Summary

Section 1248 of the National Defense Authorization Act of Fiscal Year 2010 (Public Law 111-84) provides that the Secretaries of Defense and State shall carry out an assessment of the risks associated with removing satellites and related components from the United States Munitions List (USML). The Departments of Defense (DoD) and State (DoS) conducted this review and identified two satellite types, and related items, that are not purely defense-related and thus should not be designated as defense articles on the USML or controlled under the International Traffic In Arms Regulations (ITAR) administered by DoS. These satellites and related items do not contain technologies unique to the United States (U.S.) military industrial base nor are they critical to national security. In particular, the Departments believe the following items are more appropriately designated as dual-use items on the Commerce Control List (CCL) and controlled under the Export Administration Regulations (EAR):

- Communications satellites (COMSATs) that do not contain classified components;
- Remote sensing satellites with performance parameters below certain thresholds; and
- Systems, subsystems, parts and components associated with these satellites and with performance parameters below thresholds specified for items remaining on the USML.

The assessment examined the risks associated with removing from the USML those above-referenced dual-use items. The United States and other space-faring nations have satellites far more capable than those identified above as dual-use; however, those dual-use satellites and related items, including technology, can be used by countries with less experience and expertise in space to generate basic, initial military communications, remote sensing assets, and satellite jamming capabilities. It found that even though these items were available from other non-U.S. sources and not critical to preserving U.S. military edge, they could provide to a nation, with less space expertise than the United States, functionality that could potentially reduce or hinder U.S. military activities, operations, plans, or strategies.

Hence, the Departments agreed as long as the CCL includes adequate protections that the transfer of items from the USML would not contribute to the improvement of foreign military capabilities that could harm regional and international security and stability, and would not be diverted to support such capabilities. The Departments determined that the identified risks can be mitigated by transferring jurisdiction over their export licensing to the CCL. The CCL controls provide appropriate visibility into where and by whom the dual-use space components are being used, thus protecting national security by ensuring that foreign space assets containing U.S. components are not used against the United States.

The Departments used the flexibility of the CCL to design a set of controls that mitigates the risks associated with transfers of satellites and related items to countries that may use these items.
counter to U.S. interests. The agreed-upon set also relaxes controls on our allies and partners while maintaining controls as agreed upon in multilateral trade control arrangements. However, Public Law (P.L.) 105-261, the Strom Thurmond National Defense Authorization Act (NDAA) for Fiscal Year 1999, Section 1513, removed the President’s authority to change the jurisdictional status of satellites and related items. Rather, the law requires that the United States treat space-related items differently than other controlled technologies.

Space-related items, even if they have civilian applications, are the only dual-use items that are required by law to be controlled as defense articles. For all other items that warrant export controls, the President has, consistent with Arms Export Control Act, the authority to determine whether the controls of the ITAR, administered by the State Department, or of the EAR, administered by the Commerce Department, should govern. Moreover, for all items other than satellite-related items, the President has the authority to authorize the easing of controls on items and related technologies that transition to predominately civil uses or that become widely available. Other countries apply strict controls on export of space-related items for military applications and apply fewer controls to items supporting commercial space ventures. Current law forces the U.S. Government to continue to protect commonly available satellites and related items on the USML, thus impeding the U.S. ability to work with partners and putting U.S. manufacturers at a disadvantage, but providing no noticeable benefit to national security.

The Departments’ review also confirmed the continued need for other space-related items to remain on the USML because they and related services contain critical components and technologies – along with the implicit expertise to create and use them – that provide the United States with a military or intelligence advantage in space. These items include:

- Satellites that perform a purely military or intelligence mission;
- Remote sensing satellites with high performance parameters;
- Systems, subsystems, parts and components unique to the above satellite types and not common to dual-use satellites; and
- Services in support of foreign launch operations for USML and CCL designated satellites.

P.L. 105-261, Section 1514, requires that the U.S. Government monitor and review technical exchanges between U.S. and foreign engineers that involve launch of a U.S. satellite by a foreign company. Such U.S. Government monitoring is referred to as "Special Export Controls" (SECs). The U.S. Government must perform, and U.S. industry must fund, SECs for all activities related to the export of a satellite for launch in a foreign country, unless it is a member of the North Atlantic Treaty Organization (NATO) or a major non-NATO ally of the United States.

Some of the launch activities that currently require monitoring present a very low risk to national security, such as transport of a satellite to the foreign launch site, return of test equipment to the United States, and review of technical documents whose content and format are contractually required and previously approved by the U.S. Government, but P.L. 105-261 does not cover higher risk activities, including launch vehicle development conducted in partnership with a foreign company or launch from NATO countries that use Russian launch vehicles and technical personnel. However, ITAR Section 124.15(c) allows the U.S. Government the discretion to
apply SECs to any USML licensed activity "in furtherance of the security and foreign policy of the United States." The two authorities differ regarding whether to implement and who pays for the SECs. P.L. 105-261 requires that the U.S. Government monitor and the U.S. satellite manufacturer provide physical security in Russia for a table specially manufactured to hold the satellite after the satellite has been moved and attached to the launch vehicle, but does not require monitoring of technical discussions or data exchanges between U.S. and Russian launch vehicle engineers on how to modify a Russian engine for use on a new U.S. commercial launch vehicle. To apply SECs to the higher risk activities where not required by law to do so, DoD must invoke its discretionary authority and cannot seek industry reimbursement. The review thus concluded that DoD should be authorized greater flexibility to apply SECs in response to the actual risk, and be provided the authority to seek appropriate reimbursement from industry.

For the sake of national and economic security, the Departments recommend that authority to determine the appropriate export control status of satellites and space-related items be returned to the President. Specifically:

- The President should be authorized to determine the export control jurisdiction status of satellites and related items; and

- The Department of Defense should be authorized to determine the need to apply special export controls to U.S. companies providing technical services in support of foreign satellite or launch vehicle development and associated launch operations, and to be reimbursed as appropriate.

The Departments have provided as appendices to this report the Administration’s current drafts of the regulatory text illustrating how the current controls would change if the President is given authority to change the export control jurisdiction of spacecraft and related items. Appendix 1 provides a draft rewritten USML Category XV for spacecraft and related items that identifies items and services that should continue to be controlled on the USML. The methodology used to create the draft Category XV is the “Bright Line” methodology used to rewrite other USML categories, and the process would be used for future updates to Category XV if the recommended authority was returned to the President. Appendix 2 provides a draft of the associated CCL regulations for items that could be transferred to the CCL. Changes to existing regulations could only be implemented following the enactment of legislation that removes current restrictions on Presidential authority, publication of both draft texts as proposed rules for public notice and comment, and appropriate notifications to Congress.

In summary, the Departments agree that maintaining non-critical satellites and related components on the USML and monitoring low-risk launch activities provide limited national security benefits. Moreover, this practice places the U.S. space industrial base at a distinct competitive disadvantage when bidding against companies from other advanced satellite-exporting countries that have less stringent export control policies and practices. Transferring select items from the USML to the CCL would allow for controls consistent with other technologies and would help enhance the competitiveness of the U.S. space industrial base, while continuing to protect U.S. national security needs. It would also provide the flexibility needed to apply U.S. export control personnel and resources to higher priority issues, increasing protection of those items that do provide the United States with significant military or intelligence advantages.
Findings

1. Compared to the United States, other nations have fewer controls on commercial space and space-related items. Currently, most other space-faring countries control the export of satellites and specific items associated with satellites, including underlying technologies. Each country controls military satellites based on the sensitivity of the technology, capability, and their own unique foreign policy and national security imperatives. But none of the other space-faring countries control all parts, components, accessories, or attachments that were in any way modified for use with a commercial satellite. The United States is the only country that controls reexport of foreign-origin satellites containing U.S.-origin satellite-related items. Some countries allow their items to be incorporated into a third party satellite and then reexported without further restrictions.

The U.S. Government, however, continues to apply strict control, even in instances when the technology is available from non-U.S. suppliers on whom no such restrictions are in place. Commercial communications and imaging satellites and related equipment, for example, are considered dual-use items by Wassenaar Arrangement (WA) Participating States and are exported with fewer restrictions than those imposed by the U.S. Government. The United States is the only space-faring nation that controls all commercial satellites and related items, including technology, as munitions items.

The U.S. Government’s control of commercial satellites and related items as munitions items is not effective in protecting U.S. national security because some dual-use satellites and related technologies equivalent to those originating in the United States are available from non-U.S. providers. Countries can often times obtain similar levels of technology from other countries with export policies that differ from the United States. Allied countries and those that are not of concern to the United States can also obtain items of similar capability from non-U.S. providers – and without the significant degree of collateral, extra-territorial controls that the United States imposes on such items as a result of the current law. Applying more stringent export control policies and practices than are imposed by other advanced satellite-exporting countries places the U.S. satellite industry at a distinct, competitive disadvantage that undermines the U.S. space industrial base to the detriment of U.S. national security, while doing nothing to protect the technological advances that are critical to giving our war fighters the advantages that U.S. technology can afford them.

2. Over the last 15 years, a substantial number of commercial satellite systems, subsystems, components, and related technologies have become less critical to national security. During that time, other countries have become more proficient in space technologies. The interim Section 1248 report of May 2011 provided an initial assessment of these exports. The results and recommendations provided herein expand upon and supersede those of the earlier interim report. The original assessment was a conservative starting point and identified a limited number of items no longer critical to national security. This final report includes a more comprehensive assessment of United States Munitions List (USML) Category XV Spacecraft Systems and Associated Equipment. The methodology used to assess Category XV is the same as that used in the Administration’s Export Control Reform effort to rewrite other USML categories. The same process would be used for future updates if the authority to determine the export control
jurisdictional status of satellites and related items was returned to the President. The methodology results in controls focused on critical technologies and items, the proliferation of which could pose a significant national security threat.

The USML defines the articles and services the President has identified to be specifically designed, adapted, or modified for military use, that have no predominant civil application. The identified items are designated as “defense articles” or “defense services” on the USML, and their export is controlled by the strict rules of the International Traffic in Arms Regulations (ITAR) and administered by the Department of State (DoS). Items that can be used in both military and commercial applications are, by definition, dual-use, and should not be on the USML. Nevertheless, all satellites and related items, including technology, have required since more than a decade ago by Public Law (P.L.) 105-261, the Strom Thurmond National Defense Authorization Act (NDAA) for Fiscal Year 1999, Section 1513, to be placed on the USML. Since that time, many items have moved from military use to predominantly civil uses. Direct broadcast television, satellite communications, and earth mapping are prime examples.

The review determined that the following items do not contain technologies unique to military applications or critical for maintaining a military edge:

- Communications satellites (COMSATS) that do not contain classified components;
- Remote sensing satellites with performance parameters below (worse than) thresholds identified in Appendix 1 paragraphs (a)(7)(i) – (iv); and
- Systems, subsystems, parts and components associated with these satellites and with performance parameters below thresholds specified for items remaining on the USML.

The above items no longer meet the definition of a defense article. However, they can provide important military functionality. Although the United States and other space-faring nations have technologies and satellites far more capable than the items identified above, those dual-use technologies can be used by countries with less experience and expertise in space to generate basic, initial military communications, remote sensing assets, and satellite jamming capabilities.

The controls typically applied to dual-use items on the Commerce Control List (CCL) are sufficient to safeguard and monitor the export of the identified items. The export control provisions of the Export Administration Regulations (EAR) are intended to serve the national security, foreign policy, non-proliferation, and short-supply interests of the United States, and, in some cases, to carry out its international obligations. The EAR contains controls to restrict access to dual-use items by countries or persons that might apply such items to uses inimical to U.S. interests, e.g., controls to stem the proliferation of weapons of mass destruction or to limit the military and anti-terrorism support capability of certain countries. The effectiveness of many of the controls under the EAR is enhanced by their being maintained as part of multilateral control arrangements, such as the Nuclear Suppliers Group, the Australia Group, and the Missile Technology Control Regime. The EAR also includes controls that protect the United States from the adverse impact of the unrestricted export of commodities in short supply.

The items identified for transfer from the USML are dual-use items. They should be designated as such, included in the CCL, and controlled under the EAR. The EAR provides for flexible controls that can be applied or removed as technology becomes readily available on the global
market and transitions away from predominantly military uses to commercial purposes. It also can protect national security interests through licensing policies dedicated to certain countries or regions known to pursue technology for purposes that run contrary to the interests of the United States and its partners.

Appendix 1 provides a draft USML Category XV for spacecraft and related items that identifies items and services that should continue to be controlled on the USML. Appendix 2 provides a draft of the associated CCL regulations for items that could be transferred to the CCL. Appendix 3 provides an abbreviated description of the Administration’s “Bright Line” USML re-write process used to assess satellites and related items for this report. Changes to existing regulations could only be implemented following the enactment of legislation that removes current restrictions on Presidential authority, publication of both draft texts as proposed rules for public notice and comment, and appropriate notifications to Congress.

3. Without appropriate export controls on the CCL, removing space-related items identified in Finding #2 from the USML could significantly improve the military potential of another country. Space assets provide important military and intelligence capabilities ranging from strategic intelligence collection to improved tactical communications. Access to space is expensive, and nations strive to maximize access to space assets while minimizing costs. Thus, nations without established space capabilities seek to improve their indigenous assets by procuring commercial satellite services e.g., communications and imaging, operational satellite systems, or the parts and components needed to produce and launch a satellite. If they can succeed in acquiring the necessary and sufficient technology and expertise, it could translate into a significant enhancement of that nation’s military.

The satellites and related items identified in Finding #2 provide the initial, basic military functionality and can serve as the stepping stones to more advanced military space assets and operations. Therefore, the United States needs to retain control over and insight into the end-user and end-use of U.S. satellites and related items removed from the USML. However, many of the items identified are available from foreign suppliers. Because of the foreign availability, there is no benefit to U.S. national security from controls more stringent than those of the global community. In fact, stringent controls on exports are harmful because they will not stop development of foreign, and possibly adversarial, space assets. In addition, the global market’s reaction to strict export controls is that U.S. parts and components will not be bought, which in turn reduces U.S. insight into what space capabilities a country is pursuing. U.S. national security interests are best served by implementing controls similar to that of other nations with advanced space capabilities, and in the case of satellites and related items identified in Finding #2, “similar” controls are those of the CCL.

4. Export of space-related items to our allies and closest partners presents a low risk to national security and should be subject to fewer restrictions than exports to other countries. Certain North Atlantic Treaty Organization (NATO) allies and other close partners are among the top-tier satellite and space-faring nations. Some western European countries have space-related design, manufacturing, and operational capabilities closest to that of the United States, and it is unlikely that exports of U.S.-origin satellites and related items, including technology, to these countries would result in harm to U.S. national security objectives. Moreover, there is a
likelihood that any improvement in their military capabilities would serve to enhance and strengthen our strategic partnership, and the Departments judge that these potential benefits outweigh the low risks associated with export.

NATO Allies and other partners present an unparalleled opportunity for international cooperation in space. France and Italy recently signed agreements to develop the Athena-Fidus telecommunications satellite systems that will share payloads and provide communications services for the governments of both nations as well as NATO Allies. Recently, Europe’s Arianespace carried the first commercially hosted payload for the U.S. Air Force into geostationary transfer orbit. European nations are in discussions with the U.S. Government on possible cooperation in space exploration and space science.

Direct transfer to our allies and partners of the satellites and related items identified in Finding #2 presents low risk to national security and serves to advance U.S. interests. Continuing to enforce the current regulatory requirements associated with munitions controls on our partners for these satellites and related items places an unneeded administrative burden on transfers that the United States will ultimately approve. To give a sense of scale, considering all types of satellites and their associated parts and components, in 2011, DoD reviewed 1,935 licenses involving USML controlled satellite-related parts and components going to the 36 countries identified as “Strategic Partners” for CCL export control purposes. DoD approved 95.7% of these licenses with no additional provisos or restrictions, another 4% were approved with some additional provisos, and a mere 0.3% were denied or returned without action due to insufficient information. Under the CCL, many of these transfers could occur without obtaining a license at all. Neither U.S. regulators nor the U.S. space industrial base should expend personnel, time, or funding when there is no benefit gained or harm avoided. The more flexible controls of the CCL would promote this important cooperation while maintaining sensible controls given the level of foreign availability, trust we place in our partners, and the assessed impact of unauthorized transfer.

5. The United States should maintain strict controls on transfers of non-critical space-related items to end-users and for end-uses that are likely to be used against the U.S. national interests. The Departments are aware that some countries are pursuing advanced missile and space-related technologies for use against U.S. national interests. These countries aggressively seek and exploit technology from the United States and other technologically advanced nations. Uncontrolled technology transfer has the potential to benefit their military modernization, research and development (R&D), and industrial capability beyond what they could achieve if these items were controlled on the CCL and at a commensurate level for foreign suppliers. The potentially harmful outcomes of transferring the identified satellites and related items include reverse engineering and gaining knowledge that enhances the military industrial base or improves the performance of a country’s entire space system. For example, China implements active and effective technology acquisition techniques that target U.S. space-related technologies and, therefore, warrants special scrutiny. A detailed discussion of the People’s Republic of China’s (PRC) space-related strategic goals, capabilities, and methods for acquiring technology is provided in Appendix 4.

Countries do not need a direct transfer of a satellite or related item to derive benefit for their military capabilities. Valuable expertise is gained through interactions with technical personnel
supporting launch preparation, operations, or failure analyses of a U.S.-manufactured satellite or a foreign satellite containing U.S. origin items. Information on the design, manufacture, and performance of U.S. technology may be transferred during discussions or data exchanges on spacecraft-to-launch vehicle interfaces, characteristics of the spacecraft once attached to the launch vehicle and in-flight, launch failure analyses, or satellite anomaly analyses. This type of expert information or “know how” directly from U.S. or partner countries’ engineers on technologies or items for which the receiving countries have not developed an indigenous capability will assist them more than reverse engineering an item that they physically control.

The Departments agree that where there is a high likelihood of diversion to military purposes, proliferation of missile technology, or a reduction in the effectiveness of U.S. foreign policies, transfers of dual-use satellites and related items, including technology and “know how,” should be strictly controlled.

Transferring satellites and related items to the CCL could make these items eligible for export or re-export to embargoed countries. Section 902 of the Foreign Relations Authorization Act, Fiscal Years 1990 and 1991 (P.L.101-246; 22 U.S.C. 2151 note), commonly known as the Tiananmen Square Sanctions, currently prohibit the launch of any U.S. manufactured satellite by a launch vehicle owned by the PRC without a Presidential waiver, and prohibit transfer of any munitions item. Tiananmen Square Sanctions will prohibit CCL satellites from being launched in China. However, the sanctions do not prohibit dual-use items from being incorporated into a foreign-built satellite that is launched in the PRC or transferred directly to the PRC. For example, Tiananmen Square Sanctions would not prohibit transfer to China of a dual-use satellite already on orbit, nor could they be used to stop a transfer of a U.S. satellite to China for environmental testing so long as the launch is from some country other than China. Also, the satellite-related parts and components transferred to the CCL would no longer be considered munitions items, so they could be eligible for export to China. The same applies for any embargo that restricts the transfer of items based on their designation as munitions.

The Departments therefore recommend that the CCL adhere to broader U.S. nonproliferation policies and prohibit approval of licenses for the transfer of dual-use satellites and related items, including technology, for incorporation into satellites destined for Chinese launches until China brings its missile proliferation activities under control as it previously committed to do. It follows that for the same reasons of broader U.S. foreign policy, we recommend CCL licensing policies prohibit transfers to any embargoed country.

Some may argue that countries without embargoes or sanctions can present the same risks of diversion to military use or proliferation of missile technology and should be subject to similar prohibitions on transfers. For example, Russian commercial and military space industries are closely aligned, and likelihood of diversion from commercial to military purpose is a concern. Russia pursues space “defense” as a strategic priority. Therefore, the United States carefully reviews any export request for satellites and related items to Russia to ensure there is no harm to national security and believes it is important to continue to apply special export controls (see Finding #7) on launches of U.S. satellites by Russian launch platforms.
Such scrutiny to be able to address national security, regional security, and missile technology proliferation issues can and should continue under the CCL. However, Russia has an established history of manned space flight, space lift operations, and intercontinental ballistic missile capabilities. The United States relies on Russian launch vehicles to provide transportation to the International Space Station. Russia operates a large network of space surveillance sensors, second only in size to the U.S. space surveillance network. For commercial launch, Russia’s facilities and services are established, insurable, and on par with western commercial launch providers. A blanket prohibition on dual-use transfers to Russia would not serve U.S. national security interests better than the recommended CCL security reviews to address national security, regional security, and missile proliferation issues, but would deny potential international cooperation efforts relating to space.

Since the United States is not the sole provider of space technologies, the U.S. Government cannot successfully prevent access to space-related technologies by countries of concern. There is an increasing number of nations that produce the equivalent or near-equivalent of U.S. space technologies. Wherever possible, the United States works with multilateral regimes and partner countries to ensure adequate controls over transfers of sensitive space and missile-related technologies. The Departments support continuing stringent controls on countries with which the United States maintains an arms embargo or otherwise prohibits exports or sales under ITAR Section 126.1. We believe that the proposed revisions to the control texts in Appendices 1 and 2, and the changes in control policy that would come with their publication as final rules, accomplish both objectives.

6. If authorized by the Congress, the risks due to removing space-related dual-use items from the USML could be acceptably managed through controls and licensing policies under the CCL. The CCL and its associated regulations, the EAR, provide the controls needed for dual-use and other technologies. CCL controls offer the flexibility to restrict transfer for a number of reasons, such as national security or anti-terrorism, and at the same time, provide U.S. industry consistent, transparent processes and policies so it can more effectively compete in a global environment. Foreign manufacturers have been hesitant to use U.S. suppliers when the U.S. supplier cannot guarantee re-export of its item will be allowed by the U.S. Government. In fact, the uncertainty of obtaining a USML license has encouraged other countries to pursue development of “ITAR-free” satellites that remove U.S. suppliers altogether. If the dual-use satellites and related items identified above are transferred to the CCL, U.S. suppliers would be able to take advantage of CCL provisions that allow for, in certain circumstances, re-export without obtaining an additional license from the U.S. Government.

The Departments of State, Defense, and Commerce have agreed on a specific set of controls that would be used for satellite and related items transferred to the CCL. The Departments have agreed that space-related items moved from the USML would require a license for all countries, with certain exceptions. First, exports to Canada would not need a license, because it is exempt, by law, from the EAR licensing requirement for dual-use items. For our NATO Allies and multi-regime partners, the new EAR license exception, Strategic Trade Authorization (STA), eliminates the license requirement for transfers to or among the 36 countries specifically

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1 Argentina, Australia, Austria, Belgium, Bulgaria, Canada, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Latvia, Lithuania, Luxembourg, Netherlands,
designated for the exception. However, a license would be required from the U.S. Government if the item is to be retransferred outside the 36 countries. The CCL starts with a presumption of approval for transfers to all countries. However, in order to address the risks identified in Finding #5 that are associated with embargoed countries, the Departments agreed that there would be a policy of presumptive denial for export or re-export of space-related items to any county prohibited to receive munitions exports under the ITAR, Section 126.1, including countries such as China, Iran, North Korea, and others.

A major difference between the controls placed on USML and CCL items is that a USML item requires an additional license for re-export, even when incorporated into a foreign, dual-use, or commercial item. Under the CCL, U.S. dual-use satellite components incorporated into a foreign satellite can be re-exported without first obtaining an additional license from the U.S. Government. The CCL's “de minimis” rule normally allows re-export without a U.S. license if the foreign satellite contains less than 25% by value of controlled U.S.-origin content. The “de minimis” rule provides a substantial benefit to the U.S. space industrial base, especially second and third tier suppliers. It means that foreign companies selling foreign-origin items from outside the United States do not need to come back to the U.S. Government for a specific authorization to transfer their foreign-origin item containing a de minimis amount of U.S.-origin content. The USML retransfer obligations, even for a de minimis amount of insignificant U.S.-origin content, motivate foreign companies to avoid U.S.-origin sellers or to develop production capability outside the United States that otherwise would exist in the United States.

However, the CCL "de minimis" rule, by itself, would not prevent a foreign satellite with U.S.-manufactured parts from being transferred for launch or use by an end-user with interests contrary to those of the United States or its partners. In order for the United States to appropriately mitigate the risks associated with transfers to countries of concern and to retain insight into what embargoed countries are using U.S. satellite-related technology, the "de minimis" rule would not be applicable for transfers to countries with which the United States maintains an arms embargo or otherwise prohibits exports or sales under ITAR Section 126.1. Thus, for example, the export to China from Europe of a European-made satellite containing even one U.S.-origin connector that was specially designed for a satellite would require a license from the U.S. Government, which would be presumptively denied. The transfer of the European satellite with that de minimis amount of U.S.-origin content to any other country in the world not subject to an arms embargo would, however, not require an authorization from the U.S. Government, so long as the item is not ultimately destined for China or any other country subject to an arms embargo.

In summary, the Departments used the flexibility of the CCL to design a set of controls that: mitigates the risks tied to transfers of satellites and related items to countries of concern, with a presumption of denial and no application of "de minimis"; relaxes controls on our Allies and partners, using the STA exception and availability of de minimis; and maintains the controls for transfer to all other nations as agreed upon in multilateral trade control arrangements, such as the WA.

New Zealand, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, South Korea, Spain, Sweden, Switzerland, Turkey, and the United Kingdom.
7. **USML Special Export Controls (SECs)** remain necessary to mitigate against the substantial risks associated with the following services that remain on the USML: satellite failures and anomaly resolution, launch know-how, launch services, and launch failure analysis. Space export control processes would also be improved if legislation allowed for flexible application of SECs and required industry to reimburse the DoD for all SECs. Inadvertent or deliberate transfer of space-related expertise poses the most significant potential harm to U.S. national interests. SECs require U.S. Government monitoring of technical discussions, review of technical data, and approval of Technology Transfer Control Plans and Launch Campaign Security Plans, and are an effective tool available through the USML to mitigate the risk of unauthorized technology transfers of space-related expertise associated with the aforementioned defense services provided by a U.S. manufacturer to a foreign launch provider. See Appendix 5 for information on legislation, funding, and the effectiveness of SECs.

Current law, P.L. 105-261, Section 1514, and regulations, ITAR Section 124.15(c), dictate the provision of mandatory and discretionary SECs. Legislation requires SECs for all activities related to export of a satellite or related items for launch in a foreign country, unless it is a member of NATO or a major non-NATO ally of the United States. SECs must be applied, regardless of the actual risk of unauthorized disclosure. The ITAR permits discretionary SECs to be applied to other activities licensed under the USML for reasons of national security. For example, discretionary SECs have been used successfully by the U.S. Government on U.S. launch vehicle development programs between a U.S. company and a foreign entity, such as Orbital Sciences Corporation’s Taurus II launch vehicle that subcontracted engine procurement to Aerojet and its Russian partner, United Engine Corporation/SNTK. The discretionary SECs provided the risk mitigations needed to protect U.S. national security interests.

Mandatory monitoring and oversight are paid for by industry, whereas the cost of discretionary monitoring is covered by DoD appropriated funds. DoD does not have the authority to waive or exempt a given license activity from mandatory monitoring based on the actual risk of an unauthorized transfer of expertise. In addition, current law focuses on the location of launch and does not account for recent experiences in which third country launch providers may be using launch facilities in a NATO country.

DoD’s inability to waive or exempt an activity from monitoring results in the unnecessary expenditure of resources by industry and the U.S. Government. Conversely, the limitations on what can be reimbursed may restrict DoD’s ability to monitor a higher risk activity. SECs should be flexible and allow for application of some or all SECs to any end-user, regardless of location, depending upon the risk associated with the end-users, end-use, and technologies involved. The U.S. Government should be authorized to require the applicant to reimburse the DoD for any SECs applied in its license.

**Recommendations**

(1) Congress should:

   (a) **Return to the President authority to determine the export control jurisdictional status of satellites and related items; and**
(b) Authorize DoD to determine the need for industry reimbursement for special export controls, e.g., monitoring and oversight, on satellite failures and anomaly resolutions, launch operations, launch failure analysis, and launch vehicle development programs regardless of location or parties in order to mitigate national security risks, and to require such reimbursements.

(2) The Administration then would:

(a) Begin implementation of a revised USML Category XV and a new CCL entry for satellites and related items as described in Appendices 1 and 2; which would:

(i) Move the following items from the USML to the CCL:

- Communications satellites (COMSATS) that do not contain classified components;
- Remote sensing satellites with performance parameters below (worse than) thresholds identified in Appendix 1 section (a)(7); and
- Systems, subsystems, parts and components associated with these satellites and with performance parameters below thresholds specified for items remaining on the USML.

(ii) Retain the following on the USML:

- Satellites that perform a purely military or intelligence mission as defined in Appendix 1 paragraph (a);
- Remote sensing satellites with performance parameters equal to or above (better than) thresholds identified in Appendix 1 section (a)(7);
- Systems, subsystems, parts and components unique to these satellite types and not common to dual-use satellites; and
- Services in support of foreign launch operations for USML and CCL designated satellites.

(b) Create new rules for satellites and related items in both USML and CCL and assign, as described in the proposed rules, appropriate controls and licensing policies as agreed upon by the Departments of State, Defense, and Commerce, including a license exception for Allies and partners, and a policy of denial for exports and re-exports to countries of concern; and

(c) Establish processes for:

(i) Moving items to a lower level of control on the CCL only upon consensus of the Departments of State, Defense, and Commerce; and

(ii) Conducting periodic reviews by the relevant departments and agencies and using ECR’s “Bright Line” USML review process to determine whether additional space items and related technologies on the USML should, for the sake of national and economic security, be transferred to the CCL, and vice-versa.
Appendix 1

Draft Proposed USML Category XV Satellite and Related Items

The draft Category XV presented herein reflects the Department’s review of satellites and related items. Global Positioning System (GPS) receiving equipment, currently in XV(c), and radiation-hardened microelectronic circuits, currently in XV(d), are not exclusively satellite technologies, and their final disposition is dependent upon on-going reviews of other USML categories and interagency discussions. They will be included when Category XV is published in the Federal Register for public review and comment.

CATEGORY XV – SPACECRAFT SYSTEMS AND RELATED ARTICLES

(a) Spacecraft, including satellites, manned or unmanned space vehicles, whether designated developmental, experimental, research or scientific, or having a commercial, civil, or military end-use, that:

*(1) Are “specially designed” to mitigate effects (e.g., scintillation) of or detect a nuclear detonation;

*(2) Track ground, airborne, missile or space objects using imaging, infrared, radar, or laser systems;

*(3) Conduct signals or measurement and signatures intelligence;

(4) Provide space-based logistics, assembly or servicing of any spacecraft (e.g., refueling);

*(5) Are anti-satellite or anti-spacecraft (e.g., kinetic, RF, laser, charged particle);

*(6) Have space-to-ground weapons systems (e.g., kinetic or directed energy);

*(7) Have any of the following electro-optical remote sensing capabilities or characteristics:

(i) Electro-optical visible and near infrared (VNIR) (i.e., 400nm to 1,000nm) or Infrared (i.e., greater than 1,000nm to 30,000nm) with less than 40 spectral bands having an aperture greater than 0.35 meters;

(ii) Electro-optical Hyperspectral with 40 spectral bands or more in the VNIR, short-wavelength infrared (SWIR) (i.e., greater than 1,000nm to 2,500nm) or any combination of the aforementioned AND having a Ground Sample Distance (GSD) less than 30 meters;

(iii) Electro-optical Hyperspectral with 40 spectral bands or more in the mid-wavelength infrared (MWIR) (i.e., greater than 2,500nm to 5,500nm) having a narrow spectral bandwidth of Δλ less than or equal to 20nm full width at half
maximum (FWHM or having a wide spectral bandwidth with $\Delta \lambda$ greater than 20nm FWHM AND a GSD less than 200 meters; or

(iv). Electro-optical Hyperspectral with 40 spectral bands or more in the long-wavelength infrared (LWIR) (i.e., greater than 5,500nm to 30,000nm) having a narrow spectral bandwidth of $\Delta \lambda$ less than or equal to 50nm FWHM or having a wide spectral bandwidth with $\Delta \lambda$ greater than 50nm FWHM AND a GSD less than 500 meters.

Note 1: Ground Sample Distance (GSD) is measured from a spacecraft’s nadir (i.e., local vertical) position.

Note 2: Optical remote sensing spacecraft or satellite spectral bandwidth is the smallest difference in wavelength, (i.e., $\Delta \lambda$) that can be distinguished at full width at half maximum (FWHM) of wavelength $\lambda$.

Note 3: An optical satellite or spacecraft identified in (a)(7) is not SME if non-earth pointing.

*(8) Have radar remote sensing capabilities or characteristics (e.g., active electronically scanned array (AESA), synthetic aperture radar (SAR), inverse synthetic aperture radar (ISAR), ultra-wideband SAR) except those having a center frequency equal to or greater than 1 GHz but less than or equal to 10 GHz AND having a bandwidth less than 300 MHz.


Note: This paragraph does not control a satellite or spacecraft that provides only a differential correction broadcast for the purposes of positioning, navigation, or timing.

*(10) Are “specially designed” to be used in a constellation or formation that when operated together, in essence or effect, form a virtual satellite (e.g., functioning as if one satellite) with the characteristics of other items in paragraph (a);

(11) Are man-rated sub-orbital, orbital, lunar, interplanetary or habitat; or

*(12) Are classified, contain classified software or hardware, are manufactured using classified production data, or are being developed using classified information (e.g., having classified requirements, specifications, functions, or operational characteristics or include classified cryptographic items controlled under Category XIII of this subchapter). “Classified” means classified pursuant to Executive Order 13526, or predecessor order, and a security classification guide developed pursuant thereto or equivalent, or to the corresponding classification rules of another government.

Note: Spacecraft that are not identified in paragraph (a) are subject to the EAR.
(b) Ground control systems and training simulators “specially designed” for telemetry, tracking, and control of spacecraft in paragraph (a) above;

Note: Individual items, equipment, components, or parts that are common to satellite ground systems or simulators used to control non-USML satellites are subject to the EAR.

(c) [Reserved – Disposition of articles controlled under this paragraph, is to be determined.]

(d) [Reserved – Disposition of articles controlled under this paragraph, is to be determined.]

(e) Spacecraft systems, subsystems, components, parts, accessories, attachments, or associated equipment as follows:
   (1) Antennas having a diameter greater than 25 meters or are actively scanned, adaptive beam forming, or interferometric radar antennas;
   
   (2) Space-qualified optics (i.e., lens or mirror), including optical coating, having active properties (e.g., adaptive or deformable) or having a largest lateral dimension greater than 0.35 meters;
   
   (3) “Space-qualified” focal plane arrays (FPA) having a peak response in the wavelength range exceeding 900nm and readout integrated circuit (ROIC) “specially designed” therefor;
   
   (4) “Space-qualified” mechanical cryocooler, active cold finger, and associated control electronics “specially designed” therefor;
   
   (5) “Space-qualified” active vibration suppression, including isolation and dampening, and associated control electronics therefor;
   
   (6) Optical bench assemblies for items in (a) and the multi-aperture assemblies; fast steering mirrors (i.e., greater than 300 rad/sec^2 acceleration), pushbroom assemblies, flexure mounts, beam splitters, mirror folds, focus or channeling mechanisms, alignment mechanisms, inertial reference unit (IRU), black body cavities, baffles and covers, and control electronics “specially designed” therefor;
   
   (7) Non-communications space-qualified directed energy (e.g., lasers or RF) systems and “specially designed” for a spacecraft in paragraph (a);
   
   (8) Space-based kinetic systems or charged particle energy systems, including power conditioning and beam-handling/switching, propagation, tracking or pointing equipment, and “specially designed” parts and components therefor;
   
   (9) “Space-qualified” Cesium, Rubidium, Hydrogen Maser, or Quantum (e.g., based upon Al, Hg, Yb, Sr, Be Ions) atomic clocks, and “specially designed” parts and components therefor;
(10) Attitude Determination and Control Systems, and “specially designed” parts and components therefor that provide earth location accuracy without using Ground Location Points better than or equal to:
   (i) 5 meters from low earth orbit (LEO);
   (ii) 30 meters from medium earth orbit (MEO);
   (iii) 150 meters from geosynchronous orbit (GEO); or
   (iv) 225 meters from high earth orbit (HEO).

(11) Space-based nuclear thermionic or non-nuclear thermionic converters or generators; and “specially designed” parts and components therefor;

(12) Thrusters (e.g., rocket engines) that provide for orbit adjustment greater than 150 lbf (i.e., 667.23 N) vacuum thrust;

(13) Control Moment Gyroscope.

(14) “Space qualified” monolithic microwave integrated circuits (MMIC) that combine transmit and receive (T/R) functions on a single die as follows:
   (i) Having a power amplifier with maximum saturated peak output power (in watts), $P_{\text{sat}}$, greater than 200 divided by the maximum operating frequency (in GHz) squared [$P_{\text{sat}} > 200 \frac{\text{W}}{\text{GHz}^2}$];
   (ii) Having a common path (e.g., phase shifter-digital attenuator) circuit with greater than 3 bits phase shifting at operating frequencies 10 GHz or below, or greater than 4 bits phase shifting at operating frequencies above 10 GHz.

(15) “Space-qualified” oscillator for radar in (a) with phase noise less than $-120 \text{ dBc/Hz} + (20 \log_{10}(\text{RF}) \text{ (in GHz)})$ measured at 2 KHz*RF (in GHz) from carrier.

(16) “Space-qualified” star tracker or star sensor with angular accuracy less than or equal to 1 arcsec in all three axes AND a tracking rate equal to or greater than 3.0 deg/sec.

*(17) Secondary or hosted payload, and “specially designed” parts and components therefor, that perform any of the functions described in paragraph (a).

*(18) Department of Defense-funded secondary or hosted payload, and “specially designed” parts and components therefor.

*(19) Any component, part, accessory, attachment, equipment, or system that (i) is classified, or (ii) contains classified software, or (iii) is manufactured using classified production data, or (iv) is being developed using classified information. “ Classified” means classified pursuant to Executive Order 13526, or predecessor order, and a security classification guide developed pursuant thereto or equivalent, or to the corresponding classification rules of another government.

Note 1: Parts, components, accessories, and attachments “specially designed” for spacecraft enumerated in this category but not listed in paragraph (e) are subject to the EAR.
Note 2: For the purposes of this paragraph, “space-qualified” means a product is “space-qualified” if it (a) is being or was designed and manufactured to meet the special electrical, mechanical, or environmental requirements required for use in the deployment of satellites or other spacecraft (i.e., systems, including equipment, capable of operating at altitudes greater than 100 km) or (b) was tested to, and met, such requirements.

Note 1: “Product” is synonymous with “commodity,” as defined in EAR § 772.1.

Note 2: A determination that a specific product (or commodity) (e.g., by product serial number) is “space qualified” by virtue of “(b)” does not mean that other such products in the same production run or model series are “space qualified” if not individually tested or intended to be used in satellites or spacecraft.

Note 3: An item designed and manufactured to meet the standards in (a) is “space-qualified” even if it is not tested to meet such requirements.

Note 4: An item designed and manufacture to meet the standards in “(a)” is, however, not “space-qualified” if it is tested and fails to meet the requirements of such standards.

Note 5: Technology and technical data “required” and directly related to design and manufacture an item to meet the standards in “(a)” remain controlled in the applicable USML category or ECCN regardless of whether the items produced there from passes a test described in “(b).”

(f) Technical data (as defined in §120.10) and defense services (as defined in §120.9) directly related to the defense articles enumerated in paragraphs (a) through (e) of this category. (See §125.4 for exemptions.)
§120.9 Defense service
(a) A defense service means:

(1) The furnishing of assistance (including training) using other than public domain data to foreign persons (see §120.16 of this subchapter), whether in the United States or abroad, in the design, development, engineering, manufacture, production, assembly, testing, intermediate or depot level repair or maintenance (see §120.38 of this subchapter), modification, demilitarization, destruction, or processing of defense articles (see §120.6 of this subchapter);

(2) The furnishing of assistance to foreign persons, whether in the United States or abroad, for the integration of any item controlled on the U.S. Munitions List (USML) (see §121.1 of this subchapter) or the Commerce Control List (see 15 CFR part 774) into an end item (see §121.8(a) of this subchapter) or component (see §121.8(b) of this subchapter) that is controlled as a defense article on the USML, regardless of the origin;

(3) Training or providing advice to foreign units and forces, regular and irregular, regardless of whether technical data is transferred to a foreign person, including formal or informal instruction of foreign persons in the United States or abroad by any means including classroom or correspondence instruction, conduct or evaluation of training and training exercises, in the employment of defense articles;

(4) Conducting direct combat operations for or providing intelligence services to a foreign person directly related to a defense article;

(5) The furnishing of assistance (including training) in the integration of a satellite or spacecraft to a launch vehicle, including both planning and onsite support, regardless of the jurisdiction of, the ownership of, or the origin of the satellite or spacecraft, or whether technical data is used; or

(6) The furnishing of assistance (including training) in the launch failure analysis of a satellite, spacecraft, or launch vehicle, regardless of the jurisdiction of, the ownership of, or the origin of the satellite, spacecraft, or launch vehicle, or whether technical data is used.

(b) The following is not a defense service:

(1) Training in the basic operation (functional level) or basic maintenance (see §120.38 of this subchapter) of a defense article;

(2) Mere employment of a U.S. citizen by a foreign person;

(3) Testing, repair, or maintenance of an item “subject to the Export Administration Regulations” (see 15 CFR §734.2) administered by the Department of Commerce, Bureau of Industry and Security, that has been incorporated or installed into a defense article;
(4) Providing law enforcement, physical security or personal protective training, advice, or services to or for a foreign person (see §120.16 of this subchapter), using only public domain data; or

(5) Providing assistance (including training) in medical, logistical (other than maintenance), or other administrative support services to or for a foreign person.
Appendix 2

Draft Proposed CCL ECCN 9X515 Spacecraft and Related Commodities

9A515 “Spacecraft” and related commodities.

Reason for Control: NS, RS, AT

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<th>Control(s)</th>
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<td>NS applies to entire entry except 9A515.y</td>
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<tr>
<td>AT applies to entire entry</td>
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License Exceptions

LVS: $1500
GBS: N/A
CIV: N/A
APR: N/A

STA: Paragraph (c)(2) of License Exception STA ($ 740.20(c)(2)) of the EAR may not be used for any item in 9A515.

List of Items Controlled

Unit: End items in number; parts, component, accessories and attachments in $ value.

Related Controls: Spacecraft, launch vehicles and related articles that are enumerated in the USML, and technical data (including software) directly related thereto, launch services, and launch failure analysis for items in 9A515.a, are subject to the ITAR. A license is required under the ITAR for a U.S. person to provide any assistance to a foreign person for a spacecraft to be launched from outside the United States, even if that spacecraft may be exported under License Exception STA. See 22 CFR 120.9. All other “spacecraft,” as enumerated below and defined in section 772.1, are subject to the controls of this ECCN. See also ECCNs 3A001, 3A002, 3A991, 3A992, 6A002, 6A004, and 6A008 for specific “space-qualified” items and 9A004 for the International Space Station.

Items:

a. Spacecraft, including satellites, manned or unmanned space vehicles, whether designated developmental, experimental, research or scientific, not enumerated in USML Category XV.

   Note: ECCN 9A515.a includes commercial communications satellites, certain remote sensing satellites, planetary rovers, and planetary and interplanetary probes.

b. Ground control systems and training simulators “specially designed” for telemetry, tracking, and control of the spacecraft in paragraph 9A515.a.
c. through w. [Reserved]

x. “Parts,” and “components,” “accessories and attachments” that are “space qualified” and not elsewhere specified on the CCL or USML.

Note 1: ECCN 9A515.x does not include “space-qualified” items enumerated in and controlled by other ECCNs, such as 3A001.b.1, 3A001.e.4, 3A002.a.3, 3A002.g.1 and .g.3, 3A991.k, 3A992.b.3, 6A002.a.1 and .a.3, 6A002.b.2, 6A002.d.1 and .d.2, 6A002.e, 6A004.c and .d, 6A008.j.1, or 6A998.b.

Note 2: “Parts,” “components,” and “accessories and attachments” specified in USML subcategory XV(e) or enumerated in other USML categories are subject to the controls of that paragraph or category.

y. Specific “parts,” “components,” and “accessories and attachments” that are “space qualified” and not elsewhere specified in the USML or the CCL as follows:

y.1. [Reserved]

y.26. to y.98. [RESERVED]

y.99. Commodities that would otherwise be controlled elsewhere in this entry but that (i) have been determined to be subject to the EAR in a commodity jurisdiction determination issued by the U.S. Department of State and (ii) are not otherwise identified elsewhere on the CCL.

9B515 Test, inspection, and production “equipment” “specially designed” for the “development” or “production” of commodities enumerated in ECCN 9A515 or USML Category XV.

License Requirements

Reason for Control: NS, RS, AT

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License Exceptions

LVS: $1500; $5000 for 9B515.c
GBS: N/A
CIV: N/A
[APR: N/A]

STA: Paragraph (c)(2) of License Exception STA ($ 740.20(c)(2)) of the EAR may not be used for any item in 9B515.
List of Items Controlled

Unit: N/A
Related Controls: N/A
Related Definitions: N/A

Items:

a. Test, inspection, and production “equipment” “specially designed” for the “production” or “development” of commodities enumerated in ECCN 9A515 or USML Category XV.

b. “Equipment,” cells, and stands “specially designed” for testing, analysis and fault isolation of commodities enumerated in ECCN 9A515, 9A004 or USML Category XV.

c. Environmental chambers capable of pressures below \((10^{-4})\) Torr, and “specially designed” components therefor.

d. through x. [RESERVED]

9C515 [Reserved]

9D515 Software “specially designed” for the “development,” “production,” operation, or maintenance of commodities controlled by 9A515 or “equipment” controlled by 9B515.

License Requirements

Reason for Control: NS, RS, AT

<table>
<thead>
<tr>
<th>Control(s)</th>
<th>Country chart</th>
</tr>
</thead>
<tbody>
<tr>
<td>NS applies to entire entry except for “software” “specially designed” for “development” or “production” operation, or maintenance of commodities controlled by 9A515.y, 9B515.c. or .y, or 9C515.y.</td>
<td>NS Column 1.</td>
</tr>
<tr>
<td>RS applies to entire entry except for “software” “specially designed” for “development” or “production” operation or maintenance of commodities controlled by 9A515.y.</td>
<td>RS Column 1.</td>
</tr>
<tr>
<td>AT applies to entire entry</td>
<td>AT Column 1</td>
</tr>
</tbody>
</table>
License Exceptions

CIV: N/A
TSR: N/A
APR: N/A

STA: Paragraph (c)(2) of License Exception STA (§ 740.20(c)(2)) of the EAR may not be used for any software in 9D515.

Note to License Exceptions Section: Supplement No. 4 to part 740 precludes use of License Exceptions GOV (other than those provisions authorizing exports and reexports to personnel and agencies for the U.S. government) and STA with respect to “source code” for specific types of items controlled by ECCN 9A515 and identified in the supplement.

List of Items Controlled
Unit: $ value
Related Controls: Software directly related to articles enumerated in USML Category XV is subject to the control of USML paragraph XV(f). See also ECCNs 3D001, 6D001, and 6D002 for controls specific “space-qualified” items.”

Related Definitions: N/A

Items:

a. “Software” “specially designed” for the “development,” “production,” operation, installation, maintenance, repair, overhaul, or refurbishing of commodities controlled by ECCN 9A515.b. to x. [RESERVED]

y. Specific “software” “specially designed” for the “production,” “development,” or operation or maintenance of commodities enumerated in ECCN 9A515, as follows:

   y.1. Specific “software” “specially designed” for the “production,” “development,” operation or maintenance of commodities enumerated in ECCN 9A515.y.

   y.2 through y.98 [RESERVED]

y.99. Software that would otherwise be controlled elsewhere in this entry but that (i) has been determined to be subject to the EAR in a commodity jurisdiction determination issued by the U.S. Department of State and (ii) is not otherwise identified elsewhere on the CCL.

9E515 Technology “required” for the “development,” “production,” operation, installation, maintenance, repair, refurbishment, or overhaul of commodities controlled by 9A515, equipment controlled by 9B515, or software controlled by 9D515.

License Requirements
Reason for Control: NS, RS, AT
<table>
<thead>
<tr>
<th>Control(s)</th>
<th>Country chart</th>
</tr>
</thead>
<tbody>
<tr>
<td>NS applies to entire entry except “technology” “required” for the “development,” “production,” operation, installation, maintenance, repair or overhaul of commodities controlled by ECCN 9A515.y</td>
<td>NS Column 1.</td>
</tr>
<tr>
<td>RS applies to entire entry except “technology” “required” for the “development,” “production,” operation, installation, maintenance, repair, or overhaul of commodities controlled by ECCN 9A515.y</td>
<td>RS Column 1.</td>
</tr>
<tr>
<td>AT applies to entire entry</td>
<td>AT Column 1.</td>
</tr>
</tbody>
</table>

**License Exceptions**

*CIV:* N/A  
*TSR:* N/A  
*GBS:* Eligible for 9E515.b

*STA:* Paragraph (c)(2) of License Exception STA (§ 740.20(c)(2)) of the EAR may not be used for any technology in 9E515.

*Note to License Exceptions Section:* Supplement No. 4 to part 740 limits use of License Exceptions GOV (other than those provisions authorizing exports and reexports to personnel and agencies for the U.S. Government) and STA with respect to “development” and “production” “technology” for specific types of items controlled by ECCN 9A515 and identified in the supplement other than “build-to-print technology.”

**List of Items Controlled**

*Unit:* $ value  
*Related Controls:* Technical data directly related to articles enumerated in USML Category XV are subject to the control of USML paragraph XV(f). See also ECCNs 3E001, 3E003, 6E001, and 6E002 for specific “space-qualified” items.

*Related Definitions:* N/A

*Items:*

a. “Technology” “required” for the “development,” “production,” operation, installation, maintenance, repair, or overhaul of commodities controlled by ECCN 9A515, 9B515, or 9D515.
b. “Technology” “required” for passenger participation in space travel (e.g., sub-orbital, orbital, lunar, interplanetary or habitat) for space tourism, research or scientific endeavors, or transportation from one point to another for commercial purposes.

Note 1: 9E515.b includes technology for activities related to the spaceflight passenger or participant experience such as:

i. spacecraft access, ingress, and egress;

ii. physiological training (e.g., human-rated centrifuge training or parabolic flights, pressure suit training/operation);

iii. medical evaluation or assessment of the spaceflight passenger or participant;

iv. training in and operation by the passenger or participant of health- and safety-related hardware (e.g., environmental control and life support, hygiene facilities, food preparation, fire suppression, communications equipment, safety-related clothing or headgear) or emergency procedures;

v. viewing of the spacecraft (including pre-flight checks, landing, and in-flight status); and

vii. non-flight hardware integration, training, use and operation with the spaceflight vehicle.

Note 2: “Non-flight hardware” is equipment used for purposes other than to fly the spaceflight vehicle. It includes (i) the passenger or participant’s flight or pressure suit and personal equipment; (ii) spacecraft doors that the passenger or participant must learn to enter and exit; (iii) passenger or participant seating and related seatbelts and harnesses; (iv) passenger and participant’s gear for communications, safety, environmental control and comfort, or other similar purposes.

c through x. [RESERVED]

y. Specific “technology” “required” for the “production,” “development,” operation, installation, maintenance, repair, or overhaul of commodities enumerated in ECCN 9A515, or 9D515, as follows:

y.1. Specific “technology” “required” for the “production,” “development,” operation, installation, maintenance, repair, or overhaul of commodities enumerated in ECCN 9A515.y or 9D515.y.

y.2. through y.98. [RESERVED]

y.99. “Technology” that would otherwise be controlled elsewhere in this entry but that (i) has been determined to be subject to the EAR in a commodity jurisdiction determination issued by the U.S. Department of State and (ii) is not otherwise identified elsewhere on the CCL.
Part 740 is amended by adding a Supplement No. 4 to read as follows:

**Supplement No. 4 to Part 740 – 9D515 and 9E515 Items Subject to Limits Regarding License Exceptions GOV and STA**

This portion of the supplement lists certain 9D515 “source code” and 9E515 “technology” and imposes limitations on the use of License Exceptions GOV (§ 740.11 of the EAR) and STA (§ 740.20 of the EAR) with respect to exports, reexports, and transfers (in-country) of such “source code” and “technology.”

(a) *Restrictions applicable to Category 9.* License Exception STA may not be used to export, reexport, or transfer (in-country) ECCN 9D515 “source code” or ECCN 9E515 “technology” (other than “build-to-print technology”) listed below. In addition, License Exception GOV may not be used to export or reexport ECCN 9D515 “source code” or ECCN 9E515 “technology” (other than “build-to-print technology”) listed below, except with respect to exports, reexports, and transfers (in-country) to U.S. Government agencies and personnel identified in § 740.11(b)(2)(i) and (ii).

(1) 9D515

a. “Source code” that contains the algorithms or control principles (e.g., clock management, precise orbit determination (e.g., ephemeris, pseudo range), signal construct (e.g., pseudo-random noise (PRN) anti-spoofing) “specially designed” for items controlled by ECCN 9A515.

b. “Source code” “specially designed” for the integration, operation, or control (i.e., use) items controlled by ECCN 9A515.

c. “Source code” that contains algorithms or modules “specially designed” for system, subsystem, component, part, or accessory calibration, manipulation, or control of items controlled by ECCN 9A515.

d. “Source code” “specially designed” for data assemblage, extrapolation, or manipulation of items controlled by ECCN 9A515.

e. “Source code” that contains the algorithms or control laws “specially designed” for attitude, position, or flight control of items controlled in ECCN 9A515.

f. “Source code” “specially designed” for built-in test and diagnostics for items controlled by ECCN 9A515.

(2) 9E515

a. ”Technology” “required” for the “development” of items controlled by ECCN 9A515 (other than 9A515.b (e.g., ground control systems and simulators)).

b. “Technology” “required” for the “production” of items controlled by ECCN 9A515 (other than 9A515.b (e.g., ground control systems and simulators)).
c. “Technology” “required” for design verification, manufacturability, or quality control for items in ECCN 9A515 (other than 9A515.b (e.g., ground control systems and simulators)).

d. “Technology” associated with major anomaly or failure investigation or review for items in 9A515.
Appendix 3
Methodology

This appendix describes the background to and the process by which the U.S. Government reviewed and developed the proposed United States Munitions List (USML) Category XV, Spacecraft Systems and Associated Equipment. The review methodology was the same as the USML Rewrite methodology approved by the Deputies Committee on August 16, 2010 and used in the Administration’s on-going Export Control Reform (ECR) effort.

Section 1248 of Public Law 111-84, the National Defense Authorization Act (NDAA) for Fiscal Year 2010, provides that the Secretary of Defense and the Secretary of State shall carry out an assessment of the national security risks of removing satellites and related components from the United States Munitions List (USML). The assessment is to include a review of space and space-related technologies currently on the USML, and the national security risks of removing certain space and space-related technologies from the USML. The report is to provide recommendations for candidates for removal from the USML based on this national security risk assessment; propose safeguards and verification necessary to prevent proliferation and diversion of space and space-related technologies; confirm appropriateness of end-uses and end-users; minimize the risk that such space and space-related technologies could be used in foreign missile, space, or other applications that may pose a threat to the security of the United States; and propose improvements to space export control policy and processes.

The Department of Defense (DoD) and Department of State (DoS) agree that space export control policies and processes would be improved if jurisdiction of space and space-related technologies were normalized, such that the same processes that are currently available to the Administration would apply to space-related items. The Administration is pursuing review and recommendations for other USML categories through its ECR control list review effort. Therefore, the review group used the methodology for the ECR control list review to provide recommendations for the Section 1248 report concerning satellites and related components. Using the ECR USML review process, the Category XV Interagency Technical Working Group created descriptions of the items to remain on the USML and thus any items not specified would transfer to the Commerce Control List (CCL). The descriptions when viewed as a whole create a “bright line” between the two lists, i.e., an item is controlled under the USML if its function or performance parameters match a description in the list and CCL if not. The “bright line” serves to clarify jurisdictional determinations and reduce government and industry uncertainty about whether particular items are subject to the jurisdiction of the International Traffic in Arms Regulations (ITAR) or the Export Administration Regulations (EAR).

In order to accomplish the assessment, the USML and, to a lesser degree, the CCL must be revised so that they are “positive lists.” A “positive list” is a list that describes controlled items using objective criteria such as horsepower, microns, wavelength, speed, accuracy, hertz, or other precise descriptions rather than broad, open-ended, subjective, catch-all, or design intent-based criteria.
**Background to the Control List Review and Revision Effort**

A key element of ECR is that all items on the USML and the CCL must be screened against criteria the U.S. Government developed to align control levels with contemporary national security threats and other issues.

Many of the ITAR’s USML controls are based on subjective or design-intent criteria. That is, regardless of an item’s capability, sophistication, age, funding, lethality, end-use, or origins, it is, with some exceptions, USML-controlled if it was originally “specifically designed, modified, or adapted” for a military or space application, purpose, or use. In particular, most current USML categories contain a non-specific catch-all control over every “part” or “component” that was “specifically designed or modified” for any of the defense articles listed in that category. This means, for example, that a solar array sized to support a communications satellite, and all technical data and services directly related to that array, are controlled for almost worldwide export in a similar manner to a military imaging satellite.

Most of the EAR’s CCL controls are based on the technical capabilities and specifications of items regardless of their intended end-use or the reasons for which they were designed. The CCL’s controls are also more flexible in that different types of items are controlled differently to different groups of destinations and end-users depending on the significance of the item. In other words, the CCL is a more “positive” list with more flexible controls than the USML. The EAR do nonetheless have a significant number of export control classification numbers (ECCNs) with controls on items that are “specially designed” for some purpose or end-item. The issues involving the definition of this term – a term that must remain in many ECCNs to remain consistent with multilateral obligations – are addressed below.

Because the USML contains many broad, general descriptions of the types of articles controlled, the satellite USML category (Category XV) needed to be “opened” in order to assess further whether items within its scope still warranted control under the USML based on national security concerns and to screen them against the U.S. Government’s criteria for creating a “positive list.” “Screening” articles means determining which USML-controlled satellites and related items should remain on the USML, which items could be controlled under the CCL, and which items no longer require any control beyond EAR99 controls because they do not meet the criteria of any of the three future tiers. “Opening” the satellite category meant identifying and then creating specific, positive lists (a “bright line”) of the specific types of items the U.S. Government wanted to control rather than relying on broad, general descriptions of or subjective criteria for determining when something is controlled.

**Steps for Category XV Spacecraft Systems and Associated Equipment Review and Recommendations**

The following are the steps and the guidelines the U.S. Government agencies involved in the review effort followed when preparing proposed amendments to the USML and the CCL so that they are, with rare exceptions, aligned “positive lists” that do not overlap and are consistent with the tiered criteria. The guidelines are set out in ordered steps.

1. **Identify and Involve Agencies with Equities**
Departments of Defense including National Geospatial-Intelligence Agency (NGA), National Reconnaissance Office (NRO), National Air Intelligence Center (NAIC), State, and Commerce; National Aeronautics and Space Administration (NASA); and the Director of National Intelligence (DNI) and DNI staff worked together on the review of Category XV, Satellites and Related Items. Each agency committed to the effort by making available their staff with technical expertise in the specific items.

2. Generally Identify the Broad Types of Satellite and Related Items that Should Remain as ITAR-Controlled

The first task of the review team was to decide what general types of USML articles should remain ITAR-controlled and, thus, not transferred to the EAR or off the control lists altogether. The following are general types of issues the review teams had in mind when making subjective determinations about whether an item should remain USML-controlled:

- Is the item “specially designed” for a military or intelligence application?
- Are the end-users of the items predominately or exclusively governments or militaries?
  For example, is it equipment to be used for national security purposes that is only legal for use by governments?

None of these issues alone determined whether an item should remain or become USML-controlled, but they were nonetheless the general types of considerations the review teams had in mind before proceeding.

After the review team mapped out the broad scope of items that should be USML-listed defense articles, it then translated their judgments into objective, positive control lists consistent with the ECR objectives. They also, at the same time, decided what, if any, types of items should become EAR-controlled in order to (a) differentiate items that may not need the more rigid national security and foreign policy controls of the ITAR, (b) take advantage of the EAR’s more flexible country group-based controls, and (c) create a bright line between the two lists. This task of translating subjective judgments into objective criteria is the key to the success of the entire positive list review and revision effort.

For example, commercial communications satellites under the ITAR are for commercial (non-governmental) end-use. The rewrite of Category XV acknowledged that these satellites could move to the CCL. Under the CCL, satellites could be controlled under the more flexible country-based controls of the EAR instead of the worldwide ITAR controls.

3. Identify Characteristics of the Remaining Defense Articles

The team then described and identified characteristics of each item, such as whether the item is (1) almost exclusively available from the United States and provides a critical military or intelligence advantage; (2) is almost exclusively available from Regime Partners or Adherents and provides a substantial military or intelligence advantage; (3) makes a substantial contribution to the indigenous development, production, use, or enhancement of an item meeting (1) or (2)
above; or (4) provides a significant military or intelligence advantage, or makes a significant contribution to the indigenous development, production, use, or enhancement of an item meeting (1) or (2) above.

Items controlled pursuant to multilateral agreements – i.e., Wassenaar Arrangement, Missile Technology Control Regime (MTCR), Australia Group, Chemical Weapons Convention, and Nuclear Suppliers Group – that do not meet the availability or “military or intelligence advantage” characteristics above were identified by the teams as potential CCL items until and unless their control status is adjusted consistent with the procedures of the applicable multilateral agreement.

4. Describe the Remaining Controlled Defense Articles in a “Positive” Way

When developing “positive” description for items to remain on the USML, the review team followed the guidelines established for the ECR control list review effort:

Positive List Guideline #1: The review team should, to the extent possible, use objective criteria, such as precise descriptions or technical parameters that do not lend themselves to multiple interpretations by reasonable people.

Positive List Guideline #2: Revised USML categories should not contain (i) catch-all controls for generic “parts,” “components,” “accessories,” “attachments,” or “end-items”; or (ii) other types of controls for specific types of defense articles because, for example, they were “specifically designed or modified” for a defense article.

Positive List Guideline #3: Items are not to be listed on both the CCL and the USML unless there are specific technical or other objective criteria – regardless of the reason why any particular item was designed or modified – that distinguish between when an item is USML-controlled and when it is CCL-controlled.

Positive List Guideline #4: In cases where technical characteristics are classified and need to be protected, the objective descriptions of the products controlled should be set at an unclassified level below the classified level.

Positive List Guideline #5: Use “Specially Designed” as a control criterion only when required by multilateral obligations or when no other reasonable option exists.

5. Verify that USML Controls over “Parts” and “Components” Are Significantly Narrowed after the USML Is Screened Against the Criteria

The majority of “parts” and “components” that are USML-controlled are controlled on the USML solely because their “form” or “fit” has been modified in some way specifically for a defense article even though their essential “function” is not inherently military. For example, the mechanisms that deploy an antenna of a satellite are “specially designed” for the particular satellite (size, connection points, etc.), but the function they provide – moving an
object into a predetermined position -- is not uniquely military. Then-Secretary Gates specifically called out the issue of unnecessary controls on parts like nuts and bolts during his April 20, 2010 speech on export control reform as one that needs to be resolved. Moreover, the largest impact on licensing in a manner consistent with Secretary Gates’ vision likely will be achieved as a result of screening the USML against the Criteria with respect to generic controls on “parts” and “components.”
Appendix 4

China's Space-related Strategic Goals, Capabilities, and Methods for Acquiring Technology.

China's rise as a major international actor is likely to stand out as a defining feature of the strategic landscape of the early 21st century. Sustained economic development has raised the standard of living for China's citizens and elevated China's international profile. This development, coupled with an expanding science and technology base, has also facilitated a comprehensive and on-going military modernization program. China's 2010 Defense White Paper asserts China's "future and destiny have never been more closely connected with those of the international community." Nonetheless, China's modernized military, and especially its space-related capabilities, could be put to use in ways that increase China's ability to gain diplomatic advantage or resolve disputes in its favor, and possibly against U.S. national security interests.

This appendix will address the following:

- DoD's understanding of the importance of the Chinese government efforts to acquire space capabilities;
- China's current and developing space capabilities;
- China’s employment of those capabilities that could potentially run counter to U.S. national interests; and
- China’s decision regarding its pursuit of space technologies.

Space assets, operational capabilities, and missile technologies are indispensible to China. China's National Medium- and Long-Term Program for Science and Technology Development (2006-2020), issued by the State Council in February 2006, seeks to transform China into an "innovation-oriented society by 2020." The plan defines China's science and technology focus in terms of "basic research," "leading edge technologies," "key fields and priority subjects," and "major special items," each of which contain space-related technologies and are all military-related. According to the 2010 Chinese Academy of Sciences publication Pace of Science & Technology in China: A Roadmap to 2050, China identified the following space-related areas: material design and preparation, manufacturing in extreme environmental conditions, and aeronautic and astronomic mechanics. China identified radar, counter-space capabilities, secure Command, Control, Communications, and Computer (C4) Intelligence, Surveillance, and Reconnaissance (C4ISR) and all defense technologies, as key fields and priority subjects due to their potential to provide technological breakthroughs, remove technical obstacles across industries, and improve international competitiveness. Under major special items, China plans to develop or expand indigenous capabilities to produce high-resolution satellites, manned spacecraft, and lunar exploration. China's most recent Defense White Paper published on March 31, 2011 included "accelerating the modernization of national defense and the armed forces" as one of its strategic goals. Space and satellite manufacturing capabilities directly support these stated goals.
In 2010, China had a national record of 15 space launches. As a comparison, the United States had 14 launches in 2010. Russia had 31, and Europe had eight. These numbers include government as well as commercial launches. All of China’s launches were for domestic programs, including space-based intelligence, surveillance, reconnaissance, navigation, meteorology, and communications satellite constellations. In parallel, China is developing a multi-dimensional program to improve its capabilities to limit or prevent the use of space-based assets by adversaries during times of crisis or conflict.

- During 2010, Beijing launched five satellites for its Compass navigation constellation. China plans to complete the regional network by 2012 and a global network by 2020.
- China launched nine new remote sensing satellites in 2010, which can perform both civil and military applications.
- In 2010, Beijing also launched two communications satellites (one military and one civil), a meteorological satellite, two experimental small satellites, and a second lunar mission during the year.
- China continues to develop the Long March V (LM-V) rocket, which is intended to lift heavy payloads into space. LM-V will more than double the size of low earth orbit and geosynchronous orbit payloads China is capable of placing into orbit.
- To support these rockets, China began constructing the Wenchang Satellite Launch Center in 2008. Located on Hainan Island, the launch facility is expected to be complete by 2012, with initial LM-V launch scheduled for 2014.

China is deploying imagery, reconnaissance, and earth resource systems with military utility. Examples include Yaogan satellites, the Haiyang-1B, and the Huanjing disaster/environmental monitoring satellite constellation. China is planning eight satellites in the Huajing program that are capable of visible, infrared, multispectral, and synthetic aperture radar imaging. In the next decade, even as Beijing fields a larger and more capable array of reconnaissance satellites, it probably will continue to employ commercial satellite imagery to supplement its coverage. China currently accesses high-resolution, commercial electro-optical, and synthetic aperture radar imagery from all the major providers including Spot Image (Europe), Infoterra (Europe), MDA (Canada), Antrix (India), GeoEye (United States), and Digital Globe (United States). Recently, China attempted to acquire a fully functional, European imaging satellite constellation, but was blocked by USML re-export laws due to U.S. technology being on the satellites. As part of the Administration's recommendations in this report, this technology would remain subject to the USML.

China is developing and testing several new classes and variants of offensive missiles, upgrading older missile systems, and developing space-based methods to counter ballistic missile defenses of the United States and our allies, including anti-satellite (ASAT) weapons. China produces a broad range of sophisticated ballistic, cruise, air-to-air, and surface-to-air missiles. Many of China's final assembly and rocket motor production facilities have received upgrades over the past few years, likely increasing production capacity. In addition to supplying China's military, complete systems and missile technologies could be marketed for export. China's space launch vehicle industry is expanding to support satellite launch services and the manned space program.
China continues to develop and refine its ASAT capabilities as one component of a multi-dimensional program to limit or prevent the use of space-based assets by potential adversaries during times of conflict. In addition to the direct-ascent ASAT program, China is developing other technologies and concepts for kinetic and directed energy for ASAT missions. Foreign and indigenous systems give China the capability to jam common satellite communications bands and Global Positioning satellites (GPS) receivers. Specifically, the Chinese navigation constellation, Compass, has been designed so that the PLA is using the same downlink frequencies as Europe's burgeoning Galileo Global Navigation System. The United States is now investigating Compass's impact on our GPS network. Citing the requirements of its manned and lunar space programs, China is improving its ability to track and identify satellites -- a prerequisite for effective, precise counter-space operations.

The People's Liberation Army (PLA) is acquiring a range of technologies to improve China's space and counter-space capabilities. A PLA analysis of U.S. and coalition military operations reinforced the importance of operations in space to enable informationalized warfare. This analysis claimed that "space is the commanding point for the information battlefield. Battlefield monitor and control, information communications, navigation and position guidance all rely on satellites and other sensors."

PLA writings emphasize the necessity of "destroying, damaging, and interfering with the enemy's reconnaissance ... and communications satellites," suggesting that such systems, as well as navigation and early warning satellites, could be among initial targets of attack to "blind and deafen the enemy." The same PLA analysis of U.S. and coalition military operations also states that "destroying or capturing satellites and other sensors ... will deprive an opponent of initiative on the battlefield and [make it difficult] for them to bring their precision guided weapons into full play."

One example of how China's advance in space-related capabilities could directly harm U.S. national security interests is in the Taiwan Strait. Beijing could use a variety of disruptive, punitive, or lethal space capabilities in a limited action against Taiwan. Limited Short Range Ballistic Missile attacks against, and precision strikes directed by, imaging and navigation satellites on Taiwan's radar sites, missiles, and space-assets could be designed to degrade its defenses or neutralize its leadership. The PLA builds capabilities aimed not only at Taiwan, but also to deter, delay, or deny possible U.S. or allied intervention in a cross-Strait conflict. China's ASAT programs have significant implications for anti-access/area-denial efforts against the United States in Taiwan Strait contingencies.

Operational space capabilities are a source of Chinese national pride as well as a new international engagement leverage point that may run counter to U.S. national security objectives. As an example, from Futron’s 2011 Space Competitiveness Index, Yin Liming, the president of China Great Wall Industry Corporation, stated in April of 2010 that China was aiming for 20 percent of the world’s space business by 2015. Public statements, like these, demonstrate its intent to expand and extend their satellite and launch services to international customers. Moreover, China’s expanding space agreements are part of broader bi-lateral trade and natural resources access strategy. Many of these arrangements are with countries that are not supportive or are openly opposed to U.S. foreign policy objectives. For
example, China entered the world market by exporting satellites and infrastructure to nations throughout South America, Africa, the Middle East, and Asia. China is developing niche markets, introducing space-related technologies in systems not offered by Russian or western suppliers. These systems include GPS and GLONASS-equipped multiple rocket launcher systems and short-range ballistic missiles that have been marketed and sold to Middle East and African partners. China offers generous repayment options and technology transfer to persuade other countries to purchase from PRC firms.

The pace and scope of China's military development, combined with a relative lack of transparency, remains a point of concern in the United States and among our regional allies and partners. PRC officials continue to support publicly a reliable military-to-military relationship with the United States, but China has also suspended military-to-military relations in 2008 and 2010. PRC officials have repeatedly linked continuation of engagement to "respect" China's "core interests." As recently as October 2011, China canceled meetings with U.S. officials because of U.S. arms sales to Taiwan. The Chinese commitment to engaging with the United States military remains challenging. With regard to the reliability and fidelity of civil-only end-use of U.S. technologies with China, the United States must remain vigilant against any unauthorized end-use or diversion of U.S. satellite technologies for China’s military modernization or enhancement of its military capability.

Chinese leadership’s top priority is to develop innovative dual-use technology and an industrial base that serves both military and civilian needs. China’s defense industry has benefited from its integration with a rapidly expanding civilian economy and science and technology sector, particularly elements that have access to foreign technology. Progress within individual defense sectors appears linked to the relative integration of each, through China's civilian economy, into the global production and research and development chain. For example, the defense electronics sectors benefitted from China's leading role in producing information technologies over the last decade. China’s continued integration of civil and military sectors is evident in the field of information technology. Several well-known national level civil information technology companies maintain close ties to the PLA.

China's capability for overall space systems design and integration relies heavily on foreign designs obtained through reverse engineering. It is widely known that China pursues foreign technologies, in part, for the purpose of reverse engineering or to supplement indigenous military modernization efforts. China’s continuing efforts to acquire U.S. military and dual-use technologies are enabling China’s science and technology base to advance its defense industrial capability and to improve its technological acumen in areas critical to the development of military weapons and communications systems. China utilizes a large, well-organized network of enterprises, defense factories, affiliated research institutes, and computer network operations to facilitate the collection of sensitive information and export-controlled technology, as well as basic research and science that support U.S. defense system modernization.

Many of the organizations comprising China's military-industrial complex have both military and civilian research and development functions. This network of government-affiliated companies and research institutes enables the PLA to access sensitive and dual-use
technologies under the guise of civilian research and development. The enterprises accomplish this through technology conferences and symposia, legitimate contracts and joint commercial ventures, partnerships with foreign firms, and joint development of specific technologies.

In the case of key national security technologies, controlled equipment, and other materials not readily obtainable through commercial means or academic exchange, China has utilized its intelligence services and employed other illicit approaches that circumvent or outright violate U.S. laws and export control regulations. For example, in September 2010, Chi Tong Kuok was convicted for conspiracy to export U.S. military encryption technology illegally to China via Hong Kong. The relevant technology included encryption, communications equipment, and GPS equipment used by U.S. and NATO forces.

Economic espionage, supported by extensive open-source research, computer network exploitation, and targeted intelligence operations also enables China to obtain technologies to supplement indigenous military modernization efforts. According to Defense Security Service, collection activity associated to countries from the East Asia and Pacific region focused their efforts on "information systems" technology, specifically targeting various components of military command, control, communications, computers, Intelligence, Surveillance and Reconnaissance (C4ISR) applications. Other technologies targeted included Aeronautics, Armaments and Energetic Materials and Biological. DSS attributes the targeting of Information systems to research and development shortcomings and ongoing efforts to modernize aging military and C4ISR capabilities.

The DoC’s Bureau of Industry Security and the Department of Justice identified at least 26 major cases since 2006 linking China to the acquisition of controlled power amplifiers with military applications, space launch technical data and services, Delta IV rockets, information related to cruise missile design, and military grade accelerometers. Additional space related items included satellite/missile thermal insulation blankets, controlled electronic components, traveling wave tubes used with satellite and radar systems, microwave amplifiers with radar applications, and carbon fiber material for aircraft, rockets, and spacecraft.

China's continuing efforts to acquire U.S. military and dual-use technologies are enabling China’s science and technology base to diminish the U.S. technological edge in areas critical to the development of weapons and communications systems. Additionally, the technologies China has acquired could be used to develop more advanced technologies by shortening Chinese R&D cycles.

In summary, China has the political/governmental will and resources to modernize its military, and it has chosen to focus specifically on space-related capabilities as one of its highest priorities. China is progressing at a steady pace in its indigenous space capabilities. Unfortunately, it was often able to accomplish this progress by exploiting foreign technologies and items, especially those from the United States. China's civilian and military space industry are fused together such that reasonable regulators must consider the high likelihood that space-related items and technology will be diverted from a civil use and applied to military programs. As China advances in operational space capabilities, it is
actively focusing on how to destroy, disrupt, or deny U.S. access to our own space assets. The United States cannot ignore the significant advances in space operational capability achieved while China has been under munitions sanctions and denied legal access to U.S. space-related technology. The logical assumption to be drawn is that if the United States were to relax controls on satellite and related items, China would purchase and acquire more of these items, and in turn, further reduce the technological edge of the United States' and its allies' space assets. The United States must walk a fine line and limit its transfers to China to only those non-sensitive items that are readily available from non-U.S. sources.

NOTE: Source for the information provided in this appendix, unless otherwise stated, is from the Office of the Secretary of Defense’s Annual Report to Congress for 2011 on Military and Security Developments Involving the People’s Republic of China.
Appendix 5

Special Export Controls (Monitoring)

Public Law (PL) 105-261, the Strom Thurmond National Defense Authorization Act (NDAA) for Fiscal Year (FY) 1999, Section 1513, reversed the 1996 decision concerning the export jurisdiction of commercial communications satellites (COMSATS) by placing them back on the United States Munitions List (USML). This action resulted from the findings and concerns expressed in the Cox Committee investigation. The law also requires that Special Export Controls (SECs) be used in conjunction with USML licenses for the launch of satellites by certain foreign launch providers. To implement the law, the ITAR (22 C.F.R. §§120-130) articulates the use of SECs in §124.15. SECs are applied by the Department of State (DoS) through export licenses, and implemented by the Department of Defense (DoD). SECs are intended to minimize the risk of unauthorized technology transfers from U.S. satellite manufacturers to the foreign launch service providers. The SECs consist of risk mitigation measures, namely: mandatory Technology Transfer Control Plans (TTCPs) developed by the exporter and approved by DoD; the DoD review and approval of technical data prior to export; and the monitoring of technical assistance and defense services (for example, technical interchange meetings (TIMs) and factory/launch operations). PL 106-65, the NDAA for FY 2000, Section 1409, further defined and expanded upon PL 105-261 with respect to the implementation of SECs by DoD.

DoD is required by law to monitor all activities related to export of a satellite or related items for launch in a foreign country, unless it is a member of the North Atlantic Treaty Organization (NATO) or a major non-NATO ally of the United States. To ensure that unauthorized transfers do not take place, all aspects of the launch are monitored including technical assistance, defense services, and reviews of technical data. Since PL 105-261 was enacted, the DoD has created a dedicated cadre of engineers with significant experience and expertise in satellite and launch vehicle technologies. From FY 2000 through the first quarter of FY 2010, DoD monitoring of more than 100 launches has contributed to the prevention of any known unauthorized technology transfers. DoD oversight and monitoring have created a cooperative export control awareness and compliance culture in U.S. industry. The review and approval of TTCPs and technical data, and the scheduling of monitoring activities are conducted using a near real-time, web-based tool that maximizes responsiveness to industry. This risk mitigation approach has been proven effective since the enactment of P.L. 105-261.

Current law requires SECs regardless of the assessed risk of unauthorized disclosure. The law does not permit DoD discretion to waive or exempt a given license activity from mandatory monitoring. By statute, the costs associated with mandatory monitoring are fully reimbursed by industry to DoD. PL 105-261, Section 1514, states that “the costs of such monitoring services shall be fully reimbursed to the DoD by the person or entity receiving such services.” Reimbursed costs include employee, administrative, and direct travel costs. Discretionary monitoring, not reimbursed under the statute, is employed to mitigate risks for launch programs not addressed by the law. Authority for discretionary monitoring resides in ITAR §124.15(c), which states:
“Although PL 105-261 does not require the application of SECs for the launch of U.S.-origin satellites and components from or by nationals of countries that are members of NATO or major non-NATO allies, such export controls may nonetheless be applied. Further, the export of any article or defense service controlled under this subchapter to any destination may also require that the special export controls identified in paragraphs (a) (1) and (a) (2) of this category be applied in furtherance of the security and foreign policy of the United States.”

Discretionary SECs are implemented at various levels, commensurate with the assessed risks of the activity. For example, activities associated with launch vehicle and rocket engine design and development represent a much higher level of risk of diversion than activities for marketing or insurance placement. SECs can range from technical data reviews to physical on-site monitoring depending on the level of risk involved in the program. Although the law does not require monitoring for some of the highest risk scenarios, DoD implements discretionary SECs to mitigate such risks. Mandatory monitoring and oversight is paid for by industry, whereas the cost of discretionary monitoring is covered by DoD appropriated funds. Furthermore, in the event of a launch failure, a separate license requiring SECs is mandatory in accordance with PL 105-261 and ITAR §124.15.

The primary launch service providers for commercial COMSATS are France (Ariane and Soyuz launched from French Guiana), Russia (Proton and Soyuz), and Ukraine/Russia (Zenit – Sea Launch/Land Launch). China can provide launch services with its Long March rocket. However, U.S. satellites or foreign satellites with U.S. ITAR content cannot be launched on the Long March without a Presidential waiver, due to statutory limitations, including the Tiananmen Square sanctions. Such a waiver has never been approved for satellites licensed under the USML since enactment of the NDAA for 1999. However, soon after the NDAA for 1999 was passed in October 1998, there were four U.S. satellites launched from China, two on a launch in December 1998 and two on another launch in June 1999. Presidential certifications/waivers were granted for the launch of these satellites that had previously been approved for export under the EAR. There are additional U.S. and foreign entities developing launch vehicles. These launch vehicles are at different stages of developmental maturity, with SpaceX's Falcon operational and Orbital Science's Taurus II close to being operational. Although virtually all U.S. launch capacity is committed to military and civilian government missions, these new vehicles are focused on commercial markets including providing launch services for foreign-built satellites.

The greatest risk of unauthorized transfer of technology is during satellite or launch failure analyses and investigations. The exchange of technical data and defense services for such analyses and investigation, regardless of the jurisdiction/origin of the satellite or related item, should require an ITAR license with monitoring required at the discretion of DoD and DoS and reimbursed by the license applicant. These activities should remain under USML control and continue to require strong oversight.

Regardless of jurisdiction, the risk of unauthorized technology transfers remains during the U.S. satellite build, test, and integration onto a foreign launch vehicle and subsequent launch. Such
risk is equally present during the same activities for a foreign satellite launched on a U.S. vehicle. This risk can best be mitigated by applying SECs on a case-by-case basis, taking into account the foreign parties (end-users) and the scope of activities (technical data and defense services). This approach implements SECs in direct relation to risk associated with the specific licensed activities. Those activities that may warrant oversight and monitoring via SECs include:

1) technical discussions and activities, including the design, development, operation, maintenance, modification and repair of satellites, satellite components, and associated equipment;

2) technical discussions and activities related to satellite processing and launch activities, including launch preparation, launch facilities, launch vehicles, satellite transportation, satellite-to-launch vehicle integration, testing and checkout prior to launch, satellite launch, launch site storage of the satellite and associated equipment, return of equipment to the United States, and post-launch reviews; and

3) technical discussions and activities related to satellite and launch vehicle anomalies and failures.

Currently under the ITAR, the U.S. Government has the discretion to impose SECs for satellite or launch vehicle programs or services, for which it has determined that significant risk of unauthorized technology transfer exists. The decision to apply discretionary SECs is made during the license review process based on a risk analysis of the scope of activities identified in the license application and the license participants (end-users). The level of SECs recommended by DoD and imposed on USML licenses by DoS is tailored to the given license based on feedback from a separate DoD group responsible for monitoring.

With respect to satellite-to-launch vehicle integration, the commercial COMSAT manufacturer supplies interface data to the launch service provider in order to ensure the successful integration of the satellite onto the launch vehicle and provides data necessary to enable the launch provider to define the mission parameters and events for the satellite’s orbit insertion. The commercial COMSAT manufacturer’s data includes form (e.g., clearance requirements), fit (e.g., interface tolerances), mass, electrical (e.g., battery charging), mechanical (e.g., lift requirements), environmental requirements (e.g., temperature, vibration, and acoustics), dynamic load limits, telemetry, fairing access, launch pad access, launch parameters, safety, transportation, and facility requirements. More specifically, the commercial COMSAT manufacturer does not assist the launch service provider in the launch vehicle configuration, mission profile design, launch vehicle checkout, actual launch preparation, and launch, including fuel loading, guidance updates, orbit targets, weather input, flight profile events such as engine shutdown, maximum aerodynamic coast, separation, etc. Conversely, the launch service provider does provide assistance with spacecraft design, configuration, or orbital analysis. The satellite manufacturer and the launch service provider exchange technical data through a document called the Interface Control Document (ICD). The ICD is based upon the data from the satellite manufacturer (delineated above) and the launch service provider. The launch service provider also provides form, fit, and function data for the launch vehicle to the satellite manufacturer. The ICD is a
contractual document that describes each party's responsibilities concerning the integration and mission requirements.

DoD oversight and monitoring ensures that the U.S. parties maintain export control discipline. It is noteworthy that the ITAR violations by U.S. commercial COMSAT manufacturers, which commenced in 1996 and drove the transfer of commercial COMSATs from the CCL back to the USML, were not caused by U.S. satellite manufacturers during launch integration activities. Instead, these violations of the law were subsequent to the failure of the launch vehicle to place the satellite in orbit and the result of U.S. satellite manufacturers’ providing defense services by assisting in the failure review of a foreign launch vehicle without a license. Since these launches occurred under EAR jurisdiction, no U.S. monitors were present, and the U.S. manufacturers did not secure the necessary ITAR licenses to engage in launch failure discussions.

Subsequent to 1999, U.S. commercial COMSATs were placed under ITAR jurisdiction. Since 1999, SECs have been applied to all licenses for launch services in countries that are not a member of NATO or are not a major non-NATO ally. During the 10 years of oversight and monitoring of more than 100 satellite launch programs, there have been no known unauthorized technology transfers. DoD oversight and monitoring have thus been effective in mitigating the risks of unauthorized technology transfers.

The application of SECs will be necessary to preclude the recurrence of events that led to the enactment of P.L. 105-261, if commercial communication satellites are moved from the USML to the CCL. SEC safeguards and verifications must be maintained and applied at an appropriate level for satellite-to-launch vehicle integration export authorizations. The history of SEC implementation since 1999 validates that SECs have prevented a recurrence of the violations that occurred in 1996. Those violations occurred, in large part, because SECs on CCL items were not allowed.
Appendix 6
Congressional Requirement


Sec. 1248. RISK ASSESSMENT OF UNITED STATES SPACE EXPORT CONTROL POLICY.

(a) Assessment Required.--The Secretary of Defense and the Secretary of State shall carry out an assessment of the national security risks of removing satellites and related components from the United States Munitions List.

(b) Matters to Be Included.--The assessment required under subsection (a) shall include the following matters:

(1) A review of the space and space-related technologies currently on the United States Munitions List, to include satellite systems, dedicated subsystems, and components.

(2) An assessment of the national security risks of removing certain space and space-related technologies identified under paragraph (1) from the United States Munitions List.

(3) An examination of the degree to which other nations' export control policies control or limit the export of space and space-related technologies for national security reasons.

(4) Recommendations for--

(A) the space and space-related technologies that should remain on, or may be candidates for removal from, the United States Munitions List based on the national security risk assessment required paragraph (2);

(B) the safeguards and verifications necessary to--

(i) prevent the proliferation and diversion of such space and space-related technologies;
(ii) confirm appropriate end use and end users; and
(iii) minimize the risk that such space and space-related technologies could be used in foreign missile, space, or other applications that may pose a threat to the security of the United States; and

(C) improvements to the space export control policy and processes of the United States that do not adversely affect national security.

(c) Consultation.--In conducting the assessment required under subsection (a), the Secretary of Defense and the Secretary of State may consult with the heads of other relevant departments and agencies of the United States Government as the Secretaries determine is necessary.

(d) Report.--Not later than 180 days after the date of the enactment of this Act, the Secretary of Defense and the Secretary of State shall submit to the congressional defense committees and the Committee on Foreign Affairs of the House of Representatives and the Committee on Foreign Relations of the Senate a report on the assessment required under subsection (a). The report shall be in unclassified form but may include a classified annex.

(e) Definition.--In this section, the term "United States Munitions List" means the list referred to in section 38(a)(1) of the Arms Export Control Act (22 U.S.C. 2778(a)(1)).
Benefits of Space Systems

Space is vital to protecting U.S. economic prosperity and the national security interests of the United States, its allies, and partners. The benefits derived from space-based systems permeate almost every aspect of our daily life. The utilization of space helps by: warning of natural disasters; facilitating navigation and transportation globally; expanding our scientific frontiers; providing national decision makers with global communications, command, and control; monitoring strategic and military developments as well as supporting treaty monitoring and arms control verification; providing global access to financial operations; and scores of other activities worldwide. However, space, a domain that no nation owns but on which all rely, is becoming increasingly congested and contested.

Space Congestion

Today there are approximately 60 nations and government consortia that operate satellites, as well as numerous commercial and academic satellite operators, creating an environment that is increasingly congested. The Department of Defense tracks roughly 22,000 objects in orbit, of which 1,100 are active satellites. There are hundreds of thousands of additional objects too small to track but still capable of damaging satellites in orbit and the International Space Station. We need to work with the international community to address hazards and concerns that have arisen from this increasingly congested space environment.

Threats to Space

The threats to the space environment will increase as more nations and non-state actors develop and deploy counter-space systems. Today space systems and their supporting infrastructure face a range of man-made threats that may deny, degrade, deceive, disrupt, or destroy assets. Irresponsible acts against space systems will have implications beyond the space environment, disrupting worldwide services upon which civil, commercial, and national security sectors depend. Given the increasing threat—through either irresponsible or unintentional acts—to the long-term sustainability, stability, safety, and security of space operations, we must work with the community of spacefaring nations to preserve the space environment for all nations and future generations.

An International Code of Conduct for Outer Space Activities

In response to these challenges, the United States reached a decision to formally work with the European Union and spacefaring nations to develop and advance an International Code of Conduct for Outer Space Activities. The European Union’s draft Code of Conduct is a good foundation for the development of a non-legally binding International Code of Conduct focused on the use of voluntary and pragmatic transparency and confidence-building measures to help prevent mishaps, misperceptions, and mistrust in space. An International Code of Conduct, if adopted, would establish guidelines for responsible behavior to reduce the hazards of debris-generating events and increase the transparency of operations in space to avoid the danger of collisions.

Protecting National and Economic Security

The Obama Administration is committed to ensuring that an International Code enhances national security and maintains the United States’ inherent right of individual and collective self-defense, a fundamental part of international law. The United States would only subscribe to such a Code of Conduct if it protects and enhances the national and economic security of the United States, our allies, and our friends. The Administration is committed to keeping the U.S. Congress informed as our consultations with the spacefaring community progress.
Draft Environmental Assessment for the Launch and Reentry of SpaceShipTwo Reusable Suborbital Rockets at the Mojave Air and Space Port
March 2012
Draft Environmental Assessment for the Launch and Reentry of SpaceShipTwo Reusable Suborbital Rockets at the Mojave Air and Space Port

AGENCY: Federal Aviation Administration (FAA), lead agency; United States Air Force and National Aeronautics and Space Administration, cooperating agencies

ABSTRACT: This Draft Environmental Assessment (EA) for the launch and reentry of SpaceShipTwo reusable suborbital rockets at the Mojave Air and Space Port analyzes the potential environmental impacts of the Proposed Action to issue experimental permits and/or launch licenses to operate SpaceShipTwo reusable suborbital rockets and WhiteKnightTwo carrier aircraft at the Mojave Air and Space Port in Mojave, California. Under the No Action Alternative, the FAA would not issue experimental permits or launch licenses for operation of SpaceShipTwo and WhiteKnightTwo from the Mojave Air and Space Port. The Mojave Air and Space Port would continue its existing operations.

This Draft EA analyzes the potential environmental impacts of the Proposed Action and No Action Alternative on the following resource areas: air quality; biological resources (including fish, wildlife, and plants); historical, architectural, archaeological, and cultural resources; hazardous materials, pollution prevention, and solid waste; health and safety; land use (including Department of Transportation Section 4(f) properties); light emissions and visual resources; noise and compatible land use; socioeconomic resources, environmental justice, and children’s environmental health and safety; and cumulative impacts.

CONTACT INFORMATION: To request copies of the Draft EA, please contact Daniel Czelusniak, Environmental Program Lead, Federal Aviation Administration, 800 Independence Ave., SW, Suite 325, Washington, DC 20591; e-mail Daniel.Czelusniak@faa.gov; or phone (202) 267-5924.

This Draft EA becomes a Federal document when evaluated, signed, and dated by the responsible FAA official.

Issued in Washington, DC on: 3/1/2012

Dr. George C. Nield
Associate Administrator for Commercial Space Transportation
Responsible FAA Official
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### ACRONYMS AND ABBREVIATIONS

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<th>Description</th>
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<tr>
<td>AFB</td>
<td>Air Force Base</td>
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<td>AST</td>
<td>Office of Commercial Space Transportation</td>
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<td>ATCAA</td>
<td>Air Traffic Control Assigned Airspace</td>
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<td>BMSSC</td>
<td>Black Mountain Supersonic Corridor</td>
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<tr>
<td>CCB</td>
<td>Complex Control Board</td>
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<td>CCF</td>
<td>Central Coordinating Facility</td>
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<td>CDNL</td>
<td>C-weighted Day-Night Average Sound Level</td>
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<td>A-weighted sound level</td>
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<td>DNL</td>
<td>day-night average sound level</td>
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<td>Finding of No Significant Impact</td>
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<td>GHG</td>
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<td>Military Operations Area</td>
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<tr>
<td>Acronym</td>
<td>Full Form</td>
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<td>N₂</td>
<td>nitrogen</td>
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1. INTRODUCTION

1.1 Background

Multiple companies propose to operate SpaceShipTwo reusable suborbital rockets and WhiteKnightTwo carrier aircraft at the Mojave Air and Space Port in Mojave, California. These proposals require FAA issuance of experimental permits and/or launch licenses. Issuing experimental permits and launch licenses are considered major Federal actions subject to environmental review under the National Environmental Policy Act of 1969, as amended (NEPA; 42 United States Code [U.S.C.] 4321, et seq.). The FAA/AST prepared this Draft Environmental Assessment (EA) in accordance with NEPA, Council on Environmental Quality (CEQ) NEPA implementing regulations (40 Code of Federal Regulations [CFR] Parts 1500 to 1508), and FAA Order 1050.1E, Environmental Impacts: Policies and Procedures, Change 1, to evaluate the potential environmental impacts of activities associated with the FAA/AST’s Proposed Action of issuing experimental permits and launch licenses to operate SpaceShipTwo and WhiteKnightTwo at the Mojave Air and Space Port (see Section 2.1 for a more detailed description of the FAA/AST’s Proposed Action).

According to FAA regulations, an applicant must provide enough information for the FAA to analyze the potential environmental impacts associated with the operation of SpaceShipTwo and WhiteKnightTwo. The information provided by an applicant must be sufficient to enable the FAA to comply with the requirements of NEPA. This EA is intended to fulfill NEPA requirements for analyzing the potential environmental impacts of issuing an experimental permit and/or launch license for the operation of SpaceShipTwo and WhiteKnightTwo. The successful completion of the environmental review process does not guarantee that the FAA/AST would issue an experimental permit and/or launch license to operators of SpaceShipTwo and WhiteKnightTwo. The project also must meet all FAA safety, risk, and financial responsibility requirements per 14 CFR Part 400. Additional environmental analyses would be required for future proposed activities not addressed in this EA or in previous environmental analyses.

The FAA/AST previously analyzed the environmental impacts of reusable suborbital rocket operations at the Mojave Air and Space Port in the September 2009 Final Programmatic Environmental Impact Statement for Streamlining the Processing of Experimental Permit Applications (2009 FAA PEIS) (FAA 2009a). The 2009 FAA PEIS, which is hereby incorporated by reference, did not specifically consider the environmental impacts of SpaceShipTwo or WhiteKnightTwo operations, but did evaluate the environmental impacts of 400 annual horizontal and 300 annual vertical rocket launches at the Mojave Air and Space Port over a five-year period, from 2009 to 2014. In order to focus this EA on impacts specific to SpaceShipTwo and WhiteKnightTwo operations at the Mojave Air and Space Port, where the 2009 FAA PEIS provides information and analyses common to all reusable suborbital rocket activities at the Mojave Air and Space Port, the discussion in the 2009 FAA PEIS is summarized and incorporated by reference. Where impacts are specific to SpaceShipTwo and WhiteKnightTwo operations, a detailed discussion is included in this EA. An electronic copy of the 2009 FAA PEIS can be downloaded from the FAA/AST website at: http://www.faa.gov/about/office_org/headquarters_offices/ast/environmental/nepa_docs/review/documents_completed/.
The East Kern Airport District (EKAD) holds a launch site operator license to operate the Mojave Air and Space Port as a commercial space launch site. The FAA/AST granted the Launch Site Operator License to EKAD on June 17, 2004, after the FAA issued an EA (FAA 2004) on February 18, 2004 (hereafter referred to as the 2004 FAA EA), analyzing the environmental impacts of operating a launch site at the Mojave Air and Space Port. A Finding of No Significant Impact (FONSI) for the 2004 FAA EA was published in the Federal Register (69 FR 22584) on February 26, 2004. The FAA/AST renewed the Launch Site Operator License in 2009, and it expires on June 16, 2014. Relevant information from the 2004 FAA EA is referenced as appropriate in the affected environment and impact analyses for this EA. This EA does not address the Launch Site Operator License.

As the agency responsible for issuing experimental permits and launch licenses to operate reusable suborbital rockets, the FAA is the lead agency for preparation of this EA. The United States Air Force (USAF) and the National Aeronautics and Space Administration (NASA) have agreed to serve as cooperating agencies for the preparation of this EA. The Air Force Flight Test Center, Edwards Air Force Base (AFB) is one of three principal military entities conducting activities in the special use airspace (R-2508) where SpaceShipTwo and WhiteKnightTwo operations would occur (see Section 2.1.1 below for more information). NASA has special expertise and interest in the operation of reusable suborbital rockets through its programs, such as its Flight Opportunities Program, which are intended to help foster the development of the commercial reusable suborbital transportation industry.

1.2 Purpose and Need for the Proposed Action

The purpose of the Proposed Action in this EA is to fulfill the FAA’s responsibilities under the Commercial Space Launch Act, 51 U.S.C. Subtitle V, ch. 509, §§ 50901-50923 for oversight of commercial space launch activities, including issuing experimental permits and launch licenses to operate reusable suborbital rockets. The need for the action results from the statutory direction from Congress under the Commercial Space Launch Act to facilitate rocket developers’ research and development associated with testing new design concepts, new equipment, or new operating techniques; compliance with requirements; and flight crew training; and to encourage, facilitate, and promote commercial space launches and reentries by the private sector; in order to strengthen and expand U.S. space transportation infrastructure. The FAA/AST could receive multiple applications for experimental permits and launch licenses to operate SpaceShipTwo and WhiteKnightTwo. The FAA/AST must review all applications and determine whether to issue an experimental permit or launch license, as appropriate.

1.3 Request for Comments on the Draft EA

The FAA is initiating a public review and comment period for this Draft EA. Interested parties are invited to submit comments on environmental issues and concerns, preferably in writing, on or before April 13, 2012, or 30 days from the date of publication of the Notice of Availability in the Federal Register, whichever is later. The FAA invites interested agencies, organizations, Native American tribes, and members of the public to submit comments on all aspects of this Draft EA. The FAA will consider all comments on this Draft EA in preparing a Final EA. To facilitate FAA consideration and response to comments, it is critical that comments be as specific as possible and clearly state concerns or recommendations related to the issues addressed in this Draft EA.
2. PROPOSED ACTION AND NO ACTION ALTERNATIVE

2.1 Proposed Action

The Proposed Action (preferred alternative) is for the FAA/AST to issue experimental permits and launch licenses to conduct the activities described in this EA at the Mojave Air and Space Port (see Exhibit 2-1 below and Sections 2.1.2.5 and 3.6 of the 2009 FAA PEIS for a description of the Mojave Air and Space Port). Under the FAA/AST’s experimental permit program (implemented by 14 CFR Part 437), the FAA/AST may issue experimental permits to commercial launch operators for the operation of developmental reusable suborbital rockets on suborbital trajectories. An experimental permit is valid for one year and authorizes an unlimited number of launches and reentries of a reusable suborbital rocket from a U.S. launch site. A permittee can renew its permit by submitting an application to the FAA/AST at least 60 days before the permit expires. The FAA/AST can also issue launch licenses for the operation of reusable suborbital rockets (14 CFR Part 431). A launch license for a reusable launch vehicle is valid for two years and authorizes a licensee to launch and reenter, or otherwise land, any of a designated family of reusable launch vehicles within authorized parameters, including launch sites and trajectories, transporting specified classes of payloads to any reentry site or other location designated in the license. A licensee can renew its license by submitting an application to the FAA/AST at least 90 days before the license expires. This EA assumes that the FAA could issue either new or renewed experimental permits and launch licenses.

Although experimental permits and launch licenses could authorize unspecified number of launch and reentries, for the purposes of evaluating environmental impacts in this EA, the FAA/AST has assumed a maximum of up to 30 total launches and reentries per year of SpaceShipTwo at the Mojave Air and Space Port, for a total of up to 150 launches and reentries of SpaceShipTwo between 2012 and 2016. The FAA/AST used this estimate to develop an upper bound to assess the potential environmental impacts of the Proposed Action. As mentioned in Section 1.1 of this EA, the 2009 FAA PEIS evaluated the potential environmental impacts of multiple operators conducting 400 annual horizontal rocket launches at the Mojave Air and Space Port through 2014. The proposed 30 annual launches and reentries of SpaceShipTwo at the Mojave Air and Space Port through 2014 would be a component of the 400 annual launches addressed by the PEIS. The potential environmental impacts of the proposed launches and reentries of SpaceShipTwo from the Mojave Air and Space Port that are not covered by the PEIS are considered in this EA. Additional operators could be covered by the PEIS analysis, which analyzed 370 more annual launches than the SpaceShipTwo proposal. If the total number of launches and reentries under all issued experimental permits and launch licenses (new or renewed) for SpaceShipTwo operations exceeded 30 per year during 2012 to 2016, additional environmental analyses would be required, as appropriate.

Operations associated with the Proposed Action would primarily consist of two components: a carrier aircraft (i.e., WhiteKnightTwo) and the mated SpaceShipTwo. Both WhiteKnightTwo and SpaceShipTwo would be piloted during operations. During a launch, WhiteKnightTwo would takeoff from an existing runway at the Mojave Air and Space Port and ascend to an altitude of approximately 50,000 feet, where SpaceShipTwo would be released. SpaceShipTwo would ignite its rocket motor and ascend on a nearly vertical trajectory until all rocket
Exhibit 2-1. Mojave Air and Space Port and Surrounding Area\textsuperscript{a,b}

\textsuperscript{a} Source: FAA 2009

\textsuperscript{b} Note: The Mojave Airport has been renamed to the Mojave Air and Space Port since the development of this graphic. Mojave, CA is considered an unincorporated community.
propellants are consumed, coast to apogee (the highest point in the vehicle flight trajectory), and then glide unpowered to a horizontal landing back on the runway. Up to two smaller support aircraft could also accompany WhiteKnightTwo to track SpaceShipTwo operations. The remainder of Section 2.1 describes Special Use Airspace operations (2.1.1) and SpaceShipTwo, WhiteKnightTwo, and the support aircraft (2.1.2) – Description (2.1.2.1), Propellants (2.1.2.2), Pre-flight and Post-flight activities (2.1.2.3), and Flight Profile (2.1.2.4).

Under the Proposed Action in this EA, the FAA/AST could issue experimental permits or launch licenses to multiple operators of SpaceShipTwo and WhiteKnightTwo. This EA does not reference specific operators, and assumes that the potential environmental impacts associated with operating SpaceShipTwo and WhiteKnightTwo under experimental permits and launch licenses would be identical. It is anticipated that several SpaceShipTwo rockets and WhiteKnightTwo aircraft would be built and operated over time.

The Proposed Action does not include any construction activities. The Mojave Air and Space Port’s existing infrastructure, which consists of an air traffic control tower, rocket motor test stands, launch pads, engineering facilities (including the recently built 68,000 square foot hangar), a high bay building, and an existing runway (Runway 12-30 or Runway 08-26), would be used for takeoff and landing activities.

### 2.1.1 Special Use Airspace Operations

As discussed in Section 3.1.2 of this EA, the off-site operating area includes the R-2508 Complex, which includes all the airspace and associated land presently used and managed by the three principal military entities conducting activities in the Upper Mojave Desert region: Air Force Flight Test Center, Edwards AFB; Army National Training Center, Fort Irwin; and Naval Air Warfare Center Weapons Division, China Lake. When this airspace is not needed for U.S. Department of Defense (DoD) activities, it is released to the FAA for joint use (USAF 2011a). Operation of SpaceShipTwo, WhiteKnightTwo, and the support aircraft within the R-2508 Complex would be compatible with the operations currently being conducted in this airspace and would be conducted under a Letter of Agreement or other appropriate coordination or approvals between the aircraft operators and the managers of each special use airspace involved. After takeoff from the Mojave Air and Space Port, the WhiteKnightTwo and support aircraft would enter the R-2508 Complex under control of either the High Desert Terminal Radar Approach Control (TRACON) (call sign “Joshua Approach”) or the Space Positioning Optical Radar Tracking (SPORT) Radar Control Facility located at Edwards AFB, or the Mojave Air Traffic Control Tower. High Desert TRACON is an FAA Air Traffic Control Facility and the controlling agency for the R-2508 Complex. All operations (including takeoff, launch, and landing) would be conducted under control of one of these facilities to ensure appropriate integration with other aircraft operations in the special use airspace. The R-2508 Complex would not close during launch or reentry operations, and all launches and reentries would be coordinated with the appropriate DoD agency.

### 2.1.2 SpaceShipTwo, WhiteKnightTwo, and Support Aircraft

#### 2.1.2.1 Description

The carrier aircraft, WhiteKnightTwo, is powered by four Pratt and Whitney PW308A engines with a total thrust of approximately 27,600 pounds. WhiteKnightTwo would carry the mated
SpaceShipTwo (see Exhibit 2-2) during takeoff and launch events. WhiteKnightTwo has a wingspan of approximately 140 feet and a maximum gross takeoff weight of approximately 70,000 pounds.

SpaceShipTwo has a hybrid rocket motor with a thrust in the range of 50,000 to 85,000 pounds and a burn time of approximately 60 seconds. The wingspan of SpaceShipTwo is approximately 27 feet, and its maximum launch weight is approximately 29,000 pounds. SpaceShipTwo has an un-fueled/dry weight of approximately 13,500 pounds.

**Exhibit 2-2. SpaceShipTwo Mated to WhiteKnightTwo**

Source: Virgin Galactic 2011a

Up to two other support aircraft operating from the Mojave Air and Space Port could be used to track SpaceShipTwo operations. Support aircraft would takeoff from an existing runway after WhiteKnightTwo and stay aloft with WhiteKnightTwo until SpaceShipTwo returns to the runway. These support aircraft could include a twin turboprop aircraft such as a Beach Starship (tracking at a higher altitude) and a single-engine piston aircraft such as an Extra 300 (tracking at a lower altitude).

### 2.1.2.2 Propellants

WhiteKnightTwo uses Jet A fuel and has a maximum fuel capacity of approximately 21,600 pounds. The Beach Starship support aircraft uses Jet A fuel, and the Extra 300 uses aviation gasoline (100 Low Lead) as its fuel.

SpaceShipTwo uses a hybrid propellant with nitrous oxide (N₂O) as an oxidizer and a solid organic material, such as, but not restricted to, nylon, hydroxyl-terminated polybutadiene (HTPB) rubber, plastic, or similar non-explosive organic material, as fuel. Depending on what fuel is used, nylon would be fabricated onsite at the Mojave Air and Space Port, and HTPB would be manufactured off-site in Poway, California. Section 2.1.1.2 of the 2009 FAA PEIS describes hybrid propulsion systems, including the HTPB rubber/N₂O combination of fuel and oxidizer.
SpaceShipTwo has a total propellant capacity (i.e., oxidizer plus fuel) of approximately 15,500 pounds. The solid fuel cartridge, approximately 15 feet long by 33 inches in diameter, integrated with a nozzle throat and nozzle expansion bell called a case, throat, and nozzle, is a single-use item which would be replaced after each flight.

If a flight were aborted after release of SpaceShipTwo from WhiteKnightTwo, it might be necessary to release the N2O oxidizer from the tank via redundant release valves before SpaceShipTwo glides to a landing. This process could be completed in 2 to 9 minutes. SpaceShipTwo’s solid fuel would remain onboard and would return to the ground with SpaceShipTwo.

2.1.2.3 Pre-flight and Post-flight Activities

Pre- and post-flight activities would include preparing SpaceShipTwo, WhiteKnightTwo, and the support aircraft for takeoff and launch and providing ground operations support (see Section 2.1.1.3 and 2.1.1.5 of the 2009 FAA PEIS for additional detail). All hazardous pre-flight ground operations would take place in a specified location which has established appropriate safety clear zones in accordance with the Mojave Air and Space Port’s launch site operator’s license.

For nominal launches, all of the oxidizer would be consumed during SpaceShipTwo powered flight. For aborted flights, the oxidizer would be released before landing, while the solid fuel would remain onboard and would be returned to the ground with SpaceShipTwo. For a nominal launch, no hazardous post-flight ground operations would be required to return SpaceShipTwo to safe conditions, and SpaceShipTwo would be returned to the hangar. In the event the oxidizer is not completely consumed or released, SpaceShipTwo would be moved to an area with an established safety clear zone, and the remaining oxidizer and fuel would be removed in accordance with the Mojave Air and Space Port’s Explosive Site Plan. WhiteKnightTwo and the support aircraft would not be affected by an aborted SpaceShipTwo launch and would land as planned.

2.1.2.4 Flight Profile (Takeoff, Flight, and Landing)

SpaceShipTwo and WhiteKnightTwo takeoffs, launches, and landings at the Mojave Air and Space Port would occur only during daytime hours. WhiteKnightTwo with the mated SpaceShipTwo would takeoff horizontally from Runway 12-30 or Runway 08-26 at the Mojave Air and Space Port and fly to the designated launch area within the R-2508 Complex. WhiteKnightTwo would ascend to an altitude of approximately 50,000 feet, and SpaceShipTwo would be released (see Exhibit 2-3). Once released, SpaceShipTwo would fall for several seconds prior to ignition of the rocket motor. WhiteKnightTwo would pull away but remain in flight until shortly after SpaceShipTwo lands. Following ignition of the rocket motor, SpaceShipTwo would climb at supersonic speed (in excess of 768 miles per hour) until propellants are consumed, at or around 150,000 feet, after which the rocket motor would shut off. SpaceShipTwo would then coast to an apogee of at least 360,000 feet above mean sea level. For exoatmospheric flight, a cold gas (compressed air) reaction control system would be used for attitude control. There would be no propellant combustion during the descent of SpaceShipTwo. SpaceShipTwo would fly only suborbital trajectories and therefore would not reach Earth orbit.
SpaceShipTwo would reenter the Earth’s atmosphere in a feathered configuration to make the vehicle less streamlined and to increase drag, thus slowing down the vehicle. SpaceShipTwo would descend from the point of reentry until reaching an altitude of approximately 70,000 feet at which point SpaceShipTwo would switch to a normal or un-feathered configuration and glide unpowered, with no propellant combustion, to a horizontal landing on the designated runway at the Mojave Air and Space Port. A sonic boom would be generated during reentry, at the point at which SpaceShipTwo is no longer supersonic (around 80,000 feet). No supersonic operations would occur outside the area outlined in Exhibit 2-4. WhiteKnightTwo would make a powered horizontal landing on the designated runway at the Mojave Air and Space Port.

Up to two support aircraft could also be used to track SpaceShipTwo and WhiteKnightTwo during flight and would land after SpaceShipTwo and WhiteKnightTwo. In the event of an off-nominal reentry or aborted flight, SpaceShipTwo would glide to the most appropriate contingency or emergency landing site, such as the nearest public, military, or private airport or dry lake bed.

### 2.2 No Action Alternative

Under the No Action Alternative, the FAA would not issue experimental permits or launch licenses for the operation of SpaceShipTwo and WhiteKnightTwo from the Mojave Air and Space Port. The Mojave Air and Space Port would continue its existing operations.
2.3 Resource Areas Analyzed in this EA

Because the 2009 FAA PEIS is incorporated by reference, the scope of this EA focuses on those resource areas that might be affected by impacts specific to the Proposed Action for SpaceShipTwo, WhiteKnightTwo, and support aircraft operations. These resource areas include the following: air quality; biological resources (including fish, wildlife, and plants); historical, architectural, archaeological, and cultural resources; hazardous materials, pollution prevention, and solid waste; health and safety; land use (including Department of Transportation Section 4(f) properties); light emissions and visual resources; noise and compatible land use; socioeconomic resources, environmental justice, and children’s environmental health and safety; and cumulative impacts. This EA summarizes and incorporates by reference the discussion in the 2009 FAA PEIS and does not analyze in further detail the potential impacts to the following environmental resource areas.

Construction Impacts – No construction activities are planned as part of the Proposed Action.

Coastal Resources – The Mojave Air and Space Port is not located in a coastal area, and the Proposed Action would not have an impact on coastal resources.
**Water Quality** – The Proposed Action would not involve discharges to surface waters or groundwater. Any accidental release of hazardous materials would be minimized through adherence to the EKAD Spill Prevention Control and Countermeasures Plan. In the unlikely event of a launch failure occurring outside of the Mojave Air and Space Port, any potential impacts to water quality would be minimized by emergency response and clean-up procedures.

**Wetlands** – There are no jurisdictional wetlands at the Mojave Air and Space Port. In the unlikely event of a launch failure occurring outside of the Mojave Air and Space Port, any potential impacts to wetlands would be minimized by emergency response and clean-up procedures.

**Floodplains** – The Mojave Air and Space Port does not have any 100-year floodplains, and the Proposed Action would not encroach on any base floodplains based on a 100-year flood.

**Wild and Scenic Rivers** – There are no federally designated Wild and Scenic Rivers at the Mojave Air and Space Port. There are federally designated Wild and Scenic Rivers within the R-2508 Complex, including the Amargosa River, Kern River, Kings River, and potentially portions of Cottonwood Creek, Merced River, Owens River Headwaters, and Tuolumne River. However, because the probability of a crash is low, and because Wild and Scenic Rivers are widely dispersed throughout the region, it is unlikely that debris would impact a Wild and Scenic River.

**Farmlands** – The Proposed Action would not convert farmland to nonagricultural use.

**Natural Resources and Energy Supply** – The Proposed Action would not result in the development of new facilities or result in notable changes in local energy demands or consumption of other natural resources.

**Secondary (Induced) Impacts** – The Proposed Action would not involve the potential for induced or secondary impacts to surrounding communities, such as shifts in population movement and growth, public service demands, and economic activity. The resources analyzed would incur negligible impacts; therefore, the potential for secondary (induced) impacts would also be expected to be negligible.
3. AFFECTED ENVIRONMENT

As noted in Section 1.1 above, the 2009 FAA PEIS is incorporated by reference. Sections 3.1 and 3.6 of the 2009 FAA PEIS fully describe existing general and on-site-specific (i.e., Mojave Air and Space Port) environmental conditions for all resource areas evaluated in the 2009 FAA PEIS. The on-site affected environment is therefore only briefly summarized in this EA. In compliance with the CEQ regulations at 40 CFR § 1502.15, the level of detail provided in this chapter is commensurate with the importance of the impact on these resources.

3.1 Overview of the Proposed Operational Area

This section gives an overview of the proposed operational area, which is referred to as the Region of Influence (ROI) and is divided into on-site and off-site areas. The ROI is divided into on-site and off-site areas to distinguish between the Mojave Air and Space Port property and the area surrounding it where operations would occur. A similar approach was used in the 2004 FAA EA, although the off-site ROI in this EA is larger than the off-site ROI in the 2004 FAA EA.

On-Site ROI

The on-site ROI, defined as the boundaries of the Mojave Air and Space Port, was described in Sections 2.1.2.5 and 3.6 of the 2009 FAA PEIS and is summarized here. EKAD holds a launch site operator license to operate the Mojave Air and Space Port as an FAA-licensed commercial space launch site. The Mojave Air and Space Port is approximately 3,000 acres and is located in Kern County, California east of the unincorporated community of Mojave. There are more than 60 aviation and technology companies located at the Mojave Air and Space Port, making the Mojave Air and Space Port one of the largest employment centers in eastern Kern County (Mojave Air and Space Port 2011). In addition to being a general-use public airport, Mojave Air and Space Port supports flight testing, commercial space industry development, and aircraft maintenance activities. Existing infrastructure at the Mojave Air and Space Port used to support launch activities consists of an air traffic control tower, rocket motor test stands, launch pads, engineering facilities, a high bay building, and two runways (Runway 12-30 and Runway 8-26). More than 300 acres are zoned specifically for rocket motor testing and development. Exhibit 2-1 displays the three runways and the area immediately surrounding the Mojave Air and Space Port.

Off-Site ROI

The off-site ROI is more than 20,000 square miles and is defined by the boundaries of the R-2508 Complex. The R-2508 Complex includes restricted areas R-2508, R-2502N, R-2502E, R-2505, R-2506, R-2524, and R-2515, and adjacent Military Operations Areas (MOAs) and Air Traffic Control Assigned Airspace (ATCAA) areas (see Exhibit 3-1). It encompasses large portions of Inyo, Kern, San Bernardino, and Tulare counties in east-central California. It also includes small portions of Fresno and Los Angeles counties in California, and Esmeralda County in Nevada. Major communities beneath the R-2508 Complex include the cities of California City and Ridgecrest.
A large portion (approximately 82 percent) of the land beneath the R-2508 Complex is managed by Federal agencies, including the National Park Service (26.8 percent), Bureau of Land Management (24.6 percent), Department of Defense (DoD) (17.4 percent), and the U.S. Forest Service (13 percent) (California Governor’s Office of Planning and Research 2008). This area is largely undeveloped desert consisting of shrub and brush vegetation (Kern County 2011).

The R-2508 Complex includes all the airspace and associated land presently used and managed by the three principal DoD entities conducting activities in the Upper Mojave Desert region:

- Air Force Flight Test Center, Edwards AFB;
- National Training Center, Fort Irwin (U.S. Army); and
- Naval Air Warfare Center Weapons Division, China Lake (USAF 2011a).

Management of the R-2508 Complex falls under the R-2508 Joint Policy and Planning Board (JPPB). The JPPB was founded in 1975 under direction of the Joint Logistics Commanders and approved by the respective Service Chiefs and the Office of the Secretary of Defense (USAF 2011a). JPPB members are Commanders of the three DoD entities listed above. The R-2508 Complex Control Board (CCB), established in 1975, is comprised of individuals directly representing their respective JPPB Commander (USAF 2011a). The mission of the CCB is to supervise management of the R-2508 Complex.

Under direction of the R-2508 CCB, the R-2508 Central Coordinating Facility (CCF) is located at Edwards AFB and is the managing and scheduling authority for R-2508 Complex shared-use airspace (USAF 2011a). Within the policy, scope, and limitations set by the CCB, the CCF has autonomous authority for the R-2508 Complex shared-use airspace when the Complex is...
scheduled and activated for military use. When the airspace is not needed for DoD activities, it is released to the FAA for joint use (USAF 2011a).

The purpose of the R-2508 Complex airspace is to confine military and other special-use activities, including certain types of test or training flight or weapons uses, to locations where they can be performed effectively while ensuring the greatest practical level of safety for all civil and military airspace users. Inside the R-2508 Complex, the DoD conducts military operations and training flights that require aircraft to fly at supersonic speeds, sometimes as low as 200 feet above the ground (FAA 2004).

### 3.2 Air Quality

Section 3.1.1 of the 2009 FAA PEIS provides a general description of air quality and climate change, and discussion of the regulatory setting including the National Ambient Air Quality Standards (NAAQS) and the California Ambient Air Quality Standards. Section 3.6.1 of the 2009 FAA PEIS discusses existing air quality conditions at the Mojave Air and Space Port. Section 3.2.1 below describes the attainment status of the on- and off-site ROIs. Section 3.2.2 below provides updated information on existing air quality conditions.

#### On- and Off-Site ROIs

The Mojave Air and Space Port is located within the Eastern Kern Air Pollution Control District. Eastern Kern County is in Federal nonattainment and state nonattainment for the 8-hour ozone standards, state nonattainment for the 1-hour ozone standard, and state nonattainment for particulate matter (PM) less than 10 micrometers in diameter (PM$_{10}$). Nonattainment status means that measured ambient concentrations have violated the standard in the recent past. Exhibit 3-2 lists the Eastern Kern Air Pollution Control District attainment status for criteria pollutants. As part of its efforts to reach attainment status, the Eastern Kern Air Pollution Control District has developed several planning documents, including the Federal Ozone Attainment Demonstration Plan, which have been approved by the U.S. Environmental Protection Agency (EPA) and are included in the California Ozone State Implementation Plan. The documents outline baseline and future regional emission inventories, mandated emission reductions, and computer modeling to demonstrate future attainment of the Federal ozone standard. Kern County has also developed the California Clean Air Act Kern County Ozone Air Quality Attainment Plan (most recently updated in December 2005).

#### Exhibit 3-2. Eastern Kern Air Pollution Control District Attainment Status for Criteria Pollutants$^a$

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</tr>
<tr>
<td>Lead particulates</td>
<td>Attainment</td>
<td>Unclassifiable</td>
</tr>
</tbody>
</table>

$^a$ Sources: EPA 2011a, CARB 2010.  
$^b$ 2006 Federal standard of 0.08 parts per million (ppm). The proposed designation under the 2008 standard of 0.075 ppm is the same.
Exhibit 3-2. Eastern Kern Air Pollution Control District Attainment Status for Criteria Pollutants

c. Nonattainment status means that measured ambient concentrations have violated the standard in the recent past. Maintenance status means that an area was previously designated nonattainment but re-designated as attainment due to meeting the standard. Unclassifiable status means that EPA did not have sufficient data to make an attainment designation. EPA treats federally unclassifiable areas as attainment for regulatory purposes.

d. PM10 and PM2.5 refer to particles that are less than 10 and 2.5 micrometers in diameter, respectively.

Because Eastern Kern County is designated Federal nonattainment for ozone and PM10, the EPA General Conformity requirements (41 CFR 93 Subpart B) apply to emissions of nitrogen oxides (NOx), volatile organic compounds (VOCs), and PM10. The Proposed Action would require a Federal conformity determination if it led to an increase in NOx, VOC, or PM10 emissions that exceeded the thresholds, or de minimis levels, specified in the conformity rule. The General Conformity de minimis thresholds for this area are 100 tons per year of NOx, 100 tons per year of VOCs, and 70 tons per year of PM10. If the emissions increase caused by the proposed project exceeds the thresholds, a General Conformity determination is required; if the emissions increase does not exceed the thresholds, no further conformity evaluation is required.

As discussed in Section 4.1 below, only emissions generated by aircraft during takeoff and landing would occur in the on-site ROI. Most of the emissions in the off-site ROI would occur above 3,000 feet and would not be mixed to ground level, and thus are not considered with respect to compliance with ambient air quality standards or the General Conformity rule. Therefore, the discussion of existing air quality conditions covers the on-site ROI.

Existing Air Pollutant Levels Measured in the ROI

The California Air Resources Board operates an air quality monitoring site at the Mojave Air and Space Port, at 923 Poole Street, which measures concentrations of ozone, PM10, and PM less than 2.5 micrometers in diameter (PM2.5). Exhibit 3-3 summarizes the monitoring results for the most recent three years of data. Ozone levels exceeded the NAAQS on 41 days in 2008, 32 days in 2009, and three days in 2010. PM10 levels exceeded the NAAQS on one day in 2008. PM2.5 levels did not exceed the NAAQS in 2008–2010.

Exhibit 3-3. Maximum Measured Air Pollutant Concentrations At Mojave Air and Space Port

<table>
<thead>
<tr>
<th>Pollutant and Averaging Period (Unit)</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ozone, 8 hour (parts per billion)</td>
<td>102</td>
<td>84</td>
<td>83</td>
</tr>
<tr>
<td>PM10, 24-hour (micrograms per cubic meter)</td>
<td>154.0</td>
<td>68.0</td>
<td>52.8</td>
</tr>
<tr>
<td>PM2.5, 24-hour (micrograms per cubic meter)</td>
<td>19.1</td>
<td>12.7</td>
<td>10.0</td>
</tr>
<tr>
<td>PM2.5, annual (micrograms per cubic meter)</td>
<td>6.8</td>
<td>5.1</td>
<td>Insufficient data</td>
</tr>
</tbody>
</table>


The nearest additional air quality monitoring sites are located in Lancaster (about 26 miles from the airport), Canebrake (about 37 miles from the airport), and Ridgecrest (about 46 miles from the airport), California. Aircraft landing at or taking off from the airport pass through 3,000 feet altitude within a few miles of the runway, and their emissions do not disperse to ground level at the distances at which these monitors are located. Accordingly, the Lancaster, Canebrake, and Ridgecrest monitors are outside the ROI, and this EA does not report measured concentrations for sites other than Mojave.
3.3 Biological Resources (Including Fish, Wildlife, and Plants)

Section 3.1.2 of the 2009 FAA PEIS provides a general description of biological resources in the on-site ROI, including a description of the regulatory setting. Section 3.6.2 of the 2009 FAA PEIS provides existing conditions for biological resources at the Mojave Air and Space Port.

The Mojave Air and Space Port is situated on the western portion of the Mojave Desert in California and consists largely of developed property. The Mojave Specific Plan (Kern County 2003) is one of three major plans used to control development of the Mojave community (see Section 3.7 below for other land use plans). The Mojave Specific Plan identifies the Mojave Air and Space Port as an “urbanized non-sensitive area” that has already been developed. The area surrounding the Mojave Air and Space Port (including land underlying the R-2508 Complex) is rich in biological diversity because of its varied vegetation communities, distinct landforms, and location adjacent to the Transverse Ranges, the Sierra Nevada, the Colorado Desert, and the Great Basin (FAA 2004).

On-Site ROI

Potential animals in the on-site ROI include invertebrates, reptiles, mammals, and migrant and local birds. Because there is little rainfall and only intermittent streams in the on-site ROI, there are no fish in the on-site ROI (FAA 2004). Exhibit 3-4 presents state and federally protected animal species listed by the U.S. Fish and Wildlife Service (USFWS) and/or California Department of Fish and Game that might be present at or within the vicinity of the on-site ROI. Of the listed animal species potentially occurring in the on-site ROI, the federally threatened desert tortoise (Gopherus agassizii) and the state threatened Mohave ground squirrel (Xerospermophilus mahavensis) are the only species that have been known to occur at the Mojave Air and Space Port in the past (FAA 2004). Section 4.6.2.3 of the 2009 FAA PEIS provides brief descriptions of the desert tortoise and Mohave ground squirrel.

Exhibit 3-4. State and Federally Listed Animal Species Potentially Occurring in the On-Site ROI

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Federal Status</th>
<th>State Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mohave ground squirrel</td>
<td>Xerospermophilus mahavensis</td>
<td>Not listed</td>
<td>Threatened</td>
</tr>
<tr>
<td>Desert tortoise</td>
<td>Gopherus agassizii</td>
<td>Threatened</td>
<td>Threatened</td>
</tr>
<tr>
<td>California condor</td>
<td>Gymnogyps californianus</td>
<td>Endangered</td>
<td>Endangered(^b)</td>
</tr>
<tr>
<td>Least Bell’s vireo</td>
<td>Vireo bellii pusillus</td>
<td>Endangered</td>
<td>Endangered(^b)</td>
</tr>
<tr>
<td>Southwestern Willow flycatcher</td>
<td>Empidonax traillii extimus</td>
<td>Endangered</td>
<td>Endangered(^b)</td>
</tr>
</tbody>
</table>

\(^a\) Sources: USFWS 2012, CDFG 2012

\(^b\) Note: The U.S. Fish and Wildlife Service (USFWS 2012) lists these three species as potentially occurring in the on-site ROI. However, the California Department of Fish and Game does not list these three species as being documented in the U.S. Geological Survey 7.5’ topographic quad of the Mojave Air and Space Port (CDFG 2012).

During informal consultation in 2007 between the Ventura USFWS Office and EKAD for a water line and tank project at the Mojave Air and Space Port, the USFWS stated desert tortoises have not been detected within the Mojave Air and Space Port during surveys conducted over several years and are not expected to reoccupy the area due to high levels of human activity and large amounts of disturbed land (USFWS 2007, see Appendix B). The USFWS also noted the
Mojave Air and Space Port is not within the boundaries of critical habitat of the desert tortoise or any other federally listed species (USFWS 2007, 59 FR 5820–5866 [February 8, 1994]). The USFWS did not expect that any other federally listed species was likely to occur at the Mojave Air and Space Port at the time (USFWS 2007). Therefore, the USFWS concluded that, at such time, desert tortoises were not present within the boundaries of the Mojave Air and Space Port and would not be affected by the water line and tank project or future activities undertaken at the Mojave Air and Space Port (USFWS 2007). The FAA is not aware of any indication that desert tortoises or any other federally listed species have been located within the Mojave Air and Space Port since the 2007 consultation, and no new federally listed species have been added to the list for the on-site ROI (USFWS 2012). Furthermore, the USFWS informed the FAA that no desert tortoise surveys would be required prior to launch activities at the Mojave Air and Space Port (FAA 2009b).

On April 27, 2010, the USFWS announced\(^1\) it was conducting a status review of the Mohave ground squirrel based on a petition to federally list the species as endangered. Based on this review, the USFWS issued a 12-month finding on the petition on October 6, 2011, stating that listing the Mohave ground squirrel as threatened or endangered was not warranted at this time.\(^2\)

The region surrounding the Mojave Air and Space Port to the east consists of Mojave creosote bush scrub, which may be intermixed with chenopod scrub formations (FAA 2004). Joshua tree habitats can be seen in western portions of the region. Exhibit 3-5 lists the only current state and federally protected plant species that might be present at or within the vicinity of the Mojave Air and Space Port.

**Exhibit 3-5. State and Federally Listed Plant Species Potentially Occurring in the On-Site ROI\(^a\)**

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Federal Status</th>
<th>State Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bakersfield cactus</td>
<td><em>Opuntia basilaris var. treleasei</em></td>
<td>Endangered(^b)</td>
<td>Endangered</td>
</tr>
</tbody>
</table>

\(^a\) Sources: USFWS 2012, CDFG 2012

\(^b\) Species not listed as occurring in the on-site ROI by the U.S. Fish and Wildlife Service (USFWS 2012), but listed as occurring in the U.S. Geological Survey 7.5’ topographic quad of the Mojave Air and Space Port by the California Department of Fish and Game (CDFG 2012).

**Off-Site ROI**

Like the on-site ROI, potential animals in the off-site ROI include invertebrates, reptiles, mammals, fish, and migrant and local birds. As mentioned in Section 3.1 above, a large portion of the land in the off-site ROI is federally owned and contains large areas of uninterrupted wildlife habitat. For example, two sensitive ecological areas, as defined by the county of Los Angeles, occur within Edwards AFB. Piute Ponds, in the southwestern corner of Edwards AFB, supports a significant number of waterfowl and provides a stopover area for migratory birds. Mesquite woodlands, in the south-central portion of Edwards AFB, provide a unique habitat for bird species such as phainopepla (*Phainopepla nitens*) and loggerhead shrike (*Lanius ludovicianus*) (USAF 2001).

There is designated critical habitat for the desert tortoise within the off-site ROI (59 FR 5820–5866 [February 8, 1994]). For example, approximately 60,800 acres (or about 100 square miles)

\(^1\) 75 FR 22063 (April 27, 2010)

\(^2\) 76 FR 194 (October 6, 2011).
of the Edwards AFB (located in the off-site ROI) falls within the Fremont-Kramer Desert Wildlife Management Area, one of 12 critical habitat units in the southwestern United States (USAF 2008a). In addition to the desert tortoise and Mohave ground squirrel, other state and federally listed animal species occur in the counties that comprise the off-site ROI and thus could be present within the off-site ROI (see Exhibit A-1 in Appendix A for a list of these species). For example, the off-site ROI contains important habitat for desert bighorn sheep, and some pools and drainages are the only habitat for certain protected fish species, such as pupfish (USAF 2001).

The off-site ROI contains many species of plants, including those associated with the Sequoia, Kings Canyon, and Death Valley National Parks; Sequoia and Inyo National Forests; Domeland and John Muir Wilderness Areas; wildlife and waterfowl refuges; and land managed by the Bureau of Land Management. Mojave Desert plant communities in the off-site ROI include creosote bush scrub, Joshua tree woodland, arid-phase saltbush scrub, halophytic-phase saltbush scrub, lake beds, and mesquite woodlands. These desert plant communities match closely the on-site ROI vegetation. Various non-desert scrub communities are also common within the R-2508 Complex area, including shadscale scrub, chaparral, and sage-grass (also known as sagebrush grassland) (USAF 2001).

The western portion of the R-2508 Complex overlies the Sierra Nevada Range and a portion of the San Joaquin Valley. The vegetation contained in these regions differs substantially from the vegetation found within the Mojave Desert. Mountain slope elevation and the accompanying microclimate gradient result in a zoning of plant communities on east- and west-facing slopes. Several coniferous forest types occur in the Sierra Nevada, including red fir forest, yellow pine forest, mixed coniferous forest, and pinyon-juniper woodlands. Subalpine forests dominated by high-elevation pines, and alpine habitats, also known as fell fields, occur at high elevations in the Sierra Nevada. At lower elevations, foothill grasslands, also known as valley grasslands, are dominated by various grass species. This low-growing herbaceous community is limited to the lower elevations of the western Sierra Nevada and the San Joaquin Valley. Foothill woodlands are dominated by oaks at lower elevations and certain pines at upper elevations on the western side of the Sierra Nevada (USAF 2009).

Exhibit A-2 in Appendix A lists plant species that are federally listed in the counties comprising the off-site ROI and thus potentially could occur within the off-site ROI.

### 3.4 Historical, Architectural, Archaeological, and Cultural Resources

Section 3.1.3 of the 2009 FAA PEIS provides a general description of historical, architectural, archaeological, and cultural resources, including a definition, description, and regulatory setting. Section 3.6.3 of the 2009 FAA PEIS and Section 3.5 of the 2004 FAA EA provide existing conditions for historical, architectural, archaeological, and cultural resources for the on-site ROI at the Mojave Air and Space Port.

**On-Site ROI**

As described in the 2009 FAA PEIS, there are no recorded cultural resources or sites listed on or eligible to be listed on the National Register of Historic Places at the Mojave Air and Space Port or in the immediate vicinity. Investigations conducted as part of preparing the 2004 FAA EA concluded that no designated tribal lands are on Mojave Air and Space Port property, although
Southern Paiute, Western Shoshone, Yokuts, and Mojave descendants reside in the surrounding region.

Off-Site ROI

A recent search identified 652 known sites in the California counties of Fresno, Inyo, Kern, Los Angeles, San Bernardino, and Tulare that are listed on the National Register of Historic Places (DOI 2012). One site was listed for Esmeralda County, Nevada (DOI 2012). There are many more known sites in the off-site ROI that may be eligible for listing in the National Register of Historic Places. These include sites identified as American Indian, archaeological, or Native American sites and California State Historical Landmarks.

3.5 Hazardous Materials, Pollution Prevention, and Solid Waste

Section 3.1.5 of the 2009 FAA PEIS provides a general description of hazardous materials, pollution prevention, and solid waste, including a description of the regulatory setting. Section 3.6.5 of the 2009 FAA PEIS provides existing conditions for this resource area at the Mojave Air and Space Port.

On-Site ROI

The Mojave Air and Space Port uses hazardous materials for various institutional activities, which in turn generate hazardous wastes. Hazardous materials and waste are managed in accordance with applicable Federal, state, and local rules and regulations. Most of the hazardous materials at the Mojave Air and Space Port are airplane fuels and rocket propellants (oxidizers and fuels). Other maintenance related materials used, stored, and generated on site include acetylene, paints, used motor and hydraulic oil, gear lubricant, and hydraulic fluid.

There is a bulk tank farm on site with seven above-ground storage tanks that stock Jet-A and 100 Low Lead gasoline fuel. There is also another tank on site that can hold up to 50 tons of N₂O. EKAD has a Spill Prevention Control and Countermeasures Plan in place that outlines operating procedures used to prevent fuel spills. All above-ground fuel storage tanks are monitored daily for spills, and the inspections are formally documented.

Off-Site ROI

Similar to the Mojave Air and Space Port, the off-site ROI contains hazardous materials and waste associated with the military installations located within the off-site ROI. These hazardous materials and waste are managed in accordance with applicable Federal, state, and local regulations and site-specific (e.g., Air Force Flight Test Center, Edwards AFB) environmental and safety standards.

3.6 Health and Safety

Section 3.1.6 of the 2009 FAA PEIS provides a general description of health and safety, including a description of the regulatory setting. Section 3.6.6 of the 2009 FAA PEIS provides existing conditions for this resource area at the Mojave Air and Space Port.
On-Site ROI

The Mojave Air and Space Port provides Jet A and 100 Low Lead gasoline fuel services for aircraft on site. In accordance with the Fueling Policy for Jet A and 100 Low Lead fuels, only EKAD personnel can conduct fuel service activities at the Mojave Air and Space Port. The EKAD Administrative Code, Section 4-2.11, Fuel Handling, addresses safety measures that EKAD personnel and customers must follow before, during, and after providing fuel services. In accordance with the EKAD Administrative Code, a Fueling Policy was established to address all fueling activities at the Mojave Air and Space Port. This policy details requirements regarding proper fueling techniques, storage of fuel and salvage fuel, and spill response and reporting. Additionally, the EKAD Spill Prevention Control and Countermeasures Plan provides guidance for operation of the above-ground fuel storage tanks.

Emergency response services at the Mojave Air and Space Port consist mainly of the EKAD Aerospace Rescue Fire Fighting unit. The fire fighting crew is trained and qualified in fire and rescue techniques, and its response requirements follow the guidelines of the National Fire Protection Standard 402 and the U.S. Air Force Defense Logistics Agency Manual 8210.1. The Kern County Fire Department, located 0.25 mile from the Mojave Air and Space Port, provides 24-hour support to the EKAD Aerospace Rescue and Fire Fighting unit. Additionally, a Special Crash Rescue Vehicle is located at the Mojave Air and Space Port, which is specifically designed to respond to launch vehicle accidents. Hall Ambulance provides on-site, 24-hour, land-based emergency medical services, and Mercy Air provides on-site, 24-hour, air-based emergency medical services.

A Launch Site Accident Investigation Plan contains detailed procedures for reporting, responding to, and investigating operational anomalies at the Mojave Air and Space Port, as defined at 14 CFR § 420.05.

Off-Site ROI

Edwards AFB, approximately 30 miles east of the Mojave Air and Space Port, provides local emergency response services via the mutual aid system and can provide Aerospace Rescue and Fire Fighting crews, security forces, and emergency medical services. A community response plan is in place to communicate and coordinate emergency alerts and responses to the surrounding Mojave community (FAA 2004). Additional military entities within the off-site ROI likely have their own emergency response systems (e.g., the National Training Center at Fort Irwin and the Naval Air Warfare Center Weapons Division at China Lake).

3.7 Land Use (Including U.S. Department of Transportation Section 4(f) Properties)

Section 3.1.7 of the 2009 FAA PEIS provides a general description of land use, including a description of the regulatory setting. Section 3.6.7 of the 2009 FAA PEIS provides existing conditions for this resource area at the Mojave Air and Space Port.

On-Site ROI

Three major plans control the land use development of the Mojave community including:
• **County of Kern General Plan.** In California, state law makes a General Plan the foundation and central feature of the local planning process. Each county and each city is required to prepare, adopt, and maintain a General Plan to govern the physical development of all the land area under its jurisdiction. A General Plan is a type of constitution governing the physical growth and change in the community. No land division, parcel map, conditional use permit, or rezoning can be approved unless it is found to be consistent with the adopted plan (Kern County 2009).

• **County of Kern Airport Land Use Compatibility Plan.** This plan was developed to establish procedures and criteria for Kern County and the incorporated cities to address compatibility issues when making planning decisions regarding airports and the land uses around them (Kern County 2011).

• **Mojave Specific Plan.** The Mojave Specific Plan provides a detailed description of how to implement the goals, objectives, and policies of the General Plan in a manner appropriate to the smaller unincorporated areas of the County (Kern County 2003).

In addition, the Mojave Air and Space Port Airport Layout Plan Update provides information pertaining to the airport and the area it serves, forecasts of aviation activity through 2030, identification of the adequacy of existing airport facilities, and an airport development plan (EKAD 2010). A detailed land use discussion specific to the on-site (and immediate surrounding areas) for the Mojave Air and Space Port was provided in the 2004 FAA EA and the 2009 FAA PEIS, and that discussion is incorporated by reference in this EA.

**Off-Site ROI**

The various land uses in the R-2508 Complex are characterized in the R-2508 Complex User’s Handbook (USAF 2011a). Edwards AFB and the R-2508 Complex have served an important role in test flight activities and development of supersonic vehicles as well as NASA’s Space Shuttle orbiter program, and these types of testing activities are typical of those that currently occur in the R-2508 Complex. Land use plans for the areas within the R-2508 Complex have been developed in consideration of these existing military and supersonic vehicle activities.

In 2008, a Joint Land Use Study for the R-2508 Complex was developed (California Governor’s Office of Planning and Research 2008). A Joint Land Use Study is a collaborative planning effort between active military installations, surrounding counties and cities, and other affected agencies. The overall goal of a Joint Land Use Study is to reduce potential conflicts while accommodating growth, sustaining the economic health of the region, and protecting public health and safety. The public was provided with the opportunity to participate in the Joint Land Use Study process through a series of public forums held in October 2007 and April 2008. The R-2508 Joint Land Use Study is not an adopted plan, but rather, a recommended set of compatibility guidelines that can be implemented by local jurisdictions, Native American tribes, agencies, and organizations to guide their future compatibility efforts. While the strategies in the Joint Land Use Study are not mandatory obligations, they were developed with representatives of the stakeholders involved, thereby providing a set of strategies designed to meet local needs.

Typical operations within the R-2508 Complex include:

• Aircraft research and development in all stages of flight,
• Operational weapons test and evaluation flights,
• Student pilot training,
• Air combat maneuvering and proficiency flights, and
• Civilian test aircraft in direct support of DoD and/or defense testing.

Aircraft operations occurring in the R-2508 Complex must remain flexible because airspace requirements are not entirely predictable. Therefore, to best use the available airspace, participating aircraft operating in the R-2508 Complex shared-use airspace are not given exclusive use of the airspace and are considered to be operating under concurrent operations (operations occurring simultaneous to other aircraft operations in the airspace) (USAF 2011a). Participating aircraft must accept radar traffic advisories issued by Joshua Approach, China Control, or SPORT unless otherwise coordinated, and use the “see-and-avoid” principle to avoid interfering with the missions of other aircraft using the airspace (USAF 2011a).

The R-2508 Complex includes sensitive areas such as populated areas and National Parks. Flights within the R-2508 Complex shall be conducted so that a minimum of annoyance is experienced by persons on the ground (USAF 2011a). The R-2508 User’s Handbook specifies that definite and particular effort shall be taken to fly in such a manner that the individuals (in sensitive areas) do not believe they or their property are endangered (USAF 2011a). All communities within the R-2508 Complex are considered “noise sensitive areas” (USAF 2011a). Noise sensitive areas shall be avoided by a minimum of 3,000 feet (USAF 2011a). The only exception to the 3,000 foot restriction is while operating on a CCF-approved test plan (USAF 2011a). Populated areas located within the R-2508 Complex include the following: Big Pine, Boron, Cartago, Independence, Inyo Kern, Johannesburg, Keeler, Kernville, Lake Isabella, Lone Pine, Mojave, Mt. Mesa, North Edwards, Olancha, Onyx, Randsburg, Red Mountain, Ridgecrest, Rosamond, South Lake, Stovepipe Wells, Tehachapi, Trona, Weldon, and Wofford Heights (California Governor’s Office of Planning and Research 2008, USAF 2011a).

The Federal statute that governs impacts on any publicly owned land for Department of Transportation agencies is commonly known as the Department of Transportation Act, Section 4(f) provisions, although it was recodified and renumbered as 49 U.S.C. Section 303 (c). Department of Transportation agencies must consider impacts to Section 4(f) properties when evaluating the impacts of a proposed transportation activity. Section 4(f) stipulates that Department of Transportation agencies cannot approve the use of any Section 4(f) land unless the following conditions apply:

• There is no feasible and prudent alternative to the use of the land;
• The action includes all possible planning to minimize harm to the property resulting from use.

Section 4(f) properties within the R-2508 Complex include but are not limited to Sequoia, Kings Canyon, and Death Valley National Parks; Kiavah, Bright Star, Domeland, and John Muir Wilderness Areas; publicly owned parks, recreational areas, wildlife and waterfowl refuges; and

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3 “Participating aircraft” are aircraft under the command of, or sponsored by, the Navy, Air Force, or Army, members of the R-2508 Joint Policy and Planning Board, and civilian aircraft under Letter of Agreement with the R-2508 Complex Control Board, whose flights require operations above FL180 (18,000 MSL) (USAF 2011a). Civilian flights in the R-2508 Complex that will remain below FL180 (18,000 MSL) for the entire mission are not considered participating aircraft (USAF 2011a).

4 “See and avoid” is described in 14 CFR § 91.113 as “When weather conditions permit, regardless of whether an operation is conducted under instrument flight rules or visual flight rules, vigilance shall be maintained by each person operating an aircraft so as to see and avoid other aircraft.”
public and private historical sites. Exhibit 3-6 shows sensitive land use areas located within the R-2508 Complex, as identified in the R-2508 User’s Handbook (USAF 2011a).

Exhibit 3-6. Sensitive Land Use Areas within the R-2508 Complex\textsuperscript{a,b}

Management of the R-2508 Complex falls under the R-2508 JPPB. The JPPB deals with airspace planning issues and addresses any violations to airspace use over sensitive areas within the R-2508 Complex (USAF 2011a). The R-2508 Complex scheduling requirements apply to all R-2508 Complex flight activities, including special operations and large-scale exercises. As mentioned above, the CCF is the managing and scheduling authority for R-2508 Complex shared-use airspace. The CCF coordinates mission requirements of all R-2508 Complex users to ensure optimum airspace utilization and safety. In the R-2508 User’s Handbook, low-flying aircraft over National Parks and Wilderness areas was identified as a sensitive issue, because noise complaints in these areas gain national attention (USAF 2011a).

To minimize the potential for noise impacts over sensitive areas within the R-2508 Complex, the JPPB specifies minimum altitudes at which aircraft may operate over sensitive areas. All participating aircrews operating within the R-2508 Complex over the Sequoia and Kings Canyon National Parks in the western Owens work area must maintain an altitude of 18,000 feet or above unless that area is specifically scheduled in accordance with current established procedures.
through the CCF. All participating aircraft requesting the airspace below 18,000 feet over Sequoia and Kings Canyon National Parks in the western Owens work area must schedule use of
that airspace in advance with the CCF in accordance with current procedures. Unscheduled
operations below 18,000 feet over Sequoia and Kings Canyon National Parks are authorized at
any time for safety of flight considerations.

All aircrews shall maintain a minimum altitude of 3,000 feet and a lateral separation of 3,000
feet from Sequoia and Kings Canyon National Parks, Death Valley National Park (1977 Park
Boundaries), Domeland, and John Muir Wilderness Areas (USAF 2011a).

The CCB must give approval for any deviation of uses of the airspace within the R-2508
Complex; this includes overflights of sensitive areas such as National Parks. The R-2508
Complex User’s Handbook states that existing restrictions (such as National Park overflight
altitudes) are in place to help preserve use of the R-2508 Complex to fulfill missions and to
protect other interests in the area (USAF 2011a). The R-2508 Complex User’s Handbook
suggests that potential airspace users not request deviations to existing restrictions (USAF
2011a).

3.8 Light Emissions and Visual Resources

Section 3.1.8 of the 2009 FAA PEIS provides a general description of light emissions and visual
resources, including a description of the regulatory setting. Section 3.6.8 of the 2009 FAA PEIS
provides existing conditions for these resource areas at the Mojave Air and Space Port. Visual
resources are the natural and man-made features that constitute the aesthetic qualities of an area.
Landforms, surface water, vegetation, and man-made features are the fundamental characteristics
of an area that define the visual environment and form the overall impression that an observer
receives of an area.

On-Site ROI

The existing conditions at the Mojave Air and Space Port would be characterized as having low
visual sensitivity because the site is currently an industrialized area that supports air and
spacecraft operations. Approximately 300 planes use the three runways at the Mojave Air and
Space Port each day. Numerous airplanes are continuously parked at the Mojave Air and Space
Port, which can be seen from two highways that intersect in the community of Mojave. Two rail
lines also intersect in Mojave. There are numerous wind farm projects located in the area west of
the Mojave Air and Space Port and several solar projects in the area surrounding the Mojave Air
and Space Port.

Current light sources at the Mojave Air and Space Port include security lighting on the grounds
and safety lighting on the runways, which are illuminated at night.

Off-Site ROI

In the off-site ROI, the visual landscape frequently includes aircraft operating throughout the R-
2508 Complex. The presence of aircraft is a frequent feature of the visual resources in the R-
2508 Complex. Additional visual resources include National Parks and wilderness areas, as
discussed in Section 3.7 above.

5 Lateral separation refers to the minimum distance an aircraft must keep from different airplanes or areas within the airspace.
Light sources within the R-2508 Complex include lighting in the populated areas listed in Section 3.7 above as well as lighting from other industrial areas and airports located within the R-2508 Complex.

### 3.9 Noise and Compatible Land Use

Section 3.1.10 of the 2009 FAA PEIS provides a general description of noise, including a description of the regulatory setting. Environmental noise levels are typically measured in units called decibels (dB) and then converted to A-weighted decibels (dBA). This adjustment filters out both low and high frequency sounds and approximates the frequency response of human hearing. To account for noise disturbance over time, the dBA values over a one year period are averaged over a 24-hour period resulting in an average annual day, incorporating a 10-dBA penalty weighting for noise occurring at night (10pm to 7am). This produces the day-night average sound level (DNL), which is considered by the FAA and many other agencies to be one of the more appropriate metrics for estimating the degree of annoyance caused by noise.

The noise environment in the State of California may also be described in terms of community noise equivalent level (CNEL). CNEL is essentially the same as DNL except in the CNEL, the 24-hour period is broken into three periods – day (7am to 7pm), evening (7pm to 10pm), and night (10pm to 7am) – with weightings of 5 dBA applied to the evening period and 10 dBA to the night period. FAA recognizes CNEL as an acceptable alternative noise metric, requiring the use of either DNL or CNEL for noise analyses. Because the use of a two-period (DNL) versus three-period (CNEL) measurement for aircraft noise around airports typically yields an insignificant difference (0.7 dBA at most), this analysis employs the DNL metric.

#### On-Site ROI

Section 3.6.10 of the 2009 FAA PEIS provides existing conditions for noise at the Mojave Air and Space Port. Noise at the Mojave Air and Space Port originates from four primary sources: roadways, railroads, aircraft, and research and development facilities (Kern County 2003). Aircraft activities are the primary source of noise at the Mojave Air and Space Port. Exposure to aircraft noise occurs mainly in the vicinity of the runways and taxi areas. Approximately 17,575 annual aircraft operations occur at the Mojave Air and Space Port annually (Kern County 2011). Of those, about 7.3 percent (or 1,283) are military jet aircraft operations, such as takeoff and landings of the F-4 and the Saab Draken. In addition, aerospace companies based at the Mojave Air and Space Port and the Naval Air Warfare Center at China Lake periodically test experimental rocket engines at the site (NASA 2005, USAF 2011a). The Mojave Specific Plan, under the noise element, states that the “Mojave Airport exhibits a high degree of compatibility with other land uses in the Mojave area. Because of the relatively low level of aircraft traffic into and out of the airport, noise is not a serious concern for established residents and businesses” (Kern County 2003). Land use restrictions established in the Kern County Airport Land Use Compatibility Plan also serve to reduce any potential noise impacts on land uses adjacent to the Mojave Air and Space Port (Kern County 2011).

#### Off-Site ROI

Noise within the R-2508 Complex is generated, in part, by the operations conducted within the airspace, including aircraft research and development, operational weapons test and evaluation flights, student pilot training, air-combat maneuvering and proficiency flights, and civilian-
aircraft testing in direct support of DoD and/or commercial defense testing (USAF 2011a). Uses of the airspace and underlying lands include bombing ranges, supersonic corridors, low altitude high speed maneuvers, radar intercept areas, and refueling training areas (California Governor’s Office of Planning and Research 2008). Within the R-2508 Complex, the participating aircraft are typically high-performance prototypes or existing operational aircraft such as the F-15, F-16, F-18, F-22, or F-35 (USAF 2009, 2011a). These aircrafts are operated at military power settings or lower by USAF, U.S. Army, U.S. Navy, or other entities, typically generating noise averages ranging from 94 to 121 dBA (measured at the time of the event, 1,000 feet under the flight path).

Other noise sources within the R-2508 Complex include those associated with activities in the populated areas of the off-site ROI. Ambient noise originates principally from vehicle traffic on highways, off-road recreational vehicles, trains, and construction activities. Military aircraft operations and traffic on highways generally contribute the most noise sources in the R-2508 Complex.

**Supersonic Corridors**

The R-2508 Complex contains two designated supersonic corridors, as shown in Exhibit 3-7: the R-2515 High Altitude Supersonic Corridor (HASC) and the Black Mountain Supersonic Corridor (BMSSC). The HASC is 15 nautical miles (NM) wide and 224 NM long. The BMSSC is 8 NM wide and 57 NM long, with a 9.5 NM radius circular extension for turning (U.S. Army 2003, USAF 2011a).

**Exhibit 3-7. Supersonic Corridors in R-2508**

*Sources: R-2508 Complex Control Board, R-2508 Complex User’s Handbook, 1 May 2001; 412th OSS/OSSA,afftc Instruction 11-1, Edwards AFB CA.*

a. Source: U.S. Army 2003
Supersonic flight is authorized in the HASC and BMSSC when scheduled (USAF 2011a). The CCB is responsible for granting permission to conduct supersonic flight within the established supersonic corridors (HASC and BMSSC) or to generate sonic booms outside of these corridors (but within the R-2508 airspace).

Noise generated in the two designated supersonic corridors is largely the result of sonic booms, the primary noise impact associated with supersonic activity. Sonic booms are typically heard beneath a supersonic aircraft, sometimes beyond the supersonic corridor boundaries and throughout the R-2508 Complex. The width of the noise path affected by the sonic boom extends one-half NM to the side for each 1,000 feet of flight altitude above ground level of the aircraft. For example, the sonic boom from a supersonic aircraft at 20,000 feet altitude would be heard in a path nominally 20 NM wide (within 10 NM either side of the ground track), but not likely beyond that distance (USAF 2010).

Sonic booms have been known to be heard throughout the R-2508 Complex. Historically, the supersonic corridors at Edwards AFB have hosted an average of 650 supersonic flights per year since 1980. During the 1990s, supersonic flights at Edwards AFB occurred at an average rate of 663 per year, while from 2000–2004, this average rate increased to 831 supersonic flights per year (USAF 2004). From 2006–2011, BMSSC flights at Edwards Air Force Base occurred at an average rate of 800 supersonic flights per year (USAF 2011b).

### 3.10 Socioeconomics, Environmental Justice, and Children’s Environmental Health and Safety

Section 3.1.11 of the 2009 FAA PEIS provides a general description of socioeconomics, environmental justice, and children’s environmental health and safety, including a description of the regulatory setting. Section 3.6.11 of the 2009 FAA PEIS provides existing conditions for socioeconomics, environmental justice, and children’s environmental health and safety at the Mojave Air and Space Port, which are still valid.

**On- and Off-Site ROIs**

No schools, daycare facilities, playgrounds, or other places with high concentrations of children are located in the on-site ROI. Two schools – Mojave Elementary and Mojave Junior/Senior High School – are located less than 1,000 feet from the boundary of the Mojave Air and Space Port property, and over 5,000 feet from the major runway. Combined, these schools enroll a total of 801 students.\(^6\) Due to the large size of the off-site ROI, this area contains a number of areas with a high concentration of children and also may contain environmental justice populations.

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\(^6\) Data obtained through correspondence with Kressa Coy of Mojave Junior/Senior High and Audria Kingsley of Mojave Elementary on September 22, 2011.
4. ENVIRONMENTAL CONSEQUENCES

This chapter describes the potential environmental consequences of the Proposed Action and No Action Alternative. The FAA evaluated the potential environmental consequences of the Proposed Action and the No Action Alternative in accordance with all relevant legal requirements, including 40 CFR § 1502.16 and FAA Order 1050.1E, *Environmental Impacts: Policies and Procedures, Change 1*, which specify significance thresholds for applicable resource areas.

The 2009 FAA PEIS provided information and analyses common to most reusable suborbital rockets and analyzed the environmental impacts of the use of such rockets at specified facilities, including the Mojave Air and Space Port. As detailed in the sections below, the FAA used the 2009 FAA PEIS data and analyses, and conducted additional analysis for those launch components falling outside the scope of the 2009 FAA PEIS (see Section 1.1), to determine whether any significant potential environmental impacts would result from the Proposed Action analyzed in this EA.

4.1 Air Quality

Impacts to air quality would be considered significant if they caused or contributed to an existing or projected violation of any ambient air quality standard, or conflicted with or obstructed implementation of the air quality plans identified in Section 3.2 of this EA. One indicator of whether further analysis is needed to determine the potential for a standards violation, and thus the significance of the impacts, is the level of emissions increases calculated for General Conformity compliance. If emission increases were to exceed the General Conformity thresholds discussed in Section 3.2, then there would be potential for significant impacts, and a conformity determination would be required.

Air pollutant emissions may be generated during takeoff, launch, and landing operations; pre- and post-launch ground operations; and operational anomalies. The Proposed Action does not include any changes to the physical structure of the Mojave Air and Space Port (e.g., runways) or any construction activities. Therefore, there would be no construction vehicles or associated emissions. This analysis considers emissions in two categories: the lower atmosphere from ground level to a nominal 3,000 foot altitude, and the remainder of the atmosphere above this level. The Federal government uses a 3,000 foot altitude for air quality regulatory purposes because this is the nominal height of the atmospheric mixing layer. Emissions that occur below this altitude can be mixed to ground level by diffusion and wind transport and affect ground-level ambient air quality. Emissions that occur above this altitude are not mixed to ground level. However, they can contribute to climate change and ozone depletion effects in the troposphere above 3,000 feet and the stratosphere (collectively referred to below as the upper atmosphere).

4.1.1 Air Quality Impacts from Launch Operations

The WhiteKnightTwo carrier aircraft and the support aircraft would contribute emissions to the lower atmosphere (up to 3,000 feet) and to the upper atmosphere, and SpaceShipTwo would contribute emissions to the stratosphere. Most of the emissions generated by the Proposed Action would occur in the off-site ROI. Only emissions generated by aircraft during takeoff and landing would occur in the on-site ROI. Section 4.1.1 of the 2009 FAA PEIS contains additional discussion of potential air quality impacts from reusable launch vehicles.
4.1.1.1 Carrier and Support Aircraft Emissions

The FAA’s Emissions and Dispersion Modeling System (EDMS) model (FAA 2010) was used to estimate WhiteKnightTwo emissions. WhiteKnightTwo is not included in the EDMS database, so emissions were estimated using the most similar aircraft that uses Pratt and Whitney PW308A turbofan engines (the Raytheon Hawker 4000 Horizon) and then adjusted for the number of engines (four engines on the WhiteKnightTwo and two engines on the Horizon).

EDMS was also used to estimate emissions from the two support aircraft, a Hawker/Beechcraft Starship and an Extra Flugzeugbau EA300. The Starship is powered by two Pratt and Whitney Canada PT6A-67A turboprop engines and is included in the EDMS database. The EA300 is powered by one Lycoming AEIO-540 piston engine. The EA300 is not included in the EDMS database, so emissions were estimated for the most similar aircraft that uses a Lycoming 540 series engine (the Piper PA-24 Comanche).

EDMS estimates emissions for a landing/takeoff (LTO) cycle. An LTO cycle consists of six modes: startup, taxi out (idle/taxiing to the runway), takeoff, climb out (ascent) to 3,000 feet altitude, approach (descent) starting at 3,000 feet, and landing and taxi in (taxiing/idle from the runway). For each mode for each aircraft, EDMS calculates the product of the fuel burn rate per engine (in kilograms per second), the number of engines, the duration of the mode (in seconds), and an emission factor (in grams of pollutant emitted per kilogram of fuel burned). The result is the emissions in kilograms for that aircraft and mode. EDMS sums the emissions for each mode to arrive at the emissions per LTO cycle for that aircraft and pollutant. (EDMS model output in kilograms has been converted to pounds for the exhibits below.) Exhibit 4-1 provides the estimated emissions to the lower atmosphere from WhiteKnightTwo, and the Starship and EA300 support aircraft per LTO cycle and the annual emissions for 30 LTO cycles corresponding to the projected 30 annual launches.

<table>
<thead>
<tr>
<th>Description</th>
<th>CO₂</th>
<th>CO</th>
<th>H₂O</th>
<th>VOC</th>
<th>NOₓ</th>
<th>SOₓ</th>
<th>PM₁₀</th>
<th>PM₂.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emissions per LTO cycle</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WhiteKnightTwo carrier aircraft</td>
<td>4,242</td>
<td>27.09</td>
<td>1,685</td>
<td>20.34</td>
<td>11.05</td>
<td>1.74</td>
<td>0.42</td>
<td>0.42</td>
</tr>
<tr>
<td>Beech Starship support aircraft</td>
<td>405</td>
<td>25.74</td>
<td>161</td>
<td>24.33</td>
<td>0.23</td>
<td>0.17</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td>Extra EA300 support aircraft</td>
<td>50</td>
<td>23.14</td>
<td>20</td>
<td>3.18</td>
<td>0.02</td>
<td>0.02</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td>Total aircraft, per LTO cycle</td>
<td>4,697</td>
<td>75.98</td>
<td>1,866</td>
<td>47.84</td>
<td>11.31</td>
<td>1.94</td>
<td>0.42</td>
<td>0.42</td>
</tr>
<tr>
<td>Annual Emissions (30 LTO cycles)</td>
<td>140,896</td>
<td>2,279.36</td>
<td>55,972</td>
<td>1,435.31</td>
<td>339.16</td>
<td>58.14</td>
<td>12.70</td>
<td>12.70</td>
</tr>
</tbody>
</table>

a. Source of emission factors: FAA 2010
b. Notes: Data have been rounded; LTO = landing/takeoff; CO₂ = carbon dioxide; CO = carbon monoxide; H₂O = water; VOC = volatile organic compound; NOₓ = nitrogen oxides; SOₓ = sulfur oxides; PM₁₀ = particulate matter less than 10 micrometers in diameter; PM₂.5 = particulate matter less than 2.5 micrometers in diameter; ND = no data available; NA = not applicable.
c. The lower atmosphere refers to the troposphere below 3,000 feet altitude.
Emissions from WhiteKnightTwo and the support aircraft above 3,000 feet altitude were estimated assuming one hour to climb to the 50,000 foot release altitude (for WhiteKnightTwo) or the observation altitudes (for the support aircraft) with the engines operating at climb out power setting, and one hour for the return flight after release of SpaceShipTwo with the aircraft engines operating at approach power setting. Exhibit 4-2 provides the emissions from WhiteKnightTwo and the support aircraft for the portion of total operations above 3,000 feet on a per-launch basis and the annual emissions for 30 launches. The General Conformity requirements do not apply to emissions released above 3,000 feet.

**Exhibit 4-2. Estimated Emissions to the Upper Atmosphere from WhiteKnightTwo and Support Aircraft (pounds)**

<table>
<thead>
<tr>
<th>Description</th>
<th>CO₂</th>
<th>CO</th>
<th>H₂O</th>
<th>VOC</th>
<th>NOₓ</th>
<th>SOₓ</th>
<th>PM₁₀</th>
<th>PM₂.₅</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Emissions per launch</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WhiteKnightTwo carrier aircraft</td>
<td>50,579</td>
<td>26.44</td>
<td>20,093</td>
<td>266.97</td>
<td>200.81</td>
<td>20.77</td>
<td>5.92</td>
<td>5.92</td>
</tr>
<tr>
<td>Beech Starship support aircraft</td>
<td>834</td>
<td>45.93</td>
<td>331</td>
<td>14.69</td>
<td>0.51</td>
<td>0.36</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td>Extra EA300 support aircraft</td>
<td>152</td>
<td>72.07</td>
<td>60</td>
<td>3.71</td>
<td>0.16</td>
<td>0.07</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td><strong>Total aircraft, per launch</strong></td>
<td>51,565</td>
<td>144.44</td>
<td>20,485</td>
<td>285.37</td>
<td>201.49</td>
<td>21.19</td>
<td>5.92</td>
<td>5.92</td>
</tr>
<tr>
<td><strong>Annual Emissions</strong></td>
<td>1,546,951</td>
<td>4,333</td>
<td>614,542</td>
<td>8,561</td>
<td>6,045</td>
<td>636</td>
<td>178</td>
<td>178</td>
</tr>
</tbody>
</table>

b. Note: CO₂ = carbon dioxide; CO = carbon monoxide; H₂O = water; VOC = volatile organic compound; NOₓ = nitrogen oxides; SOₓ = sulfur oxides; PM₁₀ = particulate matter less than 10 micrometers in diameter; PM₂.₅ = particulate matter less than 2.5 micrometers in diameter; ND = no data available

### 4.1.1.2 Launch Vehicle Emissions

As noted in Section 2.1.2.2 of this EA, SpaceShipTwo would use N₂O as an oxidizer and a solid organic material as fuel, such as, but not restricted to, nylon, HTPB rubber, plastic, or similar non-explosive organic material. This analysis provides emissions for both nylon and HTPB. Test data indicate that emission indices for HTPB are similar to those for nylon (Scaled Composites 2012). The emission indices for HTPB/N₂O and nylon/N₂O listed in Exhibit 4-3 were used for the SpaceShipTwo emission estimates.

**Exhibit 4-3. Estimated Emission Indices for HTPB/N₂O and Nylon/N₂O Propellants**

<table>
<thead>
<tr>
<th>Propellant</th>
<th>CO₂</th>
<th>CO</th>
<th>H₂O</th>
<th>VOC</th>
<th>NOₓ</th>
<th>N₂</th>
<th>H₂</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nylon/N₂O</td>
<td>0.178</td>
<td>0.048</td>
<td>0.184</td>
<td>0.0</td>
<td>0.004</td>
<td>0.568</td>
<td>0.022</td>
</tr>
<tr>
<td>HTPB/N₂O</td>
<td>0.240</td>
<td>0.099</td>
<td>0.100</td>
<td>0.0</td>
<td>0.004</td>
<td>0.558</td>
<td>0.001</td>
</tr>
</tbody>
</table>

a. Source: Scaled Composites 2011
b. Note: CO₂ = carbon dioxide; CO = carbon monoxide; H₂O = water; VOC = volatile organic compound; NOₓ = nitrogen oxides; N₂ = nitrogen; H₂ = hydrogen; N₂O = nitrous oxide
Emissions from launches of SpaceShipTwo would occur from the combustion of the two propellant components, N$_2$O and solid organic fuel. Each launch would use an estimated 13,000 pounds of N$_2$O and 2,500 pounds of solid organic fuel for a total propellant mass of 15,500 pounds. The emissions would begin approximately at the release altitude of 50,000 feet, well above the 3,000 foot regulatory limit, and thus are not considered with respect to compliance with ambient air quality standards or the General Conformity rule. On descent, SpaceShipTwo would have no emissions below 3,000 feet because it would glide unpowered to a horizontal landing. The propellant emission indices in Exhibit 4-3 were used to calculate SpaceShipTwo emissions. To estimate the emissions per launch, shown in Exhibit 4-4, the emission indices were multiplied by the total amount of propellant used (15,500 pounds). To estimate the total annual emissions from SpaceShipTwo, also shown in Exhibit 4-4, the emissions per launch were multiplied by the number of launches expected per year (i.e., 30 launches).

### Exhibit 4-4. Estimated Emissions to the Upper Atmosphere for SpaceShipTwo (pounds)$^a$

<table>
<thead>
<tr>
<th>Description</th>
<th>CO$_2$</th>
<th>CO</th>
<th>H$_2$O</th>
<th>VOC</th>
<th>NO$_x$</th>
<th>N$_2$</th>
<th>H$_2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emissions per launch</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Using Nylon/N$_2$O</td>
<td>2,717</td>
<td>730.12</td>
<td>2,820</td>
<td>0.00</td>
<td>61.23</td>
<td>8,695</td>
<td>339.09</td>
</tr>
<tr>
<td>Using HTPB/N$_2$O</td>
<td>3,679</td>
<td>1,516.25</td>
<td>1,532</td>
<td>0.00</td>
<td>61.23</td>
<td>8,543</td>
<td>21.38</td>
</tr>
<tr>
<td>Annual Emissions (30 launches)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Using Nylon/N$_2$O</td>
<td>81,505</td>
<td>21,904</td>
<td>84,590</td>
<td>0.00</td>
<td>1,837</td>
<td>260,859</td>
<td>10,173</td>
</tr>
<tr>
<td>Using HTPB/N$_2$O</td>
<td>110,374</td>
<td>45,488</td>
<td>45,946</td>
<td>0.00</td>
<td>1,837</td>
<td>256,276</td>
<td>642</td>
</tr>
</tbody>
</table>

$^a$ Note: CO$_2$ = carbon dioxide; CO = carbon monoxide; H$_2$O = water; VOC = volatile organic compound; NO$_x$ = nitrogen oxides; N$_2$ = nitrogen; H$_2$ = hydrogen; N$_2$O = nitrous oxide

### 4.1.1.3 Total Emissions from Launch Operations

Exhibit 4-5 lists the total estimated emissions from SpaceShipTwo, WhiteKnightTwo, and support aircraft to all layers of the atmosphere. Exhibit 4-5 represents the sum of the emissions listed in Exhibits 4-1, 4-2, and 4-4.

Under the Proposed Action, the emissions from operations of WhiteKnightTwo, support aircraft, and SpaceShipTwo in the upper atmosphere could affect global climate change. CO$_2$ and H$_2$O are greenhouse gases (GHGs), and the SO$_x$ and PM$_{2.5}$ from WhiteKnightTwo and the support aircraft can have radiative forcing effects. Based on Exhibit 4-5, the total CO$_2$ emissions due to the Proposed Action would be approximately 900 short tons per year or 400 metric tons per year. These emissions are a very small fraction of national and global emissions and in this context

### Exhibit 4-5. Estimated Emissions from SpaceShipTwo, WhiteKnightTwo, and Support Aircraft to All Layers of the Atmosphere (pounds)$^a$

<table>
<thead>
<tr>
<th>Description</th>
<th>CO$_2$</th>
<th>CO</th>
<th>H$_2$O</th>
<th>VOC</th>
<th>NO$_x$</th>
<th>SO$_x$</th>
<th>PM$_{10}$$^b$</th>
<th>PM$_{2.5}$$^b$</th>
<th>N$_2$</th>
<th>H$_2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emissions per launch</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Using Nylon/N$_2$O</td>
<td>58,978</td>
<td>950.54</td>
<td>25,170</td>
<td>333.21</td>
<td>274.02</td>
<td>23.13</td>
<td>6.34</td>
<td>6.34</td>
<td>8,695.29</td>
<td>339.09</td>
</tr>
<tr>
<td>Using HTPB/N$_2$O</td>
<td>59,941</td>
<td>1,736.67</td>
<td>23,882</td>
<td>333.21</td>
<td>274.02</td>
<td>23.13</td>
<td>6.34</td>
<td>6.34</td>
<td>8,542.54</td>
<td>21.38</td>
</tr>
</tbody>
</table>
Exhibit 4-5. Estimated Emissions from SpaceShipTwo, WhiteKnightTwo, and Support Aircraft to All Layers of the Atmosphere (pounds)\(^a\)

<table>
<thead>
<tr>
<th>Description</th>
<th>CO(_2)</th>
<th>CO</th>
<th>H(_2)O</th>
<th>VOC</th>
<th>NO(_x)</th>
<th>SO(_x)</th>
<th>PM(_{10}) (^b)</th>
<th>PM(_{2.5}) (^b)</th>
<th>N(_2)</th>
<th>H(_2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Emissions (30 launches)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Using Nylon/N(_2)O</td>
<td>1,769,352</td>
<td>28,516</td>
<td>755,105</td>
<td>9,996</td>
<td>8,221</td>
<td>694</td>
<td>190</td>
<td>190</td>
<td>260,859</td>
<td>10,173</td>
</tr>
<tr>
<td>Using HTPB/N(_2)O</td>
<td>1,798,221</td>
<td>52,100</td>
<td>716,460</td>
<td>9,996</td>
<td>8,221</td>
<td>694</td>
<td>190</td>
<td>190</td>
<td>256,276</td>
<td>642</td>
</tr>
</tbody>
</table>

\(^a\) Note: Data have been rounded; CO\(_2\) = carbon dioxide; CO = carbon monoxide; H\(_2\)O = water; VOC = volatile organic compound; NO\(_x\) = nitrogen oxides; SO\(_x\) = sulfur oxides; PM\(_{10}\) = particulate matter less than 10 micrometers in diameter; PM\(_{2.5}\) = particulate matter less than 2.5 micrometers in diameter; N\(_2\) = nitrogen; H\(_2\) = hydrogen; N\(_2\)O = nitrous oxide

\(^b\) Includes WhiteKnightTwo only. PM emissions data for SpaceShipTwo propellants and support aircraft are not available.

would have a negligible impact on global climate change. By comparison, U.S. GHG emissions were estimated at 6,633 million metric tons (MMT) of carbon dioxide equivalent (CO\(_2\)e)\(^7\) in 2009 (EPA 2011b). Global GHG emissions were estimated at 43,183 MMTCO\(_2\)e in 2005 (WRI 2011). The CO\(_2\) emissions under the Proposed Action would represent about one hundred-thousandth of one percent of U.S. GHG emissions and two millionths of one percent of global GHG emissions.

4.1.2 Emissions from Ground Operations

Emissions can occur from support equipment used during ground operations, including trucks and equipment. The 2004 FAA EA estimated the emissions from truck deliveries of Jet A fuel, N\(_2\)O, and the rocket motor case, throat, and nozzle containing HTPB. The analysis presented in Exhibit 4-3 of the 2004 FAA EA, which remains valid, can be used to estimate the total emissions from aircraft below 3,000 feet altitude and ground operations under the Proposed Action, as listed in Exhibit 4-6.

4.1.3 Total Emissions and Air Quality Impacts to the Lower Atmosphere

Exhibit 4-6 lists the total emissions from aircraft below 3,000 feet altitude and ground operations under the Proposed Action.

Exhibit 4-6. Estimated Emissions from WhiteKnightTwo, Support Aircraft, and Ground Operations to the Lower Atmosphere (pounds per year)\(^a\)

<table>
<thead>
<tr>
<th>Description</th>
<th>CO(_2)</th>
<th>CO</th>
<th>H(_2)O</th>
<th>VOC</th>
<th>NO(_x)</th>
<th>SO(_x)</th>
<th>PM(_{10}) (^b)</th>
<th>PM(_{2.5}) (^b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aircraft (from Exhibit 4-1)</td>
<td>140,896</td>
<td>2,279.36</td>
<td>55,972</td>
<td>1,435.31</td>
<td>339.16</td>
<td>58.14</td>
<td>12.70</td>
<td>12.70</td>
</tr>
<tr>
<td>Total Annual Emissions (pounds)</td>
<td>140,896</td>
<td>2,314.86</td>
<td>55,972</td>
<td>1,440.81</td>
<td>375.66</td>
<td>58.14</td>
<td>15.70</td>
<td>15.70</td>
</tr>
</tbody>
</table>

\(^7\) Each greenhouse gas has a different level of radiative forcing ability, that is, the ability to trap heat. To compare their relative contributions, gases are converted to carbon dioxide equivalent using their unique global warming potentials (GWP\(_s\)). Each gas has a unique GWP value which represents its radiative forcing ability relative to that of CO\(_2\) (IPCC 2007).
Exhibit 4-6. Estimated Emissions from WhiteKnightTwo, Support Aircraft, and Ground Operations to the Lower Atmosphere (pounds per year)\(^a\)

<table>
<thead>
<tr>
<th>Description</th>
<th>CO(_2)</th>
<th>CO</th>
<th>H(_2)O</th>
<th>VOC</th>
<th>NO(_x)</th>
<th>SO(_x)</th>
<th>PM(_{10})b</th>
<th>PM(_{2.5})b</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Annual Emissions for Conformity Evaluation (tons)</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>0.72</td>
<td>0.19</td>
<td>NA</td>
<td>0.01</td>
<td>NA</td>
</tr>
<tr>
<td>General Conformity Threshold (tons per year)</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>100</td>
<td>100</td>
<td>NA</td>
<td>70</td>
<td>NA</td>
</tr>
</tbody>
</table>

\(^a\) Note: Data have been rounded; CO\(_2\) = carbon dioxide; CO = carbon monoxide; H\(_2\)O = water; VOC = volatile organic compound; NO\(_x\) = nitrogen oxides; SO\(_x\) = sulfur oxides; PM\(_{10}\) = particulate matter less than 10 micrometers in diameter; PM\(_{2.5}\) = particulate matter less than 2.5 micrometers in diameter; N\(_2\) = nitrogen; H\(_2\) = hydrogen; N\(_2\)O = nitrous oxide

\(^b\) Aircraft PM includes WhiteKnightTwo only. PM emissions data for support aircraft are not available.

Exhibit 4-6 demonstrates that the total emissions from aircraft and ground operations under the Proposed Action would be small. Emissions from LTO operations of WhiteKnightTwo and the support aircraft and from ground operations would have negligible impacts on local air quality, as these impacts would be intermittent and temporary. The air quality impacts would be insignificant and would not be distinguishable from the impacts of the other flight and ground operations at the Mojave Air and Space Port. Emissions from WhiteKnightTwo, the support aircraft, and ground operations would not create a new violation or worsen any existing violations of any NAAQS or state ambient air quality standard for which the area is designated nonattainment, and would not lead to pollutant concentrations in excess of any NAAQS or state ambient air quality standard for which the area is designated attainment or unclassifiable.

Exhibit 4-6 shows that the annual emissions of NO\(_x\), VOC, and PM\(_{10}\) below 3,000 feet would be substantially below the General Conformity de minimis levels (100 tons of NO\(_x\) or VOC, or 70 tons of PM\(_{10}\)) for this area. Thus, the Proposed Action would not require a General Conformity determination for launch events at the Mojave Air and Space Port.

4.1.4 Air Quality Impacts from Aborted Launches

If a flight were aborted after release of SpaceShipTwo from WhiteKnightTwo, it might be necessary to jettison the N\(_2\)O oxidizer before SpaceShipTwo glides to a landing. A worst-case scenario for emissions would occur if the engine failed to ignite soon after release. In that event the entire supply of approximately 13,000 pounds of N\(_2\)O might have to be jettisoned and could be emitted to the stratosphere or to both the stratosphere and the upper troposphere, depending on the vehicle’s altitude. The global warming potential of N\(_2\)O is 298, meaning a pound of N\(_2\)O has the same effect on global climate as 298 pounds of CO\(_2\) (IPCC 2007). The worst-case scenario of 13,000 pounds of N\(_2\)O emissions would be equivalent to 3,874,000 pounds (1,937 short tons or 879 metric tons) of CO\(_2\). Atmospheric impacts from aborted flights would depend on the frequency of such incidents and the amount of N\(_2\)O actually jettisoned. All reasonable and feasible measures would be taken by Mojave Air and Space Port operators and the FAA to minimize aborted launches. Aborted flights are expected to be rare and, consequently, their impacts on air quality and climate are expected to be minimal.
4.2 Biological Resources (Including Fish, Wildlife, and Plants)

Sections 4.1.2 and 4.6.2 of the 2009 FAA PEIS discuss the general and site-specific (i.e., the Mojave Air and Space Port) impacts, respectively, on biological resources from operation of reusable suborbital rockets. The 2009 FAA PEIS concluded there would be no significant adverse impacts on biological resources as a result of operating reusable suborbital rockets at the Mojave Air and Space Port. Therefore, this discussion focuses on those aspects of the Proposed Action that are outside the scope of the 2009 FAA PEIS and have the potential to affect biological resources (namely, use of solid-organic fuel and a larger off-site ROI).

4.2.1 Fish and Wildlife

Proposed activities would use existing ground support facilities and would not require ground disturbance. Because SpaceShipTwo is air-launched 50,000 feet above the ground, no adverse impacts on animals within the off-site ROI are expected from exhaust heat and atmospheric deposition of emissions from burning the fuel (nylon or other solid organic material as noted in Section 2.1.2.2 of this EA).

In the event of a launch failure, terrestrial and aquatic animals within the off-site ROI could be affected by falling debris or direct impact of the WhiteKnightTwo, SpaceShipTwo, or support aircraft, potentially causing injury or death. However, because the probability of a crash is low, and animals are widely dispersed throughout the 20,000 square mile off-site ROI, it is highly unlikely that debris would impact any terrestrial or aquatic animals.

The greatest potential impact to fish and wildlife associated with the Proposed Action is engine noise generated by the WhiteKnightTwo and support aircraft during takeoff and flight, and noise generated by SpaceShipTwo when sonic booms are produced during reentry (see Section 4.8 for a discussion of noise). Thus, potential impacts to fish and wildlife would likely be limited to noise-induced effects.

Noise impacts on wildlife may be categorized as primary, secondary, or tertiary (Manci et al.1988). Primary effects are direct physical auditory changes, such as eardrum rupture, ossicle shattering, temporary and permanent hearing threshold shifts, and the masking of auditory signals from other individuals or the environment. Secondary effects of noise on wildlife include such non-auditory effects such as stress, behavioral changes, interference with mating, and detrimental changes in the ability to obtain sufficient food, water, and cover. Tertiary effects are the cumulative result of both primary and secondary effects, and may include population declines, destruction of important habitat and, in extreme cases, potential species extinction.

Animals differ in their hearing sensitivity and susceptibility to noise impacts. For example, at mid-range frequencies, birds have a level of hearing sensitivity similar to that of the more sensitive mammals, but at lower and higher frequency extremes, birds tend to be less sensitive than mammals. Reptile hearing is less sensitive than that of either birds or mammals. Many species have shown an ability to acclimate to high noise levels, including sonic booms, with no adverse primary, secondary, or tertiary impacts. This finding is supported by research conducted by USAF (1999) on the effects of jet noise (including sonic booms) from aircraft on the desert tortoise. The results of this study confirmed field observations that desert tortoises acclimate to aircraft-related noise exposure and do not exhibit significant adverse effects related to their hearing, behavior, or heart rate. In general, reptiles have shown little startle response to aircraft noise indicating possible low sensitivity to aircraft noise levels. Other species, including falcons,
bighorn sheep, and wild horses, are known to successfully and consistently reproduce throughout ranges where aircraft operations occur. Aircraft noise may cause a startle response to Mohave ground squirrels, but published information to suggest adverse impacts on the species is not available.

Adverse impacts from WhiteKnightTwo and support aircraft engine noise, as well as SpaceShipTwo launches, are not likely both because of the high flight altitude of the aircraft and because operation of other aircraft already occurs regularly in the off-site ROI with similar noise effects. Any noise effects generated from the aircraft would be indistinguishable from the ambient noise levels already present within the off-site ROI. Similarly, adverse impacts from SpaceShipTwo sonic booms are not likely because sonic booms would occur at a higher altitude than many sonic booms created by existing operations within the off-site ROI. Studies have shown that due to the low intensity and duration, as well as limited occurrence of the sonic booms, significant impacts on wildlife would not be expected to occur (USAF 2008b).

Activities under the Proposed Action would not present a new noise impact to wildlife, but would be consistent with the existing noise environment to which resident species have already acclimated. Although the number of sonic booms produced within the R-2508 Complex would increase under the Proposed Action (up to 30 annual launches and reentries), no potential primary impacts (direct physical impacts) would be anticipated. Potential temporary and minimal secondary impacts of a startle response might occur for resident individuals of some species during the initial proposed flight activities, but adaptation to the potential change in noise would be expected based on previous environmental documentation. Tertiary effects would not be anticipated, as most species present within R-2508 Complex have already adapted to living with aircraft noise.

For the reasons stated above, noise impacts from the WhiteKnightTwo, SpaceShipTwo, and support aircraft under the Proposed Action would have no effect on fish and wildlife populations, including the Mohave ground squirrel, desert tortoise, or any other state or federally listed species potentially present in the on- or off-site ROIs.

### 4.2.2 Plants

Because the SpaceShipTwo is launched 50,000 feet above the ground, no adverse impacts on terrestrial or aquatic plants (including protected species) within the off-site ROI are expected from exhaust heat and atmospheric deposition of emissions from burning the solid organic fuel. In the event of a launch failure, for which the probability is low, terrestrial and aquatic plants within the off-site ROI could be affected by falling debris or direct impact of the WhiteKnightTwo or SpaceShipTwo. Potential impacts include scorching and destruction (death) of the plant. Regarding protected species, because the probability of a crash is low, and protected species are rare throughout the 20,000 square mile off-site ROI, it is unlikely that debris would impact state or federally listed terrestrial or aquatic plants. Therefore, the Proposed Action would have no effect on state or federally listed plant species that might occur in the off-site ROI.

### 4.3 Historical, Architectural, Archaeological, and Cultural Resources

Section 4.1.3 of the 2009 FAA PEIS provides a general discussion of the potential impacts of launching reusable suborbital rockets on historical, architectural, archaeological, and cultural
resources. Section 4.6.3 of the 2009 FAA PEIS provides a discussion of the potential impacts on historical, architectural, archaeological, and cultural resources within the on-site ROI, and Section 5.4 of the 2004 FAA EA provide a discussion of potential impacts on these resources in the on-site ROI and surrounding area.

Potential impacts to cultural resources would generally be associated with the noise produced during flights (sonic booms) and could include physical damage to buildings, structures or rock features through accident or vibration, visual or audible impacts to the setting of cultural resources, and disturbance of traditional activities, such as religious ceremonies or subsistence hunting. Impacts to cultural resources from airspace use would most likely be related to alterations in setting from visual or aural disturbance, and the remote possibility of debris falling. Potential impacts are assessed by applying the Criteria of Adverse Effect as defined in 36 CFR § 800.5a and are considered significant if the action (or undertaking) would result in a substantial change in the significance of a historic or archeological resource, or disturb any human remains, including those interred outside of formal cemeteries.

Based on these criteria, in the 2004 FAA EA, the FAA determined that the action (or undertaking) would have no adverse effect on historic properties, and the State Historic Preservation Officer (SHPO) concurred with the FAA’s determination (see Chapter 10 of the 2004 FAA EA for the consultation letters). Similarly, in the 2009 FAA PEIS, the FAA concluded there would be no significant adverse impacts on cultural resources as a result of operating reusable suborbital rockets from the Mojave Air and Space Port.

Issuing experimental permits or launch licenses to operate SpaceShipTwo reusable suborbital rockets and WhiteKnightTwo carrier aircraft at the Mojave Air and Space Port is considered a Federal undertaking per the Section 106 regulations (36 CFR § 800.16(y)). Based on the SHPO’s concurrence in 2004 for similar activities, and because there are no historic properties located at the Mojave Air and Space Port, the FAA is making a finding of no historic properties affected. Thus, the proposed undertaking is a type of activity that does not have the potential to cause effects on historic properties, and the FAA has no further obligations under Section 106 (36 CFR § 800.3(a)(1)).

The remaining discussion focuses on those aspects of the Proposed Action that are outside the scope of the 2009 FAA PEIS and could have the potential to affect historical, architectural, archaeological, and cultural resources (namely, larger off-site ROI).

The Proposed Action would be an activity consistent with the present use of the on-site ROI and off-site ROI, and would therefore not result in an alteration in setting constituting an effect on cultural resources.

The operation of WhiteKnightTwo, SpaceShipTwo, and support aircraft would include a low probability of falling debris from a catastrophic failure of either vehicle. If falling debris collided with cultural resources on the ground, those resources would likely be damaged or destroyed. However, because the probability of a crash is low, and cultural resources are widely dispersed throughout the region, it is highly unlikely that debris would impact a cultural site.

Assuming that the SpaceShipTwo would break the sound barrier at an altitude of approximately 80,000 feet during reentry, the estimated sonic boom magnitude at ground level would be at most 1 pound per square foot (psf) (see Section 4.8 below). Based on the minimal noise impacts
discussed in Section 4.8 below, the Proposed Action would not lead to structural damage on historic buildings and other cultural resources.

The Proposed Action is not anticipated to result in adverse impacts on cultural resources in the off-site ROI, because the operation of the WhiteKnightTwo, SpaceShipTwo, and support aircraft would result in a low probability of falling debris landing on cultural sites, would not result in an alteration in setting, would result in a relatively low overpressure generated by sonic booms, and launches would occur in areas authorized by the R-2508 CCB.

### 4.4 Hazardous Materials, Pollution Prevention, and Solid Waste

Section 4.1.5 of the 2009 FAA PEIS provides a general discussion of the potential impacts of using hazardous materials and generating hazardous and solid waste as a result of operating reusable suborbital rockets. Section 4.6.5 of the 2009 FAA PEIS provides a site-specific (i.e., Mojave Air and Space Port) discussion of the potential impacts for this resource area.

Under the Proposed Action, the amount of hazardous material, hazardous waste, and solid waste generated at the Mojave Air and Space Port would increase. Hazardous materials that would be used to support the operations associated with the Proposed Action are similar to materials already handled at the Mojave Air and Space Port. In addition, procedures are currently in place to accommodate additional fuel and other launch-related and maintenance-related hazardous materials, including paint, oils, lubricants, and solvents. All hazardous pre-flight ground operations, including nitrous loading, would take place in a specified location which has established appropriate safety clear zones in accordance with the Mojave Air and Space Port’s launch site operator license. All fuels and other hazardous materials would be stored and used in compliance with the regulations applicable to their storage and use, and already in place at Mojave Air and Space Port. In the event of a spill, EKAD is ready to respond quickly. Spill response kits, which include barrier pads, are located throughout the fuel storage tank farm.

Because activities associated with the Proposed Action would comply with all relevant and applicable Federal, state, and local regulations related to hazardous materials and hazardous waste, there are no significant impacts anticipated.

### 4.5 Health and Safety

Section 4.1.6 of the 2009 FAA PEIS provides a general discussion of the potential impacts of operating reusable suborbital rockets on public health and safety. Section 4.6.6 of the 2009 FAA PEIS provides a site-specific (i.e., Mojave Air and Space Port) discussion of the potential impacts on public health and safety.

Prior to the issuance of an experimental permit or launch license, the FAA would review the hazard analysis to evaluate the potential hazards and reduce the associated risk to an acceptable level. Access to launch and support areas would be limited to essential Mojave Air and Space Port and launch personnel. Furthermore, as stated in Section 2.1.1, after takeoff from the Mojave Air and Space Port, aircraft would enter the R-2508 Complex under control of either High Desert TRACON or SPORT Radar Control Facility located at Edwards AFB, or the Mojave Air Traffic Control Tower. All flights would be conducted under control of one of these facilities to ensure appropriate integration with other aircraft operations in the special use airspace.

The probability of an operational anomaly is low. In terms of impact, for a nominal trajectory, the ground track does not include flights over populated areas. Additionally, any hazardous
materials that are not burned up prior to crashing on the ground could contaminate surface waters in the off-site ROI, if surface waters were present at the crash site. Potential impacts to surface waters would be addressed by emergency response and clean-up procedures. At the Mojave Air and Space Port, the on-site fire department could respond, secure the site, but stay clear of the immediate area until the danger of explosions is diminished. It is expected that any fires resulting from a crash landing could be contained and extinguished by the fire department. Additional off-site emergency response capability also could be used if necessary.

Based on the health and safety measures described above and in Section 4.1.6 of the 2009 FAA PEIS, operational anomalies are unlikely, and therefore no significant impacts to health and safety are anticipated.

4.6 Land Use (Including U.S. Department of Transportation Section 4(f) Properties)

Section 4.1.7 of the 2009 FAA PEIS provides a general discussion of the potential impacts of operating reusable suborbital rockets on land use. Section 4.6.7 of the 2009 FAA PEIS provides a site-specific (i.e., Mojave Air and Space Port) discussion of the potential impacts on land use.

No impacts to on- or off-site ROI land uses, including Section 4(f) properties, would occur as a result of the Proposed Action. No new construction would take place, and the proposed operations are consistent with existing land use at the Mojave Air and Space Port. Although SpaceShipTwo is larger than other previously analyzed launch vehicles for the site, and may use a new fuel (e.g., nylon), these differences would not result in a change to existing land uses at the Mojave Air and Space Port. Further, the Proposed Action would not result in a physical use of Section 4(f) properties because there is no proposed construction, and there is no constructive use of Section 4(f) properties because the proximity impacts do not result in a substantial impairment to 4(f) properties.

The Mojave Air and Space Port is a highly developed, non-sensitive area, and habitat conservation plans are not applicable to the facility. All runways used for takeoff and landing operations have orientations that would route WhiteKnightTwo, SpaceShipTwo, and support aircraft over commercial, industrial, and resource management land uses as defined in the Mojave Specific Plan, and away from sensitive land uses in the Mojave community such as residential and school areas.

4.7 Light Emissions and Visual Resources

Section 4.1.8 of the 2009 FAA PEIS provides a general discussion of the potential impacts of operating reusable suborbital rockets on light emissions and visual resources. Section 4.6.8 of the 2009 FAA PEIS provides a site-specific (i.e., Mojave Air and Space Port) discussion of the potential impacts on light emissions and visual resources.

The Proposed Action would have no significant light emissions or visual impacts to the on-site or off-site ROI. The visual landscape at the Mojave Air and Space Port and the R-2508 Complex already includes airplanes in flight, including advanced concept and experimental aircraft. WhiteKnightTwo, SpaceShipTwo, and support aircraft would leave a visual contrail, but these contrails would be similar in visual impact to contrails from existing operations at the Mojave Air and Space Port and within the R-2508 Complex. The Proposed Action would not
substantially degrade the existing visual character or quality of the site and its surroundings and would have no adverse effect on a scenic vista or scenic resources.

The Proposed Action would not create a new source of substantial light or glare to adversely affect day or nighttime views in the area. Operation of SpaceShipTwo, WhiteKnightTwo, and support aircraft would occur only during daytime hours.

### 4.8 Noise and Compatible Land Use

The FAA considers there would be a significant noise impact if the analysis shows that the Proposed Action would cause noise-sensitive areas to experience a noise increase of 1.5 dBA or more at or above DNL 65 noise exposure when compared to the No Action Alternative for the same period (FAA Order 1050.1E, Change 1). Activities associated with the Proposed Action that would affect ambient noise levels include noise generated by the WhiteKnightTwo and support aircraft during takeoff, flight, and landing; noise from launches of SpaceShipTwo; and sonic booms generated by SpaceShipTwo during reentry. Noise levels generated within the on-site ROI from WhiteKnightTwo and support aircraft operation would fall within the noise levels analyzed in the 2009 FAA PEIS, which concluded no significant impacts (see Section 4.6.10 of the 2009 FAA PEIS). The Proposed Action would not cause noise-sensitive areas to experience a noise increase of 1.5 dBA or more at or above DNL 65. The following paragraphs describe the potential impacts from noise generated by operating the WhiteKnightTwo, support aircraft, and SpaceShipTwo in the off-site ROI.

#### 4.8.1 WhiteKnightTwo and Support Aircraft

In the off-site ROI, the WhiteKnightTwo and support aircraft would be expected to operate at high altitudes (approximately 50,000 feet) and would operate in compliance with airspace agreements for use of the R-2508 Complex. For example, flights must adhere to overflight restrictions for sensitive and populated areas and maintain a minimum altitude of 3,000 feet above ground level and a lateral distance of 3,000 feet from Death Valley National Park, Domeland, and John Muir Wilderness Areas (USAF 2011a). The proposed 30 flights per year of the WhiteKnightTwo and support aircraft would not be significant compared with the number of existing aircraft operations within the R-2508 Complex. In addition, the WhiteKnightTwo and support aircraft would produce noise levels similar to that of existing aircraft operations. Therefore, noise from the WhiteKnightTwo and support aircraft would not significantly increase overall noise levels within the R-2508 airspace and underlying communities.

#### 4.8.2 SpaceShipTwo

SpaceShipTwo would launch from the WhiteKnightTwo at an altitude of 50,000 feet. At that altitude, due to the small size and the relatively low thrust of the vehicle, SpaceShipTwo engine noise may be audible at times at the Earth’s surface, but would not be significant due to substantial distance attenuation and atmospheric absorption.

SpaceShipTwo operation would create sonic booms within the off-site ROI during reentry, at the point at which SpaceShipTwo is no longer supersonic (around 80,000 feet). The SpaceShipTwo

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8 A sonic boom would also be produced during the launch of SpaceShipTwo, when the vehicle reaches supersonic speed during ascent; however, because of the very high altitude (more than 300,000 feet) at which the boom would be generated and the fact that the vehicle would be near vertical, the sonic boom would be directed vertically and would not impinge on the earth's surface. For this reason, sonic booms during the launch phase would be a non-issue.
vehicle would be expected to produce sonic booms with overpressures up to 1 psf. This value is based on a number of calculations including the vehicle “shape factor” which takes into account how vehicle shape and size affects the magnitude of the sonic boom (NASA 1978). In general, larger vehicles generate greater sonic booms than do smaller vehicles. A sonic boom of 1 psf is a relatively low magnitude with respect to other commercial space launch vehicles and is comparable to sonic booms of military jets (e.g., an F-15 fighter jet) produced in the off-site ROI. Historically, the supersonic corridors at Edwards AFB have hosted an average of 650 supersonic flights per year since 1980. During the 1990s, supersonic flights at Edwards AFB occurred at an average rate of 663 per year, while from 2000–2004, this average rate increased to 831 supersonic flights per year (USAF 2004). From 2006–2011, BMSSC flights at Edwards Air Force Base occurred at an average rate of 800 supersonic flights per year (USAF 2011b).

Sonic booms can sound like a sharp thunderclap and typically contain substantial low frequency sound energy which can rattle windows and other loose objects. In general, as altitude increases, air temperature decreases, and the resulting layers of temperature change cause sonic booms to be turned upward as they travel toward the ground. Sonic boom models take such meteorological factors into effect when predicting sonic boom overpressures experienced by listeners on the ground.

For impulsive sounds such as sonic booms, it has been found that its impact correlates well with CDNL values. C-weighting excludes sound energy below 25 hertz and above 10,000 hertz. Exhibit 4-7 shows the relation between noise level metrics DNL, CDNL, and annoyance (Finegold et al. 1994, CHABA 1981). Assuming up to 30 sonic booms per year, the Proposed Action would result in an annual CDNL of 42. As shown in Exhibit 4-7, 65 DNL is equivalent to 61 CDNL; therefore the predicted 42 CDNL resulting from sonic booms produced by the SpaceShipTwo is substantially below the FAA’s established significance threshold.

<table>
<thead>
<tr>
<th>DNL</th>
<th>CDNL</th>
<th>Average Percent Population Highly Annoyed</th>
</tr>
</thead>
<tbody>
<tr>
<td>55</td>
<td>52</td>
<td>3.3</td>
</tr>
<tr>
<td>60</td>
<td>57</td>
<td>6.5</td>
</tr>
<tr>
<td>65</td>
<td>61</td>
<td>12.3</td>
</tr>
<tr>
<td>70</td>
<td>65</td>
<td>22.1</td>
</tr>
<tr>
<td>75</td>
<td>69</td>
<td>36.5</td>
</tr>
</tbody>
</table>

Based on the factors described above, noise and sonic booms associated with SpaceShipTwo launches would not constitute a significant increase in noise level to the communities beneath the R-2508 airspace, and would not cause significant adverse noise impacts.

4.9 Socioeconomics, Environmental Justice, and Children’s Environmental Health and Safety

Section 4.1.11 of the 2009 FAA PEIS provides a general discussion of the potential impacts of operating reusable suborbital rockets on socioeconomics, environmental justice, and children’s environmental health and safety. Section 4.6.11 of the 2009 FAA PEIS provides a site-specific
(i.e., Mojave Air and Space Port) discussion of the potential impacts on socioeconomics and environmental justice.

No new development would be required to support the Proposed Action; only existing personnel would be used to conduct launch activities; and the Proposed Action would not induce substantial population growth or add or eliminate jobs at the Mojave Air and Space Port or in the communities within the R-2508 Complex. There would not be any socioeconomic impacts to areas within the on- or off-site ROIs. The WhiteKnightTwo and support aircraft would produce noise levels similar to that of existing aircraft operations at the Mojave Air and Space Port and within the R-2508 Complex. Therefore, noise from the WhiteKnightTwo and support aircraft would not significantly increase overall noise levels within the R-2508 airspace and underlying communities. The operation of SpaceShipTwo would produce launch noise and sonic booms during reentry, which could be heard by communities in the R-2508 Complex, potentially including environmental justice populations. As described in Section 4.8, the predicted 42 CDNL resulting from sonic booms produced by SpaceShipTwo is substantially below the significance threshold for noise impacts. Currently, aircrews flying within the R-2508 Complex are required to maintain a minimum altitude of 3,000 feet above ground level over populated areas such as small towns and recreation areas (USAF 2011a). The noise produced by WhiteKnightTwo, SpaceShipTwo, and support aircraft would occur infrequently over the course of a year, and these short-term noise impacts would be less than significant for environmental justice groups.

There are no significant adverse impacts from the Proposed Action for any resource area; therefore, no potential impact would disproportionately adversely affect environmental justice populations or children’s environmental health and safety.

4.10 No Action Alternative

Under the No Action Alternative, the FAA would not issue experimental permits or launch licenses for the operation of SpaceShipTwo reusable suborbital rockets and WhiteKnightTwo carrier aircraft from the Mojave Air and Space Port. The Mojave Air and Space Port would continue its existing operations.

The potential environmental effects of the Proposed Action as described in Sections 4.1 through 4.9 would not occur. With the exception of socioeconomics, the existing conditions in the on- and off-site ROIs would remain unchanged and would be as described in Chapter 3. Without obtaining the necessary experimental permits or launch licenses from the FAA, SpaceShipTwo and WhiteKnightTwo operations would potentially need to relocate to a new site, possibly resulting in an adverse impact to socioeconomics due to a loss of existing jobs at the Mojave Air and Space Port.
5. CUMULATIVE IMPACTS

In accordance with FAA Order 1050.1E, Change 1, and the CEQ NEPA implementing regulations, the FAA analyzed the potential cumulative impacts to the resources that would be adversely affected by implementation of the Proposed Action or the No Action Alternative. Based on the findings and potential impacts described in Chapter 4, the cumulative impacts analysis focuses on air quality, which would be expected to be the most affected resource area. The FAA has determined that the potential impacts for all other resource areas described in Chapter 4 of this EA would not meaningfully interact in time and space with the potential effects of other projects. Therefore, no cumulative impacts are anticipated on resource areas other than air quality.

Past, present, and reasonably foreseeable actions at the Mojave Air and Space Port and the surrounding area include current and future aircraft operations at the airport, rocket launches, rocket engine testing, development in the local area related to activities at the Mojave Air and Space Port, and any other development that may occur as a result of economic growth in the area. Recently, a 68,000 square foot hangar was constructed at the Mojave Air and Space Port next to one of the runways. The hangar is referred to as the Final Assembly, Integration, and Test Hangar. The hangar is LEED-certified and will host commercial space vehicle assembly, integration, and testing activities, as well as vehicle maintenance. These actions, considered in conjunction with the Proposed Action, formed the basis for the cumulative impacts analysis.

The Proposed Action could result in a minor increase in air pollutant emissions in the vicinity of the Mojave Air and Space Port as a result of the LTO cycles of WhiteKnightTwo and the support aircraft. These emissions would be infrequent due to the small number of aircraft operations under the Proposed Action, and when combined with emissions from existing and potential future aircraft and rocket operations in the area, would not be likely to affect local air pollutant concentrations and would not be likely to hinder attainment of the NAAQS in the region. When the air quality impacts from the Proposed Action are added to the likely impacts from past, current, and future projects and activities, it is likely that the cumulative impact would not be significant.

Cumulative impacts of emissions from launches have the potential to affect global climate change. The total CO$_2$ emissions for the Proposed Action would be approximately 900 short tons or 400 metric tons per year. U.S. GHG emissions were estimated at 6,633 MMTCO$_2$e in 2009 (EPA 2011b). Global GHG emissions were estimated at 43,183 MMTCO$_2$e in 2005 (WRI 2011). Emissions from the Proposed Action would constitute a negligible addition to national and global emissions and the cumulative impact on global warming from launches would not be significant.
6. REFERENCES


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CARB. 2011. iADAM Air Quality Data Statistics, Top 4 Summary.  
http://www.arb.ca.gov/adam/ (accessed on September 26, 2011).

CDFG (California Department of Fish and Game). 2012. California Natural Diversity Database (CNDDB) Online Map Viewer – CNDDB Quick Viewer.  


FAA. 2009b. Email and phone correspondence between Stacey M. Zee (FAA) and Ray Bransfield (USFWS) regarding desert tortoise surveys at the Mojave Air and Space Port. October.


USAF. 2011b. Center Scheduling Enterprise. Edwards Air Force Base sonic boom data extracted from the Enterprise and provided via personal communication with Samuel Cox on September 28 and October 7, 2011.


7. PREPARERS

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APPENDIX A:

STATE AND FEDERALLY PROTECTED SPECIES POTENTIALLY OCCURING IN THE OFF-SITE ROI
The list of state and federally listed species potentially occurring in the off-site ROI was derived by accessing the California Department of Fish and Game’s website (http://www.dfg.ca.gov/biogeodata/cnddb/mapsanddata.asp) and the U.S. Fish Wildlife Service’s Information, Planning, and Conservation System (http://ecos.fws.gov/ipac/). The list of protected species is displayed in Exhibits A-1 (animals) and A-2 (plants).

**Exhibit A-1. State and Federally Listed Animal Species Potentially Occurring in the Off-Site ROI**

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Federal Status</th>
<th>State Status</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Invertebrates</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vernal pool fairy shrimp</td>
<td>Branchinecta lynchi</td>
<td>Threatened; Critical Habitat</td>
<td>Not Listed</td>
</tr>
<tr>
<td>Valley elderberry longhorn</td>
<td>Desmocerus californicus dimorphus</td>
<td>Threatened</td>
<td>Not Listed</td>
</tr>
<tr>
<td>Vernal pool tadpole shrimp</td>
<td>Lepidurus packardi</td>
<td>Endangered; Critical Habitat</td>
<td>Not Listed</td>
</tr>
<tr>
<td>Nevares spring naucorid bug</td>
<td>Ambrysus funebris</td>
<td>Candidate</td>
<td>Not Listed</td>
</tr>
<tr>
<td>Conservancy fairy shrimp</td>
<td>Branchinecta conservatio</td>
<td>Endangered</td>
<td>Not Listed</td>
</tr>
<tr>
<td>Longhorn fairy shrimp</td>
<td>Branchinecta longiantenna</td>
<td>Endangered</td>
<td>Not Listed</td>
</tr>
<tr>
<td>Kern primrose sphinx moth</td>
<td>Euproserpinus euterpe</td>
<td>Threatened</td>
<td>Not Listed</td>
</tr>
<tr>
<td>Riverside fairy shrimp</td>
<td>Streptocephalus wootoni</td>
<td>Endangered</td>
<td>Not Listed</td>
</tr>
<tr>
<td><strong>Fish</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Little Kern golden trout</td>
<td>Oncorhynchus (=Salmo) aquabonita whitei</td>
<td>Threatened</td>
<td>Not Listed</td>
</tr>
<tr>
<td>Bonytail chub</td>
<td>Gila elegans</td>
<td>Endangered</td>
<td>Rare</td>
</tr>
<tr>
<td>Colorado pikeminnow</td>
<td>Ptychocheilus lucius</td>
<td>Endangered</td>
<td>Endangered</td>
</tr>
<tr>
<td>Mohave Tui chub</td>
<td>Gila bicolor mohavensis</td>
<td>Endangered</td>
<td>Endangered</td>
</tr>
<tr>
<td>Razorback sucker</td>
<td>Xyrauchen texanus</td>
<td>Endangered</td>
<td>Endangered</td>
</tr>
<tr>
<td>Owens Tui chub</td>
<td>Gila bicolor snyderi</td>
<td>Endangered</td>
<td>Endangered</td>
</tr>
<tr>
<td>Owens pupfish</td>
<td>Cyprinodon radiosus</td>
<td>Endangered</td>
<td>Endangered</td>
</tr>
<tr>
<td>Paiute cutthroat trout</td>
<td>Oncorhynchus clarki seleniris</td>
<td>Threatened</td>
<td>Not Listed</td>
</tr>
<tr>
<td>Lahontan cutthroat trout</td>
<td>Oncorhynchus clarki henshawi</td>
<td>Threatened</td>
<td>Not Listed</td>
</tr>
<tr>
<td>Central Valley steelhead</td>
<td>Oncorhynchus mykiss</td>
<td>Threatened</td>
<td>Not Listed</td>
</tr>
<tr>
<td>Unarmored threespine stickleback</td>
<td>Gasterosteus aculeatus williamsoni</td>
<td>Endangered</td>
<td>Endangered</td>
</tr>
<tr>
<td>Cotton marsh pupfish</td>
<td>Cyprinodon salinus milleri</td>
<td>Not Listed</td>
<td>Threatened</td>
</tr>
</tbody>
</table>
### Exhibit A-1. State and Federally Listed Animal Species Potentially Occurring in the Off-Site ROI (continued)

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Federal Status</th>
<th>State Status</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Amphibians and Reptiles</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>California tiger salamander</td>
<td><em>Ambystoma californiense</em></td>
<td>Threatened; Critical Habitat</td>
<td>Threatened</td>
</tr>
<tr>
<td>California red-legged frog</td>
<td><em>Rana draytonii</em></td>
<td>Threatened</td>
<td>Not Listed</td>
</tr>
<tr>
<td>Blunt-nosed leopard lizard</td>
<td><em>Gambelia (=Crotaphytus) sila</em></td>
<td>Endangered</td>
<td>Endangered</td>
</tr>
<tr>
<td>Giant garter snake</td>
<td><em>Thamnophis gigas</em></td>
<td>Threatened</td>
<td>Threatened</td>
</tr>
<tr>
<td>Mountain yellow-legged frog</td>
<td><em>Rana muscosa</em></td>
<td>Candidate</td>
<td>Candidate</td>
</tr>
<tr>
<td>Arroyo toad</td>
<td><em>Bufo californicus</em></td>
<td>Endangered</td>
<td>Not Listed</td>
</tr>
<tr>
<td>Desert tortoise</td>
<td><em>Gopherus agassizii</em></td>
<td>Threatened</td>
<td>Threatened</td>
</tr>
<tr>
<td>Yosemite toad</td>
<td><em>Anaxyrus canorus</em></td>
<td>Candidate</td>
<td>Not Listed</td>
</tr>
<tr>
<td>Black toad</td>
<td><em>Anaxyrus exsul</em></td>
<td>Not Listed</td>
<td>Threatened</td>
</tr>
<tr>
<td>Kern Canyon slender salamander</td>
<td><em>Batrachoseps simatus</em></td>
<td>Not Listed</td>
<td>Threatened</td>
</tr>
<tr>
<td>Tehachapi slender salamander</td>
<td><em>Batrachoseps stebbinsi</em></td>
<td>Not Listed</td>
<td>Threatened</td>
</tr>
<tr>
<td><strong>Birds</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>California condor</td>
<td><em>Gymnogyps californianus</em></td>
<td>Endangered</td>
<td>Endangered</td>
</tr>
<tr>
<td>Inyo California towhee</td>
<td><em>Pipilo crissalis eremophilus</em></td>
<td>Threatened</td>
<td>Endangered</td>
</tr>
<tr>
<td>Southwestern willow flycatcher</td>
<td><em>Empidonax traillii extimus</em></td>
<td>Endangered</td>
<td>Endangered</td>
</tr>
<tr>
<td>Yuma clapper rail</td>
<td><em>Rallus longirostris yumanensis</em></td>
<td>Endangered</td>
<td>Threatened</td>
</tr>
<tr>
<td>Least Bell's vireo</td>
<td><em>Vireo bellii pusillus</em></td>
<td>Endangered</td>
<td>Endangered</td>
</tr>
<tr>
<td>Western snowy plover</td>
<td><em>Charadrius alexandrinus nivosus</em></td>
<td>Threatened</td>
<td>Not Listed</td>
</tr>
<tr>
<td>Western yellow-billed cuckoo</td>
<td><em>Coccyzus americanus occidentalis</em></td>
<td>Candidate</td>
<td>Endangered</td>
</tr>
<tr>
<td>Coastal California gnatcatcher</td>
<td><em>Polioptila californica californica</em></td>
<td>Threatened</td>
<td>Not Listed</td>
</tr>
<tr>
<td>California least tern</td>
<td><em>Sterna antillarum browni</em></td>
<td>Endangered</td>
<td>Endangered</td>
</tr>
<tr>
<td>Marbled murrelet</td>
<td><em>Brachyramphus marmoratus</em></td>
<td>Threatened</td>
<td>Endangered</td>
</tr>
<tr>
<td>Bald eagle</td>
<td><em>Haliaeetus leucocephalus</em></td>
<td>Not Listed</td>
<td>Endangered</td>
</tr>
<tr>
<td>Swainson’s hawk</td>
<td><em>Buteo swainsoni</em></td>
<td>Not Listed</td>
<td>Threatened</td>
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</tbody>
</table>
Exhibit A-1. State and Federally Listed Animal Species Potentially Occurring in the Off-Site ROI (continued)

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Federal Status</th>
<th>State Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Great gray owl</td>
<td>Strix nebulosa</td>
<td>Not Listed</td>
<td>Endangered</td>
</tr>
<tr>
<td>Willow flycatcher</td>
<td>Empidonax traillii</td>
<td>Not Listed</td>
<td>Endangered</td>
</tr>
<tr>
<td>Bank swallow</td>
<td>Riparia riparia</td>
<td>Not Listed</td>
<td>Threatened</td>
</tr>
<tr>
<td>California black rail</td>
<td>Laterallus jamaicensis coturniculus</td>
<td>Not Listed</td>
<td>Threatened</td>
</tr>
<tr>
<td>Belding’s savannah sparrow</td>
<td>Passerculus sandwichensis holdingi</td>
<td>Not Listed</td>
<td>Endangered</td>
</tr>
<tr>
<td>Elf owl</td>
<td>Micrathene whitneyi</td>
<td>Not Listed</td>
<td>Endangered</td>
</tr>
<tr>
<td>Gila woodpecker</td>
<td>Melanerpes uropygialis</td>
<td>Not Listed</td>
<td>Endangered</td>
</tr>
<tr>
<td>Arizona bell’s vireo</td>
<td>Vireo bellii arizonae</td>
<td>Not Listed</td>
<td>Endangered</td>
</tr>
<tr>
<td><strong>Mammals</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Giant kangaroo rat</td>
<td>Dipodomys ingens</td>
<td>Endangered</td>
<td>Endangered</td>
</tr>
<tr>
<td>Fresno kangaroo rat</td>
<td>Dipodomys nitratoides exilis</td>
<td>Endangered; Critical Habitat</td>
<td>Endangered</td>
</tr>
<tr>
<td>Tipton kangaroo rat</td>
<td>Dipodomys nitratoides nitratoides</td>
<td>Endangered</td>
<td>Endangered</td>
</tr>
<tr>
<td>Sierra Nevada bighorn sheep</td>
<td>Ovis canadensis californiana</td>
<td>Endangered</td>
<td>Endangered</td>
</tr>
<tr>
<td>San Joaquin kit fox</td>
<td>Vulpes macrotis mutica</td>
<td>Endangered</td>
<td>Threatened</td>
</tr>
<tr>
<td>Fisher</td>
<td>Martes pennanti</td>
<td>Candidate</td>
<td>Candidate</td>
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<tr>
<td>Amargosa vole</td>
<td>Microtus californicus scirpensis</td>
<td>Endangered</td>
<td>Endangered</td>
</tr>
<tr>
<td>Buena Vista Lake shrew</td>
<td>Sorex ornatus relictus</td>
<td>Endangered</td>
<td>Not Listed</td>
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<tr>
<td>Nelson’s antelope squirrel</td>
<td>Ammospermophilus nelsoni</td>
<td>Not Listed</td>
<td>Threatened</td>
</tr>
<tr>
<td>Sierra Nevada red fox</td>
<td>Vulpes vulpes nectator</td>
<td>Not Listed</td>
<td>Threatened</td>
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</tbody>
</table>
### Exhibit A-2. State and Federally Listed Plant Species Potentially Occurring in the Off-Site ROI

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Federal Status</th>
<th>State Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hoover’s spurge</td>
<td>Chamaesyce hooveri</td>
<td>Threatened</td>
<td>Not Listed</td>
</tr>
<tr>
<td>Springville clarkia</td>
<td>Clarkia springvillensis</td>
<td>Threatened</td>
<td>Endangered</td>
</tr>
<tr>
<td>San Joaquin Valley orcutt grass</td>
<td>Orcuttia inaequalis</td>
<td>Threatened; Critical Habitat</td>
<td>Endangered</td>
</tr>
<tr>
<td>San Joaquin adobe sunburst</td>
<td>Pseudobahia peirsonii</td>
<td>Threatened</td>
<td>Endangered</td>
</tr>
<tr>
<td>Keck’s checker-mallow</td>
<td>Sidalcea keckii</td>
<td>Endangered; Critical Habitat</td>
<td>Not Listed</td>
</tr>
<tr>
<td>Ramshaw sand-verbena</td>
<td>Abronia alpina</td>
<td>Candidate</td>
<td>Not Listed</td>
</tr>
<tr>
<td>Amargosa niterwort</td>
<td>Nitrophila mohavensis</td>
<td>Endangered</td>
<td>Endangered</td>
</tr>
<tr>
<td>Bear Valley sandwort</td>
<td>Arenaria ursina</td>
<td>Threatened</td>
<td>Not Listed</td>
</tr>
<tr>
<td>Cushenbury buckwheat</td>
<td>Eriogonum ovalifolium var. vineum</td>
<td>Endangered</td>
<td>Not Listed</td>
</tr>
<tr>
<td>Cushenbury milk-vetch</td>
<td>Astragalus albens</td>
<td>Endangered</td>
<td>Not Listed</td>
</tr>
<tr>
<td>Cushenbury oxytheca</td>
<td>Oxytheca parishii var. goodmaniana</td>
<td>Endangered</td>
<td>Not Listed</td>
</tr>
<tr>
<td>Lane Mountain milk-vetch</td>
<td>Astragalus jaegerianus</td>
<td>Endangered</td>
<td>Not Listed</td>
</tr>
<tr>
<td>Parish’s daisy</td>
<td>Erigeron parishii</td>
<td>Threatened</td>
<td>Not Listed</td>
</tr>
<tr>
<td>San Fernando Valley spineflower</td>
<td>Chorizanthe parryi var. fernandina)</td>
<td>Candidate</td>
<td>Endangered</td>
</tr>
<tr>
<td>Triple-ribbed milk-vetch</td>
<td>Astragalus tricarinatus</td>
<td>Endangered</td>
<td>Not Listed</td>
</tr>
<tr>
<td>Ash Meadows gumplant</td>
<td>Grindelia fraxino-pratensis</td>
<td>Threatened</td>
<td>Not Listed</td>
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<tr>
<td>Eureka Valley evening-primrose</td>
<td>Oenothera avita ssp. eurekensis</td>
<td>Endangered</td>
<td>Rare</td>
</tr>
<tr>
<td>Fish Slough milk-vetch</td>
<td>Astragalus lentiginosus var. piscinensis</td>
<td>Threatened</td>
<td>Not Listed</td>
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<tr>
<td>Spring-loving centaury</td>
<td>Centaurium namophilum</td>
<td>Threatened</td>
<td>Not Listed</td>
</tr>
<tr>
<td>California jewelflower</td>
<td>Caulanthus californicus</td>
<td>Endangered</td>
<td>Endangered</td>
</tr>
<tr>
<td>Kern mallow</td>
<td>Eremalche kernensis</td>
<td>Endangered</td>
<td>Not Listed</td>
</tr>
<tr>
<td>San Joaquin woolly-threads</td>
<td>Monolopia congdonii</td>
<td>Endangered</td>
<td>Not Listed</td>
</tr>
<tr>
<td>Bakersfield cactus</td>
<td>Opuntia treleasei</td>
<td>Endangered</td>
<td>Endangered</td>
</tr>
<tr>
<td>Marsh sandwort</td>
<td>Arenaria paludicola</td>
<td>Endangered</td>
<td>Endangered</td>
</tr>
<tr>
<td>Mariposa pussy-paws</td>
<td>Calyptridium pulchellum</td>
<td>Threatened</td>
<td>Not Listed</td>
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</tbody>
</table>
### Exhibit A-2. State and Federally Listed Plant Species Potentially Occurring in the Off-Site ROI (continued)

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Federal Status</th>
<th>State Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>San Benito evening-primrose</td>
<td>Camissonia benitensis</td>
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<td>Not Listed</td>
</tr>
<tr>
<td>Succulent (=fleshy) owl’s-clover</td>
<td>Castilleja campestris ssp. succulenta</td>
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<td>Endangered</td>
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<tr>
<td>Palmate-bracted bird’s-beak</td>
<td>Cordylanthus palmatus</td>
<td>Endangered</td>
<td>Endangered</td>
</tr>
<tr>
<td>Hartweg’s golden sunburst</td>
<td>Pseudobahia bahiifolia</td>
<td>Endangered</td>
<td>Endangered</td>
</tr>
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<tr>
<td>Conejo dudleya</td>
<td>Dudleya abramsii ssp. parva</td>
<td>Threatened</td>
<td>Not Listed</td>
</tr>
<tr>
<td>Gambel’s watercress</td>
<td>Rorippa gambellii</td>
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<td>Threatened</td>
</tr>
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<td>Lyon’s pentachaeta</td>
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<td>Marcescent dudleya</td>
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<td>Rare</td>
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<td>Nevin’s barberry</td>
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<td>Salt marsh bird’s-beak</td>
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<td>San Fernando Valley spineflower</td>
<td>Chorizanthe parryi var. fernandina)</td>
<td>Candidate</td>
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<td>Santa Monica Mountains dudleyea</td>
<td>Dudleya cymosa ssp. ovatifolia</td>
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<td>Slender-horned spineflower</td>
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<td>Spreading navarretia</td>
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<td>Ventura marsh milk-vetch</td>
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<tr>
<td>Verity’s dudleya</td>
<td>Dudleya verityi</td>
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</table>
APPENDIX B:

AGENCY CONSULTATION
February 15, 2007

Tom Weil  
East Kern Airport District  
1434 Flightline  
Mojave, California  93501

Subject: Water Line and Tank Project and Other Mojave Airport Projects, Kern County, California

Dear Mr. Weil:

We have reviewed your letter in which you request our concurrence that the installation of a new water line and water tank at Mojave Airport will not affect the federally threatened desert tortoise (Gopherus agassizii). The funding for the project will be provided by the U.S. Economic Development Agency, which, as a Federal agency, is required by section 7(a)(2) of the Endangered Species Act of 1973, as amended, to ensure that any action it funds, implements, or permits does not jeopardize the continued existence of listed species or adversely modify their critical habitat. Pursuant to the implementing regulations for section 7(a)(2) of the Endangered Species Act (50 Code of Federal Regulations 402), the Economic Development Agency has designated the East Kern Airport District as its non-federal agent to conduct this consultation. We received your letter on January 24, 2007.

The East Kern Airport District proposes to construct an extension of a water line and a new water tank adjacent to a taxiway and existing water tanks, respectively. The areas in which the work would occur have been disturbed for many years. Although several surveys have been conducted in the past, no desert tortoises have been observed within the boundaries of the 3,000-acre airport property. The airport is not within the boundaries of critical habitat of the desert tortoise or any other federally listed species. We do not expect that any other federally listed species is likely to occur at Mojave Airport.

Section 7(a)(2) of the Endangered Species Act and its implementing regulations do not provide the U.S. Fish and Wildlife Service (Service) with the authority to concur with a Federal agency’s findings that an action will not affect a listed species or its critical habitat. In fact, the implementing regulations state that, if the Federal agency makes such
Tom Weil

a determination, compliance with section 7(a)(2) is complete. The implementing regulations also state that a Federal agency may determine that an action is “not likely to adversely affect” a listed species or its critical habitat; in such a case, if the Service agrees with the determination of the Federal agency (or its designated agent), the Service consents in writing and consultation is complete.

Desert tortoises have not been detected within Mojave Airport during surveys conducted over several years. The airport supports a high level of human activity and large amounts of disturbed land. It is also surrounded by a fence that desert tortoises generally would be unable to cross. For these reasons, we expect that desert tortoises are not present within the boundaries of Mojave Airport at this time and do not expect them to reoccupy the area and have no reason to dispute your conclusion that the proposed action will not affect desert tortoises.

We are aware that desert tortoises persist in the general vicinity of Mojave Airport and note that fences occasionally develop openings. Consequently, some possibility exists that a desert tortoise may enter airport property in the future. However, we consider this possibility to be remote. We encourage you to be alert for desert tortoises and their sign during surveys you may conduct for future projects and to alert us if you find indications that they may be present. Until such time, however, we conclude that desert tortoises are not present within the boundaries of Mojave Airport and will not be affected by this project or future activities you undertake within the airport’s boundaries. We recommend that you retain this letter to assist you in complying with the Endangered Species Act in regard to future Federal actions.

If you have any questions, please contact Ray Bransfield of my staff at (805) 644-1766, extension 317.

Sincerely,

Carl T. Benz

Carl T. Benz
Assistant Field Supervisor
Mojave/Great Basin Desert Division
MEMORANDUM OF UNDERSTANDING
BETWEEN
THE FEDERAL AVIATION ADMINISTRATION (FAA)
AND
THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)
FOR
ACHIEVEMENT OF MUTUAL GOALS IN HUMAN SPACE TRANSPORTATION

STATEMENT OF INTENT

NASA’s Commercial Crew Program (CCP) aims to facilitate the development of a U.S. commercial crew space transportation capability with the goal of achieving safe, reliable, and cost effective access to and from low-Earth orbit and the International Space Station (ISS). Under the CCP, NASA is partnering with U.S. industry by providing technical and financial assistance to facilitate industry’s development of an integrated crew transportation system. NASA plans to buy transportation and rescue services to the ISS from commercial entities for U.S. and U.S. operating segment astronauts once NASA has certified such entities. NASA intends that all launches supporting ISS crew transportation services will be licensed by the FAA for public safety and wishes to work with FAA to reach a common understanding and approach for meeting that objective.

NASA and FAA have complementary and interdependent interests in ensuring that commercially-developed human-rated systems and vehicles for low-Earth orbit are effective and safe. Both agencies seek to avoid conflicts between the goals of the two agencies. Both seek to avoid duplicating each other’s roles. These interests are consistent with the National Space Policy of the United States of America (June 28, 2010) which directs Federal agencies to “minimize, as much as possible, the regulatory burden for commercial space activities and ensure that the regulatory environment for licensing space activities is timely and responsive;” and “pursue potential opportunities for transferring routine, operational space functions to the commercial space sector where beneficial and cost effective, except where the government has legal, security, or safety needs that would preclude commercialization.”

This MOU is intended to support the transition to commercial transport of Government and non-Government passengers to low-Earth orbit in a manner that avoids conflicting requirements and multiple sets of standards. In developing these standards, the parties will exchange knowledge and best practices in the disciplines of space flight health, medical, engineering, and safety and mission assurance requirements for space systems and vehicles and operations.

AUTHORITY
This MOU is entered into on behalf of NASA under the authority of the National Aeronautics and Space Act, 51 U.S.C. § 20113. This MOU is entered into on behalf of FAA under the authority of Sections 226 and 227 of the FAA Reauthorization Act of 1996, 49 USC § 106(l)(m), 51 U.S.C. Subtitle V, Chapter 509 – Commercial Space Launch Activities, and Executive Order 12465.
SCOPE
NASA and FAA agree to collaboratively engage to understand and coordinate their respective roles to:

- Provide a stable framework for the U.S. space launch industry.
- Avoid conflicting requirements and multiple sets of standards.
- Advance both public safety and crew safety
- Advance the interests of NASA-certified U.S. commercial launch operators responsible for transporting U.S. and U.S. operating segment astronauts to the ISS.

IMPLEMENTATION
The FAA and NASA will jointly determine the tasks needed to reach the goals set forth herein. Task Statements outlining the activities to be conducted under this agreement will be appended to this document. Approval authority for Task Statements may be delegated to officials with resource authority to execute their terms. Task Statements will include the following:

A. Overall goals/objectives
B. Work requirements by each party
C. Time constraints/completion dates
D. Agreed resource commitments by agency
E. Approval points/milestones
F. Logistics requirements
G. Other pertinent information

Task Statements may not be used to modify the terms of this MOU, and in the event any Task Statement is inconsistent with the terms of this MOU, the terms of the MOU will govern. This MOU in no way restricts the Parties from participating, subject to applicable law, in similar activities or arrangements with each other, other public or private agencies, organizations, or individuals intended to enhance the objectives of this partnership. Disputes concerning scope or conduct of any Task Statement will be raised to the signatories or their designated representatives set forth in this MOU. An annual progress review of all Task Statements will be held.

FINANCIAL OBLIGATIONS
There will be no transfer of funds between the Parties under this MOU and each Party will fund its own participation. This MOU does not obligate the Parties to expend appropriations on any particular project or purpose or to enter into any agreements, contracts, or other obligations, even if funds are available. Each Party shall accept full and primary responsibility for any and all expenses incurred by that Party relating to this MOU. All activities under or pursuant to this MOU are subject to the availability of funds, and no provision of this MOU shall be interpreted to require obligation or payment of funds in violation of the Anti-Deficiency Act (31 U.S.C. § 1341).

PRIORITY OF USE
The Parties agree that NASA’s and FAA’s use of its own goods, services, facilities, or equipment shall have priority over the use planned in this MOU.
LIABILITY
Each Party agrees to assume liability for its own risks arising from or related to activities conducted under this MOU.

FREE EXCHANGE OF DATA
NASA and FAA agree that the information and data exchanged in furtherance of the activities under this MOU will be exchanged without use and disclosure restrictions unless required by national security regulations (e.g., classified information) or as otherwise provided in this MOU or agreed to by NASA and FAA for specifically identified information or data (e.g., information or data specifically marked with a restrictive notice). The Parties agree that when the following data of third parties is provided to each other, it is provided with the express understanding that:

1. The recipient of proprietary information or data may use, disclose, or reproduce such data only to the extent necessary to perform the work required under this MOU;
2. NASA and the FAA may not exchange proprietary information obtained from one commercial entity participating in NASA’s CCP with another commercial entity;
3. The Parties agree to safeguard such data from unauthorized use or disclosure, including safeguarding any data provided by one launch operator from being disclosed to another launch operator;
4. Notify its employees who may require access to such data about the obligations under this clause and ensure that such employees comply with such obligations, including the obligation that the data of one launch operator not be provided to a competing launch operator, and notify its contractors or subcontractors that may require access to such data about their obligations under this clause; and
5. Return or dispose of such data, as the disclosing Party may direct, when the data is no longer needed for performance under this Agreement.

RELEASE OF GENERAL INFORMATION TO THE PUBLIC AND MEDIA
NASA or FAA may, consistent with Federal law, release general information regarding its own participation in this MOU as desired. Insofar as participation of the other Party in this MOU is included in a public release, NASA and FAA will seek to consult with each other prior to any such release, consistent with the Parties’ respective policies.

DISPUTE RESOLUTION
All disputes concerning questions of fact or law arising under this MOU shall be referred by the claimant in writing to the appropriate person identified in this MOU as the “Points of Contact” for NASA and the FAA, who will consult and attempt to resolve all issues arising from the implementation of this MOU. If they are unable to come to agreement on any issue, the dispute will be referred to the signatories to the MOU or their designees, for joint resolution after the Parties have separately documented in writing clear reasons for the dispute. As applicable, disputes will be resolved pursuant to Section VII (Resolving Intragovernmental Disputes and Major Differences) of the Intragovernmental Business Rules (Treasury Financial Manual, Vol. 1, Chapter 2, Part 4700, Appendix 10).
TERM
This MOU becomes effective upon the date of the last signature below ("Effective Date") and shall remain in effect for six (6) years after the Effective Date, unless otherwise modified or terminated.

MODIFICATIONS
Any modification to this MOU shall be executed, in writing, and signed by an authorized representative of NASA and FAA.

RIGHT TO TERMINATE
Either Party may unilaterally terminate this Agreement by providing thirty (30) calendar days written notice to the other Party.

POINTS OF CONTACT
The following personnel are designated as the Points of Contact between the Parties in the performance of this Agreement.

NASA
Philip McAlister
Director, Commercial Spaceflight Development
philip.mcalister@nasa.gov
Office: 202-358-0712
Cell: 202-549-3744
Fax: 202-358-2885
300 E Street, SW
Washington, DC 20546-0001

FAA
Pamela A. Melroy
Director of Field Operations
pam.melroy@faa.gov
Office: 202-493-4911
Cell: 202-669-9198
Fax: 202-267-5450
800 Independence Ave, SW
Washington, DC 20591

LEGAL EFFECT
This MOU is strictly for internal management purposes for each of the Parties. It is not legally enforceable and shall not be construed to create any legal obligation on the Parties. This MOU shall not be construed to provide a private right or cause of action for or by any person or entity. Nothing in this MOU shall be interpreted as limiting, superseding, or otherwise affecting a Party from conducting normal operations or making decisions in carrying out its mission and duties.

SIGNATORY AUTHORITY
Approved and authorized on behalf of each party by:

NATIONAL AERONAUTICS
AND SPACE ADMINISTRATION

BY: William H. Gerstenmaier
Associate Administrator for Human Exploration and Operations Mission Directorate

FEDERAL AVIATION
ADMINISTRATION

BY: Dr. George C. Nield
Associate Administrator for Commercial Space Transportation
Mail Suite: 7L18
300 E Street SW
Washington, DC 20546

DATE: 4 June 2012

Room 331
800 Independence Ave, SW
Washington, DC 20591

DATE: 6/4/12
FCC REPORT TO CONGRESS
AS REQUIRED BY THE ORBIT ACT
THIRTEENTH REPORT

Adopted: June 22, 2012

Released: July 3, 2012

By the Commission:
This report is submitted in accordance with the requirements of the Open-Market Reorganization for the Betterment of International Telecommunications Act (the “ORBIT Act” or “Act”)\(^1\) which has an objective of ensuring that INTELSAT and Inmarsat are privatized in a pro-competitive manner. To this end, the Act requires the submission of annual reports to Congress as noted below.

Section 646 states:

(a) ANNUAL REPORTS - The President and the Commission shall report to the Committees on Commerce and International Relations of the House of Representatives and the Committees on Commerce, Science, and Transportation and Foreign Relations of the Senate within 90 calendar days of the enactment of this title, and not less than annually thereafter, on the progress made to achieve the objectives and carry out the purposes and provisions of this title. Such reports shall be made available immediately to the public.

(b) CONTENTS OF REPORTS - The reports submitted pursuant to subsection (a) shall include the following:

(1) Progress with respect to each objective since the most recent preceding report.

(2) Views of the Parties with respect to privatization.

(3) Views of the industry and consumers on privatization.

(4) Impact privatization has had on United States industry, United States jobs, and United States industry’s access to the global marketplace.\(^2\)

I. Progress as to Objectives and Purposes

The purpose of the ORBIT Act is “to promote a fully competitive global market for satellite communication services for the benefit of consumers and providers of satellite services

and equipment by fully privatizing the intergovernmental satellite organizations, INTELSAT and Inmarsat.\(^3\)

The ORBIT Act, as originally passed in 2000, (1) mandates the privatization of INTELSAT and Inmarsat, (2) establishes criteria to ensure a pro-competitive privatization, (3) requires the Commission to determine whether INTELSAT, Inmarsat, and the INTELSAT spin-off New Skies Satellites N.V. ("New Skies"), have been privatized in a manner that will harm competition in the United States, (4) requires the Commission to use the privatization criteria specified in the ORBIT Act as a basis for making its competition determination, and (5) directs the Commission to "limit through conditions or deny" applications or requests to provide "non-core" services to, from, or within the United States if it finds that competition will be harmed.\(^5\) The Act provides for certain exceptions to limitations on non-core services in the event of such a determination. The Act also prohibits the Commission from authorizing certain "additional" services pending privatization consistent with the criteria in the Act.\(^6\) In addition, the Act directs the Commission to undertake a rulemaking proceeding to assure users in the United States the opportunity for direct access to the INTELSAT system.

In October 2004, Congress amended the ORBIT Act, adding Sections 621(5)(F) and (G), to provide a certification process as an alternative to the initial public offering ("IPO") requirements under Sections 621(5)(A) and (B). In July 2005, Congress further amended the ORBIT Act, striking certain privatization criteria for Intelsat separated entities, removing certain restrictions on separated entities and successors to Intelsat and for other purposes.\(^7\) Congress also added a requirement that the Commission submit to Congress a separate annual report that analyzes the competitive market conditions with respect to domestic and international satellite communications services ("Satellite Competition Report").\(^8\)

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\(^3\) The intergovernmental satellite body INTELSAT later created Intelsat LLC, a privately-held U.S. corporation that became the licensee of satellite assets formerly held by INTELSAT. See infra at 3-4. As a result of an internal reorganization consummated in January 2011, Intelsat LLC was eliminated as a subsidiary company, and the majority of licenses are now held by Intelsat License LLC. See n.44, infra, and accompanying text.

\(^4\) 47 U.S.C. § 761 NOTE.

\(^5\) The Act defines "non-core" services as "services other than public-switched network voice telephony and occasional-use television" with respect to INTELSAT, and as "services other than global maritime distress and safety services or other existing maritime or aeronautical services for which there are not alternative providers" with respect to Inmarsat. 47 U.S.C. § 769(a)(11).

\(^6\) The Act defines "additional" services as direct-to-home ("DTH") or direct broadcast satellite ("DBS") video services, or services in the Ka or V bands for INTELSAT and as "those non-maritime or non-aeronautical mobile services in the 1.5 and 1.6 GHz band on planned satellites or the 2 GHz band" for Inmarsat. 47 U.S.C. § 769(a)(12).


\(^8\) The most recent satellite competition annual report was released on December 13, 2011. Third Report and Analysis of Competitive Market Conditions with Respect to Domestic and International Satellite Communications Services, IB Docket No. 09-16, and International Satellite Communications Services and (continued ...
The Commission made its first annual report to Congress on its actions to implement the ORBIT Act on June 15, 2000, following enactment of the Act on March 17, 2000. In anticipation of this thirteenth report, the Commission issued a Public Notice on February 3, 2012, inviting comments related to the development of this Report. ARTEL, Inc. (ARTEL), Intelsat License LLC (Intelsat), and Inmarsat PLC (Inmarsat) filed comments. Intelsat and SES S.A. filed reply comments.

A. Commission Actions and Activities

Since August of 2000, the Commission has undertaken a number of actions either required by the ORBIT Act, or related to its objectives and purposes. The Commission has taken the actions described below to ensure that INTELSAT, Inmarsat, and New Skies have been privatized in a pro-competitive manner, consistent with the privatization criteria of the ORBIT Act. The Commission has also taken actions to implement certain deregulatory measures in the ORBIT Act.

(Continued from previous page)


11 Comments of ARTEL, Inc., filed on March 5, 2012 (“ARTEL Comments”).

12 Comments of Intelsat License LLC, filed on March 5, 2012 (“Intelsat Comments”).

13 Comments of Inmarsat PLC, filed on March 5, 2012 (“Inmarsat Comments”).

14 Reply Comments of Intelsat License LLC, filed on March 15, 2012 (“Intelsat Reply Comments”).


16 47 U.S.C. §§ 761, 763, 763a, 763b, 763c, and 765g.

INTELSAT

In August 2000, the Commission granted conditional licensing authority to Intelsat LLC (“Intelsat”), a separate, privately held U.S. corporation, created by INTELSAT to hold U.S. satellite authorizations and associated space segment assets.\(^\text{18}\) Under this licensing authority, the Commission permitted Intelsat’s licenses to become effective upon “privatization,” meaning the transfer of INTELSAT’s satellites and associated assets to Intelsat and the transfer of its International Telecommunication Union (“ITU”) network filings to the U.S. registry. Intelsat received conditional U.S. authorizations for INTELSAT’s existing satellites, planned satellites, and planned system modifications associated with INTELSAT’s frequency assignments in the fixed satellite services (“FSS”) C- and Ku-bands existing as of privatization.\(^\text{19}\)

Later in 2000, INTELSAT adopted plans to distribute shares in Intelsat to its Signatories on July 18, 2001.\(^\text{20}\) In May 2001, the Commission found that, although the initial public offering (“IPO”) required under the privatization requirements of the ORBIT Act had not yet been completed, INTELSAT would privatize in a manner consistent with the non-IPO privatization provisions of the ORBIT Act, upon completion of its plans to distribute Intelsat shares to its Signatories.\(^\text{21}\) INTELSAT later distributed shares to its Signatories, as it had planned.

On July 28, 2003, Loral Satellite Inc. (“Debtor-in-Possession” or “DIP”), and Loral SpaceCom Corporation (DIP), and Intelsat North America, LLC filed an application seeking authority to assign five non-common carrier space station licenses to Intelsat North America. On February 11, 2004, the Commission granted authority to assign those licenses subject to certain conditions and limitations.\(^\text{22}\) Loral was providing


\(^{19}\) See generally Intelsat Licensing Order, supra, n.18. The conventional C-band refers to the 3700-4200/5925-6425 MHz frequency bands. Intelsat was also authorized to operate in the extended C-band frequencies 3625-3700/5850-5925/6425-6650 MHz on certain satellites at certain orbital locations. In addition, Intelsat was authorized to operate in the extended C-band frequencies 3420-3625 MHz on the Intelsat-805 satellite at 55.5° W.L. and in the 3400-3625 MHz band on the Intelsat 25 satellite at 31.5° W.L. for service to non-U.S. locations. The 3400-3600 MHz portion of this frequency band is not a satellite band in the United States and is operated by Intelsat outside the United States subject to potential interference from worldwide shipborne U.S. military radar operations. The conventional Ku-band refers to the 11.7-12.2/14.0-14.5 GHz frequency bands. Intelsat was also authorized to operate in the extended Ku-frequency bands 10.95-11.2/11.45-11.7/12.5-12.75/13.75-14.0 GHz on certain satellites at certain orbital locations.

\(^{20}\) Upon privatization, former INTELSAT Signatories and non-Signatory investing entities were issued shares in Intelsat Ltd. according to their March 2001 investment shares in INTELSAT.

\(^{21}\) Application of Intelsat LLC for Authority to Operate, and to Further Construct, Launch, and Operate C-band and Ku-band Satellites that Form a Global Communications System in Geostationary Orbit, Memorandum Opinion, Order and Authorization, 16 FCC Rcd 12313, 12290 ¶ 71 (2001).

\(^{22}\) Loral Satellite, Inc. (Debtor-in-Possession) and Loral SpaceCom Corporation (Debtor-in-Possession), and Intelsat North America, LLC, Applications for Consent to Assignments of Space Station Authorizations (continued ...)
services, such as Direct-to-Home ("DTH"), that are “additional services” as defined in the ORBIT Act. Intelsat was granted authority to provide additional services to the then-existing Loral customers.\textsuperscript{23}

- Intelsat was originally required by the ORBIT Act to conduct an IPO by October 1, 2001, in order to “substantially dilute” ownership by former INTELSAT Signatories.\textsuperscript{24} Subsequently, in 2002 and 2004, Congress amended the ORBIT Act to extend the deadline for Intelsat to conduct its IPO.\textsuperscript{25} In October 2004, Congress added Sections 621(5)(F) and (G) to the ORBIT Act, to provide a certification process as an alternative to the IPO requirements under Sections 621(5)(A) and (B).\textsuperscript{26}

- On December 22, 2004, the Commission authorized the transfer of control of Intelsat’s licenses and authorizations to Zeus Holdings Limited (“Zeus”),\textsuperscript{27} a private equity group, organized under the law of Bermuda, which would acquire 100 percent of the equity and voting interests of Intelsat (”Zeus/Intelsat Transaction”).\textsuperscript{28}

(Continued from previous page)


\textsuperscript{23} \textit{Loral/Intelsat Order}, 19 FCC Rcd at 2429 ¶ 65.


\textsuperscript{27} Zeus Holdings Limited subsequently changed its name to Intelsat Holdings, Ltd. See \textit{infra}, n.40.

• On April 8, 2005, the Commission determined that (a) Intelsat was in compliance with the alternative certification process under Sections 621(5)(F) and 621(5)(G) of the ORBIT Act; (b) that Intelsat can forgo the requirement for an IPO and the public listing of securities; and that (c) Intelsat was no longer subject to the provisions of Section 602 that prohibited Intelsat from providing "additional services."  

• On May 24, 2005, the Commission granted Intelsat’s request for approval of the pro forma assignments of space station authorizations and related Tracking, Telemetry and Control ("TT&C") earth station licenses, from Intelsat to Intelsat North America LLC.  

• On June 19, 2006, the Commission approved the merger of Intelsat Holdings, Ltd. with PanAmSat Holding Corporation ("PanAmSat"). The FCC action approving the transaction granted applications for the transfer of control, to Intelsat, of Commission-issued licenses and authorizations held by PanAmSat and its subsidiaries. Upon consummation of the transaction on July 3, 2006, PanAmSat became a wholly-owned subsidiary of Intelsat continuing operation as a separate corporate entity.  

• On December 19, 2007, the Commission granted a series of applications filed by Intelsat Holdings, Ltd. and Serafina Holdings Limited ("Serafina") seeking consent to transfer of control of Intelsat Holdings, Ltd., and its six subsidiary licensees from Intelsat’s existing control group of four private equity firms to Serafina, a then newly-formed Bermuda company indirectly controlled by BC Partners Holdings Limited, a U.K.-based investment firm organized under the laws of Guernsey, a British Crown Dependency. Serafina and Intelsat subsequently consummated the proposed transaction.  

(Continued from previous page)
On February 21, 2008, the Commission released an order\textsuperscript{33} modifying certain space station licenses held by Intelsat North America to include two conditions requested jointly by Intelsat and the International Telecommunications Satellite Organization ("ITSO").\textsuperscript{34} The conditions were two of three conditions initially proposed by ITSO.\textsuperscript{35} The adoption of the two conditions was supported by the State Department, after consultations with NTIA.\textsuperscript{36}

On January 20, 2010, Intelsat General Corporation was granted a pro forma transfer of control of Intelsat General Corporation’s international Section 214 authority from Intelsat Global, Ltd. (Bermuda) to Intelsat Global, S.A. (Luxembourg), effective December 15, 2009. All of Intelsat’s (Bermuda) direct and indirect subsidiaries were migrated from Bermuda and reorganized as Luxembourg entities. There was no change in the ultimate ownership and control of Intelsat General Corporation.\textsuperscript{37}

In December 2010 and January 2011, the FCC authorized a number of internal transfers and assignments that resulted in the majority of Intelsat and its affiliated corporate entities’ FCC licenses and authorizations being held by a single subsidiary.

\textsuperscript{33} Petition of the International Telecommunications Satellite Organization under Section 316 of the Communications Act, as Amended, IB Docket No. 06-137, Order of Modification, 23 FCC Rcd 2764 (Int’l Bur., 2008). The modification implemented a Commission order, pursuant to Section 316 of the Communications Act of 1934, as amended, to impose the two conditions. See Petition of the International Telecommunications Satellite Organization under Section 316 of the Communications Act, as Amended, IB Docket No. 06-137, Order Proposing Modification, 22 FCC Rcd 20093 (Int’l Bur. 2007). Intelsat North America, while stating that it did not object to the proposed conditions in principle, filed a Limited Protest to Seek Clarification as to the circumstances in which the conditions would apply. Intelsat North America Limited Protest to Seek Clarification, IB Docket No. 06-137 (filed January 10, 2008) at 1-2. The request for clarification was granted in part, and denied in part, in the February 2008 modification order.

\textsuperscript{34} ITSO is the residual, post-privatization intergovernmental organization, governed by international agreement that oversees the Intelsat public service obligations established as part of the 2001 privatization. See Agreement Relating to the International Telecommunications Satellite Organization (ITSO Agreement) (November 17, 2000), Art. III(a) ("[T]he main purpose of ITSO is to ensure, through the Public Services Agreement, that the Company provides, on a commercial basis, international public telecommunications services, in order to ensure performance of the Core Principles."), available at http://www.itso.int. The United States is a party to the ITSO Agreement, with the State Department serving as the U.S. representative. See Order of Modification, 23 FCC Rcd at 2764. The two conditions explicitly obligate Intelsat to remain a signatory to the Public Services Agreement between Intelsat and ITSO approved by the ITSO Twenty-fifth Assembly of Parties, and provide, for licensing purposes, that no entity can be considered a successor-in-interest to Intelsat under the ITSO Agreement unless the entity has undertaken to perform the obligations of the Public Services Agreement.

\textsuperscript{35} Petition of ITSO, IB Docket No. 06-137 (filed July 10, 2006).


company, Intelsat License LLC. These transfers and assignments were consummated on January 12, 2011.

- On November 23, 2011, Intelsat submitted applications seeking Commission approval to transfer control of all of its licenses and authorizations (held by Intelsat License LLC, Intelsat New Dawn Company, Ltd., Intelsat USA License LLC, and Intelsat General) pursuant to a public offering of newly issued voting shares by Intelsat Global Holdings S.A. The Commission granted these applications, subject to conditions, on May 16, 2012.

- Pursuant to U.S. obligations as the notifying administration to the ITU for Intelsat’s fixed satellite service C- and Ku-band assignments transferred at privatization, the Commission has participated in a number of international satellite coordination negotiations as Intelsat’s licensing Administration. Since the Twelfth ORBIT Act Report, the Commission has participated in coordination meetings with the Russian Federation and Malaysia on behalf of Intelsat and a number of other U.S. licensees.

- The United States has a separate process whereby U.S. operators may reach operational arrangements with operators of other Administrations. These operational arrangements are then submitted to the operators’ respective Administrations for approval. Once approved by both Administrations, the operational arrangements become, or form the basis for, a coordination agreement between the Administrations under the ITU procedures. Since the Twelfth ORBIT Act Report, Intelsat has concluded operational arrangements with operators licensed by Intersputnik (an intergovernmental organization), the Netherlands, Luxembourg, and the United Arab Emirates. In due course, this process will lead to coordination agreements between the United States and the pertinent foreign Administrations.

- Since the Twelfth ORBIT Act Report, Intelsat has filed a number of requests for license authorizations and modifications. The Commission has reviewed these

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41 Intelsat Global Holdings S.A. Files to Transfer Control of Intelsat Licenses and Authorizations From BC Partners Holdings Limited to Public Ownership, Order and Authorization, DA 12-768 (Int’l Bur., released May 16, 2012).

42 As the Notifying Administration on behalf of Intelsat, the Commission is responsible for discharging the obligation undertaken in the Constitution of the ITU, in the Convention of the ITU, and in the Administrative regulations. Article 1, Section 1.2, ITU Radio Regulations.
requests and acted on them consistent with the Commission’s licensing rules and processes.  

**Inmarsat**

- Inmarsat privatized on April 15, 1999, prior to enactment of the ORBIT Act. The ORBIT Act specified a number of criteria for determining whether Inmarsat’s privatization is pro-competitive. On October 9, 2001, the Commission released an Order in which it concluded that Inmarsat had privatized in a manner consistent with the non-IPO requirements of Sections 621 and 624 of the ORBIT Act.  

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43 *See, e.g.*, Intelsat License LLC, Special Temporary Authority to drift Intelsat 702, IBFS File No. SAT-STA-20120315-00046, DA 12-549 (grant of authority on March 30, 2012); Intelsat License LLC, Special Temporary Authority to conduct in-orbit testing of Intelsat 22, IBFS File No. SAT-STA-20120126-00013, DA 12-499 (grant of authority on March 28, 2012); Intelsat License LLC, Special Temporary Authority to stop the drift of Intelsat 701, IBFS File No. SAT-STA-20120312-00039, DA 12-499 (grant of authority on March 28, 2012); Intelsat License LLC, Launch of Authority to replace C/Ku-band satellite, to be known as Intelsat 22, IBFS File No. SAT-LOA-20110929-00193, DA 12-415 (grant of authority on March 15, 2012); Intelsat License LLC, Application for Modification, IBFS File No. SES-MFS-20111118-01380 (grant stamp on January 20, 2012); Intelsat License LLC, Special Temporary Authority Intelsat to drift Intelsat 706, IBFS File No. SAT-STA-20111209-00237, DA 11-2029 (grant of authority on December 14, 2011); Intelsat License LLC, Special Temporary Authority Intelsat to drift Intelsat Galaxy 26, IBFS File No. SAT-STA-20111123-00227, DA 11-2001 (grant of authority on December 6, 2011); Intelsat License LLC, Special Temporary Authority to drift Intelsat Galaxy 12, IBFS File No. SAT-STA-20111118-00223, DA 11-1962 (grant of authority on December 1, 2011); Intelsat License LLC, Special Temporary Authority to drift Intelsat 701, IBFS File No. SAT-STA-20111114-00218, DA 11-1962 (grant of authority on November 22, 2011); Intelsat License LLC, Application for Authority, IBFS File No. SES-LIC-20110908-01051 (grant of authority on October 24, 2011); Intelsat License LLC, Special Temporary Authority to drift Intelsat Galaxy 12, IBFS File No. SAT-STA-20110915-00183, DA 11-1764 (grant of authority on October 18, 2011); Intelsat License LLC, Special Temporary Authority Intelsat to drift Intelsat 706, IBFS File No. SAT-STA-20111010-00196, DA 11-1754 (grant of authority on October 13, 2011); Intelsat License LLC, Special Temporary Authority Intelsat to operate certain C- and Ku-band Intelsat 603, IBFS File No. SAT-STA-20110727-00138, DA 11-1565 (grant of authority on September 14, 2011); Intelsat License LLC, Special Temporary Authority Intelsat to operate Intelsat 702, IBFS File No. SAT-STA-20110805-00145, DA 11-1429 (grant of authority on September 18, 2011); Intelsat License LLC, Special Temporary Authority to drift Intelsat 706, IBFS File No. SAT-STA-20110810-00159, DA 11-1429 (grant of authority on September 18, 2011); Intelsat License LLC, Special Temporary Authority Intelsat to de-orbit Intelsat 3R, IBFS File No. SAT-STA-20110726-00134, DA 11-1398 (grant of authority on September 11, 2011); Intelsat License LLC, Special Temporary Authority to drift Intelsat 702, IBFS File No. SAT-STA-20110520-00093, DA 11-1398 (grant of authority on September 5, 2011); Intelsat License LLC, Special Temporary Authority Intelsat to drift Intelsat Galaxy 26, IBFS File No. SAT-STA-20110727-00137, DA (grant of authority on September 5, 2011); Intelsat License LLC, Special Temporary Authority Intelsat to drift Intelsat 702, IBFS File No. SAT-STA-20110607-00103, DA (grant of authority on September 3, 2011); Intelsat License LLC, Modify the authorization for the Intelsat 709, IBFS File No. SAT-MOD-20110428-00081, DA (grant of authority on July 27, 2011).  

In its decision, having found that Inmarsat had privatized in a manner consistent with the non-IPO requirements of the Act, the Commission granted Comsat Corporation, Stratos Mobile Networks, LLC, SITA Information Computing Canada, Inc., Honeywell, Inc., Marisat Communications Network, Inc., and Deere & Company regular earth station authority to use certain Inmarsat satellites for communications services to, from, or within the United States.

The ORBIT Act originally required Inmarsat to conduct an IPO no later than October 1, 2000. Subsequently, Congress amended the ORBIT Act several times to extend the deadline for Inmarsat to conduct an IPO. Ultimately, in October 2004, Congress amended the ORBIT Act, extending the IPO deadline until June 30, 2005 and adding Sections 621(5)(F) and (G) to provide a certification process as an alternative to the IPO requirements under Sections 621(5)(A) and (B).

On June 14, 2005, the Commission determined that Inmarsat was in compliance with the alternative certification process under Sections 621(5)(F) and 621(5)(G) of the ORBIT Act, that Inmarsat could forgo the requirement for an IPO and the public listing of securities, and that Inmarsat was no longer subject to the provisions of Section 602 that prohibited Inmarsat from providing additional services.

Beginning in 2005, resellers of Inmarsat satellite services filed applications to continue or, in some cases, to commence operations of mobile earth terminals (“METs”) and gateway land earth stations (“LESs”) in the United States via various Inmarsat satellites not covered by existing coordination agreements for the L-band over North America, including Inmarsat’s fourth generation (“I-4”) satellites.

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45 47 U.S.C. § 761(a), which precludes Commission authorization of additional services by Inmarsat until Inmarsat has privatized in accordance with the Act.


49 Inmarsat Group Holdings Limited Petition for Declaratory Ruling that Intelsat, Ltd. Complies With Section 621(5)(F) of the ORBIT Act, IB Docket 04-439, Memorandum Opinion and Order, 20 FCC Rcd 11366 (2005). Section 681(2) of the ORBIT Act defines “additional services” for Inmarsat as the non-maritime and non-aeronautical services in the 1.5 and 1.6 GHz bands on planned satellites in the 2 GHz band. See Pub. L. 106-180 § 602(a) (precluding Commission authorization of additional services by Inmarsat until it has privatized in accordance with the Act).

These applications were opposed by Mobile Satellite Ventures Subsidiary LLC (“MSV”), the U.S.-licensed mobile satellite service (“MSS”) operator in the L-band.  

- On December 21, 2007, Inmarsat and MSV signed a “Spectrum Coordination and Cooperation Agreement” that resolved outstanding differences between the parties regarding use of the L-band. According to the parties, the agreement addresses operations in the L-band in North America, including re-banding of spectrum, coordination of next generation Inmarsat and MSV satellites, resolution of pending regulatory issues in the United States and Canada, and greater system technical flexibility.

- On March 26, 2008, the Commission reached government-to-government satellite coordination agreements with the United Kingdom and Canada, based upon the “Spectrum Coordination and Cooperation Agreement” of Inmarsat and MSV. In light of these developments, on March 27, 2008, the Commission granted nearly all pending applications for regular authority to continue existing services via Inmarsat satellites. The Commission also granted one reseller’s applications for regular authority to provide new Broadband Global Area Network (BGAN) services via the I-4F2 satellite on April 1, 2008. An additional reseller’s application for regular authority to provide BGAN services via the I-4F2 was granted on January 14, 2009.

- In June 2008, Inmarsat filed an application seeking approval of the indirect transfer of control of Stratos Global Corporation and its wholly-owned subsidiaries from an irrevocable trust to Inmarsat. In January 2009, the Bureau granted this application for transfer of control. In April 2009, Inmarsat’s prior distribution arrangements expired and Inmarsat entered into new arrangements with its distributors.

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56 Application of Robert M. Franklin (transferor) and Inmarsat plc (transferee) Consolidated Application for Consent to Transfer of Control of Stratos Global Corporation and Its Subsidiaries from an Irrevocable Trust to Inmarsat, plc., Memorandum Opinion and Order and Declaratory Ruling, 24 FCC Rcd 449 (Int’l Bur. 2009).


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also completed the acquisition of the shares of Stratos Global Corporation. In 2012, Inmarsat conducted an internal reorganization that eliminated the use of Stratos as brand name.

- On October 21, 2008, the Commission made administrative changes to the way in which the Commission specifies authorized points of communication in licenses for L-band MSS user terminals using Inmarsat space stations. Specifically, the Commission established a list of Inmarsat satellites approved to serve the United States in the L-band (the “ISAT List”). The list includes all Inmarsat satellites that have been found to meet the Commission’s legal, technical, and policy requirements to access the U.S. market. As a result, earth station licensees and applicants may seek authority to communicate with all Inmarsat satellites on the ISAT List by listing “ISAT” as the point of communication, rather than having to seek authorization to communicate with Inmarsat satellites on a satellite-by-satellite and orbital-location-by-orbital-location basis.

- Four Inmarsat satellites were included in the original ISAT List. Since the creation of the ISAT List, three Inmarsat satellites have been added to the ISAT List, and the orbital location of one satellite on the ISAT List has been changed to a different location. In addition, on October 22, 2009, Inmarsat’s application to operate METs with satellites on the ISAT List was granted.

- Inmarsat has announced a contract with Boeing to build three Inmarsat-5 satellites that will operate in the Ka-band, independent from Inmarsat’s existing L-band

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61 The Inmarsat satellites included in the original ISAT List were the I-3F2 at 15.5° W.L., the I-3F3 at 178° E.L., the I-3F4 at 142° W.L., and the I-4F2 satellite at 52.75° W.L. See id.

62 Satellite Communications Services Information Re: Actions Taken, Public Notice, Report No. SES-01097 (Int’l Bur., rel. December 24, 2008) (adding Inmarsat 4F1 at 143.5° E.L. and Inmarsat 4F3 at 97.65° W.L. to ISAT List). On September 8, 2009, Inmarsat 2F1 at 142° W.L. was added, subject to conditions, to the ISAT list. See IBFS File Nos. SAT-PPL-20081219-00235 and SAT-APL-20090609-00068 (grant of authority on September 8, 2009).

63 Inmarsat plc, Petition for Declaratory Ruling to Modify ISAT List to Reflect Resumed Operations of I-3F4 at 54° W.L., IBFS File No. SAT-PPL-20090107-00003; SAT-APL-20090115-00005 (grant of authority on April 6, 2009).

64 Inmarsat Hawaii Inc., Application for Inmarsat Hawaii Blanket MET License, IBFS File No. SES-LIC-20090217-00184 (grant of authority on October 22, 2009).
satellites.\textsuperscript{65} Inmarsat states that the first Inmarsat-5 satellite is scheduled for completion in 2013, with the entire constellation expected to be complete by the end of 2014.\textsuperscript{66}

- Since the Twelfth ORBIT Act Report, the Commission has granted several earth station applications to communicate with Inmarsat’s satellites as a point of communication.\textsuperscript{67}

\textbf{New Skies}

- New Skies is the Netherlands-based INTELSAT spin-off, created in 1998 as INTELSAT’s first step toward privatization. On March 29, 2001, the International Bureau’s Satellite and Radiocommunication Division added four satellites operated by New Skies to the Commission’s C- and Ku-band Permitted Space Station List\textsuperscript{68} (“Permitted List”) with conditions to remove secondary status requirements for certain New Skies satellites.\textsuperscript{69} This action enabled New Skies to provide satellite services to, from, and within the United States via all routinely authorized U.S. earth stations.\textsuperscript{70}

- On June 25, 2004, the Commission granted an application to transfer control of Commission licenses and authorizations held by New Skies Satellites N.V. and New Skies Networks, Inc. to New Skies Satellites B.V.\textsuperscript{71}

\textsuperscript{65} Inmarsat website, “About Our Satellites,” available at http://www.inmarsat.com/About/Our_satellites/The_Inmarsat-5s.aspx?language=EN&textonly=False. The term “Ka-band” generally refers to the space-to-Earth (downlink) frequencies at 17.70-20.20 GHz and the corresponding Earth-to-space (uplink) frequencies at 27.50-30.00 GHz.

\textsuperscript{66} \textit{Id.}


\textsuperscript{68} The Permitted List denotes all satellites and services with which U.S. earth stations with “routinely” authorized technical parameters operating in the conventional C- and Ku-bands (“ALSAT” earth stations) are permitted to communicate, without additional Commission action. Those communications must fall within the same technical parameters and conditions established in the earth stations’ licenses. \textit{Amendment of the Commission’s Regulatory Policies to Allow Non-U.S.-Licensed Space Stations to Provide Domestic International Satellite Service in the United States}, First Order on Reconsideration, 15 FCC Rcd 7207 (1999).


On March 29, 2006, the Commission approved the transfer of control from New Skies Networks, Inc. ("NSN") to SES GLOBAL S.A. of licenses for six non-common carrier earth stations for communication with non-U.S. licensed satellites that have been added to the Commission’s Permitted List. The Commission also approved the transfer of control of three non-U.S. satellites operated by New Skies that the Commission authorized to provide service to the United States pursuant to the Permitted List. The merger was consummated on March 30, 2006.

On September 7, 2009, SES S.A. announced that the operations of its subsidiaries New Skies Satellites B.V. and SES Americom would be conducted under the single brand name, SES WORLD SKIES. This change did not affect the underlying legal entities that hold Commission authorizations or U.S. market access rights. In September 2011, SES S.A. announced that all subsidiary companies, including SES WORLD SKIES, would do business under the SES brand name.

Currently, five New Skies satellites are on the Permitted List. Earth station operators with ALSAT authority continue to have authority to access New Skies satellites on the Permitted List.

An earth station must seek specific authority to communicate with a space station if the earth station does not meet the technical requirements for an ALSAT designation and/or if the earth station seeks to communicate with a satellite in frequency bands other than the conventional C- and Ku-bands. In the last year, the Commission granted numerous earth stations specific authority to communicate with a New Skies satellite.

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72 Permitted List available online at http://transition.fcc.gov/ib/sd/se/permitted.html.


74 See http://www.ses.com/4337028/history. SES also has an ownership interest in regional satellite operators Ciel, QuetzSat, YahLive, O3b Networks, and Solaris Mobile. See http://www.ses.com/4336990/companies


76 The five New Skies satellites on the Permitted List are: NSS-5 at 20° W.L., NSS-7 at 42° W.L., NSS-703 at 47.05° W.L., NSS 806 at 40.5° W.L., and NSS-9 at 177° W.L. New Skies Satellite B.V. has an application pending to relocate NSS-7 to 20° W.L. See IBFS File No. SAT-MPL-20120215-00017 (filed Feb. 15, 2012).

77 Any of the over 7296 earth stations that have ALSAT authority can communicate with New Skies satellites that appear on the Permitted List, in the conventional C- and Ku-bands, without any further authorization. See supra, n.68.

Status of Comsat

- The ORBIT Act terminated ownership restrictions on COMSAT Corporation (“Comsat”), as mandated by the Communications Satellite Act of 1962. As a result, Lockheed Martin and Comsat jointly filed an application with the Commission for transfer of control of Comsat’s various licenses and authorizations. On July 31, 2000, the Commission found that Lockheed Martin’s purchase of Comsat was in the public interest and authorized Comsat to assign its FCC licenses and authorizations to a wholly-owned subsidiary of Lockheed Martin Corporation.\(^79\)

- On December 18, 2001, the Commission granted requests by Lockheed Martin Global Telecommunications, COMSAT Corporation, and COMSAT General Corporation, together with Telenor Satellite Services Holdings, Inc., Telenor Satellite, Inc., and Telenor Broadband Services, to assign certain Title II common carrier authorizations and Title III radio licenses held by COMSAT to Telenor.\(^80\) The assignment was in connection with Telenor’s acquisition of Comsat Mobile Communications (“CMC”), a business unit of COMSAT Corporation. On January 11, 2002, Telenor completed its purchase of substantially all of the assets of CMC, and all of CMC’s licenses and authorizations were transferred to Telenor pursuant to Commission authorization.\(^81\)

- On October 25, 2002, the Commission granted Comsat and Lockheed Martin’s jointly filed applications to assign four non-common carrier earth station licenses and an Experimental License to Intelsat.\(^82\)


\(^82\) Lockheed Martin Corporation, COMSAT Corporation, and COMSAT Digital Teleport, Inc., Assignors, (continued ...)
On October 29, 2004, Intelsat, Ltd completed the acquisition of the COMSAT General businesses from COMSAT General Corporation, COMSAT New Services, Inc., and Lockheed Martin. The Commission approved the acquisition subject to compliance by Intelsat subsidiaries with the terms of the Intelsat Commitment letter with the Criminal Division of the U.S. Department of Justice, the U.S. Department of Homeland Security, and the Federal Bureau of Investigation.

Direct Access

- Section 641(a) of the ORBIT Act requires that users and service providers be permitted to obtain Level 3 direct access to INTELSAT capacity. Previously, the Commission decided in a rulemaking proceeding, that Level 3 direct access is in the public interest. The concept of direct access became moot with INTELSAT privatization on July 18, 2001, because Intelsat, as a private company, does not have Signatories.

- Prior to INTELSAT’s privatization, the Commission implemented the requirement in Section 641(b) of the ORBIT Act that the Commission complete a rulemaking “to determine if users or providers of telecommunications services have ‘sufficient opportunity’ to access INTELSAT space segment directly from INTELSAT to meet their service or capacity requirements.” In September 2000, the Commission released a Report and Order requiring Comsat to “enter into negotiation with direct

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access customers on options to make capacity available where it is clear that there is insufficient capacity available that is not controlled by Comsat.\footnote{Availability of INTELSAT Space Segment Capacity to Users and Service Providers Seeking to Access INTELSAT Directly, IB Docket No. 00-91, Report and Order, 15 FCC Rcd 19160 (2000).}

- On March 13, 2001, Comsat submitted a report detailing the results of its negotiations and maintaining that direct access opportunities are increasing for those who want them. For example, the negotiations resulted in a commercial agreement between Comsat and WorldCom. The Commission placed Comsat’s report on public notice, including Comsat’s request to terminate the proceeding.\footnote{Satellite Policy Branch Information: Availability of Intelsat Space Segment Capacity to Users and Service Providers Seeking to Access Intelsat Directly, Public Notice, Report No. SPB-166 (Int’l Bur., rel. April 6, 2001).} With INTELSAT’s privatization and Intelsat Ltd.’s purchase of Comsat,\footnote{On October 25, 2002, the Commission approved the assignment of various earth station licenses, private land mobile radio licenses and international 214 applications from Comsat Corporation to Intelsat, Ltd.} on November 21, 2002, the Commission released an Order that concluded that the underlying basis for Section 641(b) no longer existed, and terminated the proceeding.\footnote{Availability of INTELSAT Space Segment Capacity to Users and Service Providers Seeking to Access INTELSAT Directly, IB Docket No. 00-91, Order, 17 FCC Rcd 24242 (2002).} In terminating the proceeding, the Commission noted that the termination does not imply any abdication of the Commission’s appropriate oversight of Intelsat Ltd., and that as a U.S. licensee, Intelsat Ltd., will be subject to the same Commission oversight as any similarly-situated company authorized to provide services in the United States.

### Regulatory Fees

- The ORBIT Act authorizes the Commission “to impose similar regulatory fees on the United States signatory which it imposes on other entities providing similar services.”\footnote{47 U.S.C. § 765a(c). A 1999 decision of the United States Court of Appeals for the District of Columbia Circuit in PanAmSat Corp. v. FCC, 198 F.3d 890 (D.C. Cir. 1999) set aside and remanded the Commission’s 1998 fee order, which did not assess a fee against Comsat.} On July 10, 2000, the Commission released an Order concluding that Comsat should pay a proportionate share of the fees applicable to holders of Title III authorizations to launch and operate geosynchronous space stations.\footnote{In re Assessment and Collection of Regulatory Fees for Fiscal Year 2000, MD Docket No. 00-58, Report and Order, 15 FCC Rcd 14478 ¶ 17 (2000).} Consistent with past decisions, the Commission stated that the costs attributable to space station oversight include costs directly related to INTELSAT signatory activities and are distinct from those recovered by other fees that Comsat pays, such as application fees, fees applicable to international bearer circuits, fees covering Comsat’s non-Intrelsat satellites, and earth station fees.\footnote{Id.} In 2002, the Circuit Court of Appeals for the District of Columbia held that the Commission’s actions to impose regulatory fees on Comsat were justified on the basis that the underlying policy of Section 9 of the Communications Act of 1934, as amended, favoring recovery of regulatory costs
gave the Commission good reason to require Comsat to bear its proportionate share of space station fees.\textsuperscript{95}

- Post-privatization, Intelsat, as a U.S. licensee, has paid the required regulatory fees mandated by Section 9 of the Communications Act of 1934.

**B. Status of INTELSAT Privatization**

Intelsat privatized and became a U.S. licensee, as of July 18, 2001, transferring its assets to a commercial corporation. Pursuant to international agreement, an intergovernmental organization known as the International Telecommunications Satellite Organization (“ITSO”) remained. ITSO, through a “Public Services Agreement” with Intelsat, monitors the performance of the company’s public service obligations to maintain global connectivity and global coverage, provide non-discriminatory access to the system, and honor the lifeline connectivity obligation to certain customers, specifically, those customers in poor or underserved countries that have a high degree of dependence on Intelsat.\textsuperscript{96} Under these commitments, the privatized Intelsat has made capacity available to lifeline users at fixed pre-privatization costs for approximately 12 years. ITSO has no operational or commercial role.

Upon privatization, substantially all of INTELSAT’s operational assets and liabilities were transferred to several companies within an affiliated group with a holding company structure. The record before the Commission showed that the companies created fiduciary Boards of Directors and the selection procedure for members of the Board of Directors of Intelsat, Ltd. resulted in a Board that is compliant with the ORBIT Act. The Commission found that privileges and immunities enjoyed by the pre-privatized INTELSAT had been terminated consistent with the requirements of the ORBIT Act.\textsuperscript{97} The licensed companies have licenses through notifying Administrations in countries (the United States and the United Kingdom) that have effective competition laws and have commitments under the WTO Agreement that include

\textsuperscript{95} See Comsat Corporation v. FCC and PanAmSat Corp., 283 F.3d 344 (D.C. Cir. 2002).

\textsuperscript{96} INTELSAT Assembly of Parties Record of Decisions of the Twenty-Fifth (Extraordinary) Meeting, AP-25-3E FINAL W/11/00, at ¶¶6-8 (November 27, 2000).

\textsuperscript{97} 47 U.S.C. § 763(3) states that “such preferential treatment includes –

(A) privileged or immune treatment by national governments;

(B) privileges or immunities or other competitive advantages of the type accorded INTELSAT and Inmarsat and their signatories through the terms and operation of the INTELSAT Agreement and the associated Headquarters Agreement and the Inmarsat Convention; and

(C) preferential access to orbital locations.

Access to new, or renewal of access to, orbital locations shall be subject to the legal or regulatory processes of a national government that applies due diligence requirements intended to prevent the warehousing of orbital locations.

See also Intelsat Licensing Order, 15 FCC Red at 15464, ¶ 7 (“As an intergovernmental organization, INTELSAT is immune from taxes and suits in national courts, unless it waives its immunity. Its treaty status helps ensure its access to the national markets of member countries.”).
non-discriminatory access to their satellite markets. These companies are subject to U.S. or U.K. licensing authorities and conduct satellite coordinations according to ITU procedures under the auspices of these authorities.

Additionally, as detailed above, at the end of 2004 the Commission authorized the transfer of control of Intelsat’s licenses and authorizations to Zeus, and the transaction was consummated in 2005. Also in 2005, the Commission determined that Intelsat’s certification complied with the ORBIT Act and it could forgo an IPO and listing of securities. Thus, the Commission concluded that the provisions relating to additional services under Section 602 of the ORBIT Act were no longer applicable to Intelsat.

II. Views of INTELSAT Parties on Privatization

The Commission, in response to the Public Notice for this Report, has not received any views directly from the INTELSAT Parties regarding privatization.

III. Views of Industry and Consumers on Privatization

ARTEL, Inmarsat, and Intelsat filed comments in response to the Commission’s February 3, 2012 Public Notice inviting comments related to the development of this Report. Intelsat and SES filed reply comments.

A. Inmarsat Privatization Comments

The only party to comment on Inmarsat privatization was Inmarsat. Inmarsat notes that in June 2005, the Commission found that Inmarsat had satisfied the requirement to effectuate a substantial dilution of former Signatory financial interests. Inmarsat further states that, shortly thereafter, Inmarsat completed a successful IPO, and that Inmarsat’s shares are traded on the London Stock Exchange. According to Inmarsat, no former Inmarsat Signatory owns five percent or more of the company, and the aggregate ownership of foreign governments is nominal.

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98 Applications of Intelsat LLC for Authority to Operate, and to Further Construct, Launch and Operate C-band and Ku-band Satellites that form a Global Communications System in Geostationary Orbit, Intelsat LLC Supplemental Information, at 3 (August 17, 2001).
99 See supra, n.27.
100 See supra, n.29.
101 See supra, n.6, for the definition of “additional services.”
102 The INTELSAT Parties are nations for which the INTELSAT agreement has entered into force. 47 U.S.C. § 769(a)(4)(A). Following privatization, the ITSO Agreement defines “Party” to mean a State for which the ITSO Agreement has entered into force or has been provisionally applied. See Agreement Relating to the International Telecommunications Satellite Organization, As Amended by the Twenty-Fifth (Extraordinary) Assembly of Parties in Washington, D.C. (November 17, 2000), at Art. I(p).
104 Inmarsat Comments at 1-2.
Inmarsat outlines its investments in new technologies, including its deployment of its fourth generation, Inmarsat 4 (“I-4”) satellite network\(^\text{105}\) and new or evolved services that are being offered through that network. Inmarsat also cites its announced investment in three new I-5 Ka-band satellites to be launched starting in 2013 for a high bandwidth service.\(^\text{106}\)

### B. Intelsat Privatization Comments

Intelsat, ARTEL, and SES filed comments on Intelsat privatization. Intelsat states that the privatization goals of the ORBIT Act have been fulfilled in that Intelsat: (1) operates as a fully privatized company; (2) no longer claims the privileges and immunities of an intergovernmental organization; (3) is neither directly nor indirectly owned or controlled by any government or former signatory; and (4) is regulated by the Commission on the same basis as the Commission regulates other providers of fixed satellite services.\(^\text{107}\)

As further evidence of its transformation to a fully privatized entity, Intelsat states that it has a pending application before the Commission to transfer control from its private equity owners to a public company.\(^\text{108}\) Intelsat states that its privatization has had a positive impact on the communications services marketplace, and that it faces numerous and legitimate competitors, including fiber optic cable, broadband-enabled IP applications, and terrestrial wireless platforms.\(^\text{109}\) Intelsat also states that, in response to these competitive forces, it is conducting a “capital expenditure satellite investment program” – totaling $3.75 billion during the period of 2008-2013. This project is designed to expand Intelsat’s opportunities in emerging markets and meet the needs of existing customers.\(^\text{110}\) According to Intelsat, it faces robust competition which proves that it does not enjoy any market advantages resulting from its days as an intergovernmental organization.\(^\text{111}\)

ARTEL, a provider of integrated satellite services that buys capacity from FSS space station operators such as Intelsat, alleges that the FSS market is not fully competitive.\(^\text{112}\) However, ARTEL does not provide any specific information alleging anti-competitive conduct in this Orbit Act proceeding that is not already before the Commission in another proceeding. That proceeding involves some anti-competitive allegations filed by others that were acknowledged in the Satellite Competition Report. However, the Commission concluded in the Report that additional information was needed before the allegations could be fully addressed.\(^\text{113}\) We also stated that this matter would be considered in a further proceeding.\(^\text{114}\) Significantly, the

\(^{105}\) Id. at 2.

\(^{106}\) Id. at 4-5. See also Inmarsat’s August 6, 2010 press release at http://www.inmarsat.com/About/Newsroom/00036138.aspx.

\(^{107}\) Intelsat Comments at 1-2.

\(^{108}\) Id. at 2.

\(^{109}\) Id. at 3.

\(^{110}\) Id. at 3.

\(^{111}\) Id.

\(^{112}\) ARTEL Comments at 2-4.


\(^{114}\) Id.
Commission did not conclude in its Report that either Intelsat or SES had engaged in anti-competitive conduct. Nor did we conclude that there was not a fully competitive global market for satellite communications services for the benefit of consumers and providers of satellite services.

IV. Impact of Privatization

Section 646 requires that the Commission report on the impact of privatization on U.S. industry, jobs, and industry access to the global market.

A. Inmarsat

From the record, Inmarsat’s privatization appears to have had a positive impact on the domestic market. Inmarsat states that it has continued to invest in new technologies for mobile satellite service customers. As an example of this investment, Inmarsat points to its $1.5 billion investment in its fourth-generation (“I-4”) satellite network, which is currently providing mobile broadband services to the United States and globally, including its BGAN service. Inmarsat also describes its $1.2 billion investment in three new I-5 Ka-band satellites to be launched beginning in 2013 that will provide high-bandwidth service offerings.

Inmarsat states that it continues to introduce new services, including its IsatPhone Pro handheld and Low Data Rate services. In addition, Inmarsat states that its BGAN service is being utilized in innovative ways by its customers, including in response to recent natural disasters. In this regard, Inmarsat also states that it has a formal agreement with the ITU to help nations...
better prepare for and respond to natural disasters, and that its BGAN technology has been used to support government and non-governmental organizations.\textsuperscript{122}

\textbf{B. Intelsat}

In prior ORBIT Act reports, we acknowledged that Intelsat successfully transitioned from an intergovernmental organization to a fully privatized entity, and that privatization has enabled it to more effectively compete in providing services to U.S. commercial and governmental customers. The privatization of INTELSAT enabled it to compete freely for U.S. satellite business opportunities, led to more competitive choices in the U.S. market than existed before privatization, and continues to encourage the development of service offerings to U.S. customers.

As we noted in 2010 and 2011 ORBIT Act Reports, we have received comments that allege certain practices of Intelsat post-privatization are anti-competitive, and that therefore that the market for global satellite communications services is not fully competitive.\textsuperscript{123} Intelsat disputes these claims. As stated previously, the Commission will consider appropriate options for addressing competition issues raised by the commenting parties that are within its jurisdiction under the ORBIT Act and other laws.\textsuperscript{124} In the \textit{Third Satellite Competition Report}, we committed to conducting a follow-up proceeding, which would allow the development of a more complete record regarding the anticompetitive allegations raised in the ORBIT Act and Satellite Competition Report proceedings.\textsuperscript{125} The Commission anticipates initiating this proceeding in the near future.

\textbf{V. Summary}

The Commission has undertaken a number of proceedings required by or related to the ORBIT Act. While we believe that U.S. policy goals regarding the promotion of a fully competitive global market for satellite communications services are being met in accordance with the ORBIT Act, there have been some allegations of anticompetitive conduct that the Commission will investigate further. The Commission will continue to inform Congress of the actions it takes to implement the requirements of the ORBIT Act and the impact of those actions in its next annual report.

\textsuperscript{122} Inmarsat at 3.

\textsuperscript{123} See supra, Section III.B at 22.


APPENDIX

Index of Filings

Comments, filed March 6, 2012

   Comments of Inmarsat PLC, available at
       http://apps.fcc.gov/ecfs/comment/view?id=6017022821

   Comments of Intelsat License LLC, available at
       http://apps.fcc.gov/ecfs/comment/view?id=6017022844

   Comments of ARTEL, Inc., available at
       http://apps.fcc.gov/ecfs/comment/view?id=6017022680

Comments, filed March 16, 2012

   Comments of Intelsat License LLC, available at
       http://apps.fcc.gov/ecfs/comment/view?id=6017025143

   Comments of SES S.A. available at
       http://apps.fcc.gov/ecfs/comment/view?id=6017025195
AGENCY: National Aeronautics and Space Administration.

ACTION: Final rule.

SUMMARY: NASA has adopted, with minor changes, a final rule amending the NASA FAR Supplement (NFS) to consolidate and make changes to three existing cross-waiver of liability contract clauses, and to more closely align the clauses with current mission programs.

DATES: Effective Date: October 29, 2012.

FOR FURTHER INFORMATION CONTACT: Leigh Pomponio, NASA, Office of Procurement, Contract Management Division (Suite 2P77); (202) 358–0592; email: leigh.pomponio@nasa.gov.

SUPPLEMENTARY INFORMATION:

1. Background

   A proposed rule was published on May 5, 2011 (76 FR 25657) to consolidate NASA’s three existing cross-waiver of liability clauses into two clauses and to align the two clauses with Agency mission requirements, consistent with the cross-waiver of liability regulatory authority at 14 CFR part 1266. The regulatory authority at 14 CFR part 1266 was promulgated on February 26, 2008 (73 FR 10143–50). The February 2008 rule established NASA’s cross-waiver of liability authority in two categories of NASA agreements: (1) Agreements for ISS activities pursuant to the “Agreement Among the Government of Canada, Governments of Member States of the European Space Agency, the Government of Japan, the Government of the Russian Federation, and the Government of the United States of America.” (2) Agreements for other NASA activities.
America concerning Cooperation on the Civil International Space Station” (commonly referred to as the ISS Intergovernmental Agreement, or IGA); and (2) launch agreements involving science or space exploration activities unrelated to the ISS.

Following promulgation of the two-category regulatory authority, the three-category contract clause arrangement no longer aligned. The procurement rule of May 7, 2011 proposed to delete one clause and realign the remaining two to cover the two categories of contracts on which cross-waivers of liability are authorized and required: Contracts supporting ISS and contracts supporting launches into space that are not related to the ISS. Clause 1852.228–72, Cross-Waiver of Liability for Space Shuttle Services will be deleted. Clause 1852.228–76 is amended and retitled Cross-Waiver of Liability for International Space Station Activities, and 1852.228–78 is amended and retitled Cross-Waiver of Liability for Science or Space Exploration Activities Unrelated to the International Space Station. While the proposed rule included continuing applicability of cross waivers of liability to Space Shuttle support contracts, this final rule removes the Space Shuttle support contract references because NASA will not issue any new contracts for Space Shuttle support. Further, wherever the cross-waiver of liability clauses are referenced in the NASA FAR Supplement, conforming changes are being made to clause numbers and titles.

2. Discussion and Analysis

Two respondents submitted comments in response to the proposed rule. NASA reviewed and considered all comments in the development of the final rule. No changes are being made to the rule as a result of the comments. A discussion of the comments follows:

A. One respondent mistakenly cited this docket number, but the comments submitted were unrelated to this rule.

B. One respondent submitted 19 specific recommendations for change. They are individually addressed below.

In general, the comments appear to confuse the relationship NASA has with its contractors vice that which NASA has with cooperating Parties under cooperative Space Act agreements. This procurement rule addresses only the requirements for NASA contractors. This rule does not address the relationships that NASA has with other entities under cooperative Space Act agreements.

C. Comments:

1. 1852.228–76(a): The stated objective is “to extend this cross-waiver of liability to NASA contracts” [emphasis added.] There is a distinction between NFS contracts and Space Act agreements that is recognized throughout the proposed rule, but not reflected in paragraph (a). Recommend adding “Space Act agreements”.

NASA Response: The distinction between NASA contracts and Space Act agreements is recognized throughout the rule, but this rule applies only to contracts, and therefore, Space Act agreements are not cited in the clause. The purpose of this rule is to extend cross-waivers of liability to contracts. Space Act Agreements have their own set of terms, and they are governed by 14 CFR part 1266. To the extent that cross-waivers of liability apply to Space Act agreements, the terms will be included in the Space Act agreement. Space Act agreements are outside the scope of this Rule.

2. 1852.228–76(b)(1): NASA contracts should be added to the definition of “Agreement” to ensure that the cross-waiver clauses include FAR-based contracts. NASA Response: “Agreement”, as defined in the clause, is correct. Agreement, as used here, refers to Space Act agreements between NASA and Cooperating Parties, and does not include contracts. Contracts between NASA and contractors, including subcontracts and supplier contracts thereunder, are not agreements as defined in the clause.

3. 1852.228–76(b)(5): The definition of “Party” should be amended to add NASA contractors.

NASA Response: “Party”, as defined in the clause, refers to Parties to the cooperative Space Act agreement, i.e. the Space Act agreement between NASA and a Cooperating Party. The definition does not include contractors, and the definition clearly states that contractors and subcontractors are not “Parties”.

4. 1852.228–76(b)(6): Recommend amending the definition of payload to read “all property to be flown or used on or in a Launch or Transfer Vehicle or the ISS”.

NASA Response: It is not necessary to add “transfer vehicle” to the definition of “payload” because, at the time of launch, a transfer vehicle is “property flown on a launch vehicle” and, is therefore included in the definition of payload. While it is true that, at some point, a transfer vehicle ceases to be “payload” and becomes, instead, a “space vehicle”, it is not necessary, for purposes of this rule, to define that point in time. A vehicle is subject to cross-waivers of liability whether it is functioning as payload or as a space vehicle. For a detailed discussion on NASA’s development of a definition of “transfer vehicle,” please see 73 FR 10146.

5. 1852.228–76 (b)[7]: The “Protected Space Operations” definition includes certain activities “in implementation of the IGA * * * and contracts to perform work in support of NASA’s obligations under the IGA and these related agreements.” It appears that the capitalized “Agreements” in this sentence refers to the IGA; however, “Agreement” is defined in the clause to mean otherwise. Recommend clarifying the distinction.

NASA response: Agreements as used in 1852.228–76(b)(7) is consistent with the definition of Agreement in the clause. It does not refer specifically to the IGA.

6. 1852.228–76(c)(1): Recommend changing “the contractor” to “each party”.

NASA Response: The “contractor” is the correct term. The purpose of the clause is to require the contractor to agree to a waiver of liability. The clause does not apply to “each party” to other agreements.

7. 1852.228–76(c)(2): Recommend changing “the contractor” to “each party” and “subcontractors” to “related entities”.

NASA response: The clause is correct as written. The clause requires the contractor to extend the cross-waiver liability to its subcontractors at any tier. Use of the terms “Party” or “related entities” would, for reasons stated above, be incorrect. 1852.228–76(c)(2)[i]: Recommend changing “subcontractors” to “related entities.”

NASA Response: See response to 7.

8. 1852.228–76(c)(4): Recommend changing “the Government” to “a Party”, and “own contractors or between its own contractors and their subcontractors and subcontractors” to “related entities”.

NASA response: The clause is correct as written. Cross-waivers do not apply between the Government and its contractors or between a contractor and its subcontractors. Cross-waivers and conditions apply to these relationships.

9. 1852.228–76(c)(4)[v]: Recommend changing “contractor” to “party” and “subcontractor” to “related entity”.


10. 1852.228–76(c)(4)[vi]: Recommend changing “Government” to “a Party” and “contractor’s” to “other Party’s” inserting the word “contractual” before “obligations” and changing “contract” to “agreement”.

NASA Response: The clause is correct as written. Specifically, 1852.228–76(c)(4)[vi] refers to the relationship
between NASA and its contractor and does not include any other parties or any agreements.

11. 1852.228–78(b)(1): NASA contracts should be amended to add the definition of “Agreement” to ensure that the cross-waiver clauses include FAR-based contracts. We recommend amending the definition as follows: “Agreement” refers to any NASA Space Act agreements or contracts that contain the cross-waiver of liability provisions authorized by 14 CFR Part 1266–104.”

NASA Response: This rule amends the NASA FAR Supplement which applies only to contracts and not Space Act Agreements. Also see response to 2.

12. 1852.228–78(b)(4): Recommend amending the definition of “Party” be amended to add NASA contracts.

NASA Response: See response to 3.

13. 1852.228–78(b)(5): Recommend adding “Transfer Vehicle” to the definition of “Payload”.


14. 1852.228–78(c)(1): Recommend changing “contractor” to “each Party”.

NASA Response: The clause is correct as written. The contract clause obligates the contractor. See response to 6 above.

15. 1852.228–78(c)(2): Recommend changing “contractor” to “party” and “own subcontractors at all tiers” to “related entities”.

NASA Response: The clause is correct as written. See response to 7.

16. 1852.228–78(c)(4)(i): Recommend changing “Government” to “a Party” and “own contractors or between its own contractors and their subcontractors” to “related Entities”.

NASA Response: The clause is correct as written. See response to 9.

17. 1852.228–78(c)(4)(v): Recommend changing “contractor” to “a Party” and “subcontractors” to “related entities”.

NASA Response: The clause is correct as written. See response to 9.

18. 1852.228–78(c)(4)(6): Recommend changing “Government” to “a party” and “contractors’” to “other party’s” and inserting the word contractual before “obligations” and “contract” to “agreement”.

NASA Response: See response to 11.

3. Executive Orders 12866 and 13563

Executive Orders (E.O.s) 12866 and 13563 direct agencies to assess all costs and benefits of available regulatory alternatives and, if regulation is necessary, to select regulatory approaches that maximize net benefits (including potential economic, environmental, public health, and safety effects, disruptive impacts, and equity). E.O. 13563 emphasizes the importance of quantifying both costs and benefits, of reducing costs, of harmonizing rules, and of promoting flexibility. This is not a significant regulatory action and, therefore, was not subject to review under section 6(b) of E.O. 12866, Regulatory Planning and Review, dated September 30, 1993. This rule is not a major rule under 5 U.S.C. 804.

4. Regulatory Flexibility Act

NASA certifies that this final rule will not have a significant economic impact on a substantial number of small entities within the meaning of the Regulatory Flexibility Act, at 5 U.S.C. 601, et seq., because if the rule does not impose any additional requirements on small business. The rule updates and realigns already-existing requirements.

5. Paperwork Reduction Act

The Paperwork Reduction Act (Pub. L. 104–13) is not applicable because the NSF changes do not impose information collection requirements that require the approval of the Office of Management and Budget under 44 U.S.C. 3501, et seq.

List of Subjects in 48 CFR Parts 1812, 1828, and 1852

Government procurement.

William P. McNally, Assistant Administrator for Procurement.

Accordingly, 48 CFR parts 1812, 1828, and 1852 are amended as follows:

PART 1812—ACQUISITION OF COMMERCIAL ITEMS

2. In section 1812.301, paragraph (f)(i)(K) is removed and reserved, and paragraphs (f)(i)(L) and (f)(i)(M) are revised to read as follows:

1812.301 Solicitation provisions and contract clauses for the acquisition of commercial items.

(f)(i) * * *

(L) 1852.228–76, Cross-Waiver of Liability for International Space Station Activities.

(M) 1852.228–78, Cross-Waiver of Liability for Science or Space Exploration Activities unrelated to the International Space Station.

* * * * *

PART 1828—BONDS AND INSURANCE

3. Section 1828.371 is revised to read as follows:

1828.371 Clauses incorporating cross-waivers of liability for International Space Station activities and Science or Space Exploration activities unrelated to the International Space Station.

(a) In contracts covering International Space Station activities, or Science or Space Exploration activities unrelated to the International Space Station that involve a launch, NASA shall require the contractor to agree to waive all claims against any entity or person defined in the clause based on damage arising out of Protected Space Operations. This cross-waiver shall apply only if the person, entity, or property causing the damage is involved in Protected Space Operations and the person, entity, or property damaged is damaged by virtue of its involvement in Protected Space Operations. The cross-waivers will require the contractor to extend the cross-waiver provisions to their subcontractors at any tier and related entities ensuring those subcontractors and related entities also waive all claims against any entity or person defined in the clause for damages arising out of Protected Space Operations. The purpose of the clauses prescribed in this section is to extend the cross-waivers under other agreements to NASA contractors that perform work in support of NASA’s obligations under these agreements.

(b) The contracting officer shall insert the clause at 1852.228–78, Cross-Waiver of Liability for Science or Space Exploration Activities unrelated to the International Space Station, in solicitations and contracts above the simplified acquisition threshold for the acquisition of launches for science or space exploration activities unrelated to the International Space Station or for acquisitions for science or space exploration activities that are not related to the International Space Station but involve a launch. If a science or space exploration activity is in support of the International Space Station, the contracting officer shall insert the clause prescribed by paragraph (c) of this section and designate its application to that particular launch.

(c) The contracting officer shall insert the clause at 1852.228–76, Cross-Waiver of Liability for International Space Station Activities, in solicitations and contracts above the simplified acquisition threshold when the work to be performed involves Protected Space Operations, as that term is defined in the clause, relating to the International Space Station.

(d) At the contracting officer’s discretion the clauses prescribed by paragraphs (b) and (c) of this section may be used in solicitations, contracts,
new work modifications, or extensions to existing contracts under the simplified acquisition threshold involving science or space exploration activities unrelated to the International Space Station, or International Space Station activities, respectively, in appropriate circumstances. Examples of such circumstances are when the value of contractor property on a Government installation used in performance of the contract is significant, or when it is likely that the contractor or subcontractor will have its valuable property exposed to risk or damage caused by other participants in the science or space exploration activities unrelated to the International Space Station, or International Space Station activities.

PART 1852—SOLICITATION PROVISIONS AND CONTRACT CLAUSES

1852.228–72 [Removed]
■ 4. Section 1852.228–72 is removed.
■ 5. Section 1852.228–76 is revised to read as follows:

1852.228–76 Cross-waiver of liability for international space station activities.

As prescribed in 1828.371(c) and (d), insert the following clause:

CROSS-WAIVER OF LIABILITY FOR INTERNATIONAL SPACE STATION ACTIVITIES (OCT 2012)

(a) The Intergovernmental Agreement Among the Government of Canada, Governments of Member States of the European Space Agency, the Government of Japan, the Government of the Russian Federation, and the Government of the United States of America concerning Cooperation on the Civil International Space Station (IGA) for the International Space Station (ISS) contains a cross-waiver of liability provision to encourage participation in the exploration, exploitation, and use of outer space through the ISS. The objective of this clause is to extend this cross-waiver of liability to NASA contracts in the interest of encouraging participation in the exploration, exploitation, and use of outer space through the International Space Station (ISS). The Parties intend that this cross-waiver of liability be broadly construed to achieve this objective.

(b) As used in this clause, the term:
   (1) “Agreement” refers to any NASA Space Act agreement that contains the cross-waiver of liability provision authorized by 14 CFR 1266.102.
   (2) “Damage” means:
      (i) Bodily injury to, or other impairment of health of, or death of, any person;
      (ii) Damage to, loss of, or loss of use of any property;
      (iii) Loss of revenue or profits; or
      (iv) Other direct, indirect, or consequential Damage.
   (3) “Launch Vehicle” means an object, or any part thereof, intended for launch, launched from Earth, or returning to Earth which carries Payloads or persons, or both.
   (4) “Partner State” includes each Contracting Party for which the IGA has entered into force pursuant to Article 25 of the IGA or pursuant to any successor agreement. A Partner State includes its Cooperating Agency. It also includes any entity specified in the Memorandum of Understanding (MOU) between NASA and the Government of Japan’s Cooperating Agency in the implementation of that MOU.
   (5) “Party” means a party to a NASA Space Act agreement involving activities in connection with the ISS and a party that is neither the prime contractor under this contract nor a subcontractor at any tier.
   (6) “Payload” means all property to be flown or used on or in a Launch Vehicle or the ISS.
   (7) “Protected Space Operations” means all Launch, Transfer Vehicle, the ISS, Payloads, or instruments, as well as related support equipment and facilities and services; and
   (ii) All activities related to ground support, test, training, simulation, or guidance and control equipment and related facilities or services. “Protected Space Operations” also includes all activities related to evolution of the ISS, as provided for in Article 14 of the IGA. “Protected Space Operations” excludes activities on Earth which are conducted on return from the ISS to develop further a Payload’s product or process for use other than for ISS-related activities in implementation of the IGA.
   (8) “Related Entity” means:
      (i) A contractor or subcontractor of a Party or a Partner State at any tier;
      (ii) A user or customer of a Party or a Partner State at any tier;
      (iii) A Related Entity of any entity specified in the Memorandum of Understanding (MOU) between NASA and the Government of Japan’s Cooperating Agency. It also includes any entity specified in the Memorandum of Understanding (MOU) between NASA and the Government of the Russian Federation or any other party to the Intergovernmental Agreement.
   (9) “Transfer Vehicle” means any vehicle that departs from and returns to the same location on a space object.

(c) Cross-waiver of liability:
   (1) The Contractor agrees to a cross-waiver of liability pursuant to which it waives all claims against any of the entities or persons listed in paragraphs (c)(1)(i) through (c)(1)(iv) of this clause based on Damage arising out of Protected Space Operations. This cross-waiver shall apply only if the person, entity, or property causing the Damage is involved in Protected Space Operations and the person, entity, or property damaged is damaged by virtue of its involvement in Protected Space Operations. The cross-waiver shall apply to any claims for Damage, whatever the legal basis for such claims, against:
      (i) A Party as defined in (b)(5) of this clause;
      (ii) A Partner State other than the United States of America;
      (iii) A Related Entity of any entity identified in paragraphs (c)(1)(i) or (c)(1)(ii) of this clause; or
      (iv) The employees of any of the entities identified in paragraphs (c)(1)(i) through (c)(1)(iii) of this clause.
   (2) In addition, the contractor shall, by contract or otherwise, extend the cross-waiver of liability set forth in paragraph (c)(1) of this clause to its subcontractors at any tier, by requiring them, by contract or otherwise, to:
      (i) Waive all claims against the entities or persons identified in paragraphs (c)(1)(i) through (c)(1)(iv) of this clause;
      (ii) Require that their subcontractors waive all claims against the entities or persons identified in paragraphs (c)(1)(i) through (c)(1)(iv) of this clause.
   (3) For avoidance of doubt, this cross-waiver of liability includes a cross-waiver of claims arising from the Convention on International Liability for Damage Caused by Space Objects, which entered into force on September 1, 1972, where the person, entity, or property causing the Damage is involved in Protected Space Operations and the person, entity, or property damaged is damaged by virtue of its involvement in Protected Space Operations.
   (4) Notwithstanding the other provisions of this clause, this cross-waiver of liability shall not be applicable to:
      (i) Claims between the Government and its own contractors or between its own contractors and subcontractors;
      (ii) Claims made by a natural person, his/her estate, survivors or subrogues (except when a subrogue is a Party to an Agreement or is otherwise bound by the terms of this cross-waiver) for bodily injury to, or other impairment of health of, or death of, such person;
      (iii) Claims for Damage caused by willful misconduct;
      (iv) Intellectual property claims;
      (v) Claims for Damage resulting from a failure of the contractor to extend the cross-waiver of liability to its subcontractors and related entities, pursuant to paragraph (c)(2) of this clause;
      (vi) Claims by the Government arising out of or relating to the contractor’s failure to perform its obligations under this contract.
   (5) Nothing in this clause shall be construed to create the basis for a claim or suit where none would otherwise exist.
   (6) This cross-waiver shall not be applicable when 49 U.S.C. Subtitle IX, Chapter 701 is applicable.

(End of clause)
6. Section 1852.228–78 is revised to read as follows:

**1852.228–78 Cross-waiver of liability for science or space exploration activities unrelated to the International Space Station.**

As prescribed in 1828.371(b) and (d), insert the following clause:

**CROSS–WAIVER OF LIABILITY FOR SCIENCE OR SPACE EXPLORATION ACTIVITIES UNRELATED TO THE INTERNATIONAL SPACE STATION**

*(OCT 2012)*

(a) The purpose of this clause is to extend a cross-waiver of liability to NASA contracts for work done in support of Agreements between Parties involving Science or Space Exploration activities that are not related to the International Space Station (ISS) but involve a launch. This cross-waiver of liability shall be broadly construed to achieve the objective of furthering participation in space exploration, use, and investment.

(b) As used in this clause, the term:

(1) “Agreement” refers to any NASA Space Act agreement that contains the cross-waiver of liability provision authorized in 14 CFR 1266.104.

(2) “Damage” means:

(i) Bodily injury to, or other impairment of health of, or death of, any person;

(ii) Damage to, loss of, or loss of use of any property;

(iii) Loss of revenue or profits;

(iv) Other direct, indirect, or consequential Damage.

(3) “Launch Vehicle” means an object, or any part thereof, intended for launch, launched from Earth, or returning to Earth which carries Payloads or persons, or both.

(4) “Party” means a party to a NASA Space Act agreement for Science or Space Exploration activities unrelated to the ISS that involve a launch and a party that is neither the prime contractor under this contract nor a subcontractor at any tier hereof.

(5) “Payload” means all property to be flown or used on or in a Launch Vehicle.

(6) “Protected Space Operations” means all Launch or Transfer Vehicle activities and Payload activities on Earth, in outer space, or in transit between Earth and outer space in implementation of an Agreement for Science or Space Exploration activities unrelated to the ISS that involve a launch. Protected Space Operations begins at the signature of the Agreement and ends when all activities done in implementation of the Agreement are completed. It includes, but is not limited to:

(i) Research, design, development, test, manufacture, assembly, integration, operation, or use of Launch or Transfer Vehicles, Payloads, or instruments, as well as related support equipment and facilities and services; and

(ii) All activities related to ground support, test, training, simulation, or guidance and control equipment, and related facilities and services.

Protected Space Operations excludes activities on Earth which are conducted on return from space to develop further a payload’s product or process other than for the activities within the scope of an Agreement.

(7) “Related entity” means:

(i) A contractor or subcontractor of a Party at any tier;

(ii) A user or customer of a Party at any tier;

(iii) A contractor or subcontractor of a user or customer of a Party at any tier.

**Note to paragraph (a)(7):** The terms “contractors” and “subcontractors” include suppliers of any kind.

(8) “Transfer Vehicle” means any vehicle that operates in space and transfers Payloads or persons or both between two different space objects, between two different locations on the same space object, or between a space object and the surface of a celestial body. A Transfer Vehicle also includes a vehicle that departs from and returns to the same location on a space object.

(c) Cross-waiver of liability:

(1) The Contractor agrees to a waiver of liability pursuant to which it waives all claims against any of the entities or persons listed in paragraphs (c)(1)(i) through (c)(1)(iv) of this clause based on Damage arising out of Protected Space Operations. This cross-waiver shall apply only if the person, entity, or property causing the Damage is involved in Protected Space Operations and the person, entity, or property damaged is damaged by virtue of its involvement in Protected Space Operations. The waiver shall apply to any claims for Damage, whatever the legal basis for such claims, against:

(i) A Party;

(ii) A Party to another NASA Agreement or contract that includes flight on the same Launch Vehicle;

(iii) A Related Entity of any entity identified in paragraphs (c)(1)(i) or (c)(1)(ii) of this clause; or

(iv) The employees of any of the entities identified in (c)(1)(i) through (iii) of this clause.

(2) The Contractor agrees to extend the cross-waiver of liability as set forth in paragraph (c)(1) of this clause to its own subcontractors at all tiers by requiring them, by contract or otherwise, to:

(i) Waive all claims against the entities or persons identified in paragraphs (c)(1)(i) through (c)(1)(iv) of this clause; and

(ii) Require that their Related Entities waive all claims against the entities or persons identified in paragraphs (c)(1)(i) through (c)(1)(iv) of this clause.

(3) For avoidance of doubt, this cross-waiver of liability includes a cross-waiver of claims arising from the Convention on International Liability for Damage Caused by Space Objects, entered into force on 1 September 1972, in which the person, entity, or property causing the Damage is involved in Protected Space Operations and the person, entity, or property damaged is damaged by virtue of its involvement in Protected Space Operations.

(4) Notwithstanding the other provisions of this clause, this cross-waiver of liability shall not be applicable to:

(i) Claims between the Government and its own contractors or between its own contractors and subcontractors;

(ii) Claims made by a natural person, his/her estate, survivors, or subrogees (except when a subrogee is a Party to an Agreement or is otherwise bound by the terms of this cross-waiver) for bodily injury to, or other impairment of health, or death of such person;

(iii) Claims for Damage caused by willful misconduct;

(iv) Intellectual property claims;

(v) Claims for damages resulting from a failure of the contractor to extend the cross-waiver of liability to its subcontractors and related entities, pursuant to paragraph (c)(2) of this clause; or

(vi) Claims by the Government arising out of or relating to a contractor’s failure to perform its obligations under this contract.

(5) Nothing in this clause shall be construed to create the basis for a claim or suit where none would otherwise exist.

(6) This cross-waiver shall not be applicable when 49 U.S.C. Subtitle IX, Chapter 701 is applicable.

(End of Clause)

[FR Doc. 2012–23715 Filed 9–26–12; 8:45 am]

BILLING CODE 7510–01–P
ACTIONS: Final rule.

SUMMARY: Between January 2009 and May 2011, pursuant to the Marine Mammal Protection Act (MMPA), NMFS issued twelve 5-year final regulations to govern the unintentional taking of marine mammals incidental to Navy training and associated activities. Additionally, in February 2009, pursuant to the MMPA, NMFS issued 5-year regulations to govern the unintentional taking of marine mammals incidental to U.S. Air Force (USAF) space vehicle and test flight activities from Vandenberg Air Force Base (VAFB). These regulations require the issuance of annual “Letters of Authorization” (LOAs).

Since the issuance of the rules, the Navy realized that their evolving training programs, which are linked to real world events, necessitate greater flexibility in the types and amounts of sound sources that they use. NMFS now amends the regulations for the affected Navy training ranges to provide for additional flexibility and allow for LOAs with longer periods of validity. Similarly, NMFS now amends the regulations issued to VAFB in February 2009, to allow for greater flexibility regarding the types and amounts of missile and rocket launches that the USAF conducts.

DATES: Effective on February 1, 2012.

ADDRESSES: Regarding the Navy action, electronic copies of the Navy’s LOA applications, NMFS’ Records of Decision (RODs), and NMFS’ proposed and final rules and subsequent LOAs; and regarding the USAF action, electronic copies of the USAF’s LOA application, NMFS’ Environmental Assessment and Finding of No Significant Impact, and NMFS’ proposed and final rules and subsequent LOAs, and other documents cited herein may be obtained by writing to Michael Payne, Chief, Permits and Conservation Division, Office of Protected Resources, National Marine Fisheries Service, 1315 East-West Highway, Silver Spring, MD 20910, telephoning the contact listed here (see FOR FURTHER INFORMATION CONTACT), or visiting the Internet at: http://www.nmfs.noaa.gov/pr/permits/incidental.htm#applications.

FOR FURTHER INFORMATION CONTACT: Jolie Harrison or Candace Nachman, Office of Protected Resources, NMFS, (301) 427-8401.

SUPPLEMENTAL INFORMATION:

Background

Sections 101(a)(5)(A) and (D) of the MMPA (16 U.S.C. 1361 et seq.) direct the Secretary of Commerce (Secretary) to allow, upon request, the incidental, but not intentional taking of marine mammals by U.S. citizens who engage in a specified activity (other than commercial fishing) during periods of not more than five consecutive years each if certain findings are made and regulations are issued or, if the taking is limited to harassment and of no more than 1 year, a notice of proposed authorization is provided to the public for review.

Authorization shall be granted if NMFS finds that the taking will have a negligible impact on the species or stock(s), will not have an unmitigable adverse impact on the availability of the species or stock(s) for subsistence uses, and if the permissible methods of taking and requirements pertaining to the mitigation, monitoring, and reporting of such taking are set forth. NMFS has defined “negligible impact” in 50 CFR 216.103.

The National Defense Authorization Act (NDAA) (Pub. L. 108–136) removed the “small numbers” and “specified geographical region” limitations, and amended the definition of “harassment” as it applies to a “military readiness activity” to read as follows (section 3(18)(B) of the MMPA):

(i) any act that injures or has the significant potential to injure a marine mammal or marine mammal stock in the wild [Level A Harassment]; or (ii) any act that disturbs or is likely to disturb a marine mammal or marine mammal stock in the wild by causing disruption of natural behavioral patterns, including, but not limited to, migration, surfacing, nursing, breeding, feeding, or sheltering, to a point where such behavioral patterns are abandoned or significantly altered [Level B Harassment].

Between January 2009 and May 2011, pursuant to the MMPA, NMFS issued 5-year final regulations to govern the unintentional taking of marine mammals incidental to Navy training and associated activities conducted in the Hawaii Range Complex (HRC), the Southern California (SOCAL) Range Complex, the Atlantic Fleet Active Sonar Training (AFAST) Study Area, the Jacksonville (JAX) Range Complex, the Virginia Capes (VACAPES) Range Complex, the Cherry Point (CHPT) Range Complex, the Naval Surface Warfare Center Panama City Division (NSWC PCD), the Mariana Islands Range Complex (MIRC), the Northwest Training Range Complex (NWTRC), the Naval Under Sea Warfare Center (NUWC) Keyport, the Gulf of Mexico (GOMEX) Range Complex, and the Gulf of Alaska Temporary Maritime Activities Area (GOTA MA). Additionally, in February 2009, pursuant to the MMPA, NMFS issued 5-
year regulations to govern the unintentional taking of marine mammals incidental to USAF space vehicle and test flight activities from VAFB in California. These regulations, which allow for the issuance of annual LOAs for the incidental take of marine mammals during the specified activities and described timeframes, prescribe the permissible methods of taking and other means of effecting the least practicable adverse impact on marine mammal species or stocks and their habitat, as well as requirements pertaining to the monitoring and reporting of such taking.

Currently, with the exception of the GOA TMAA regulations (which allow for biennial LOAs), these rules state that LOAs must be renewed annually. To date, the Navy has complied with this requirement, and NMFS has issued annual LOAs to the Navy for activities on its ranges; however, in order to alleviate some of the administrative burden associated with processing annual LOAs, the Navy has requested that NMFS revise the current regulations to allow for LOAs with longer periods of validity. NMFS’ regulations implementing section 101(a)(5)(A) through (D) of the MMPA do not limit the period of validity for LOAs to one year, and NMFS relied on this authority when regulations were promulgated for the GOA TMAA that allow for LOAs to be issued on an annual or biennial basis (76 FR 25480, May 4, 2011). The specific language found in the general regulations governing small takes of marine mammals incidental to specified activities states that, “Letters of Authorization will specify the period of validity and any additional terms and conditions appropriate for the specific request” (50 CFR 216.106(c)). With respect to revising the timing of LOA renewals, the period of validity for the LOAs can be extended past one year, but will not exceed the time remaining on the 5-year rule. For example, under the revised regulations, if the Navy requested a multi-year LOA for AFAST in 2012, the LOA could only be valid for a maximum of two years because the 5-year rule expires in 2014. Other factors may be taken into consideration when determining the period of validity for a multi-year LOA, such as the degree of advanced planning regarding future training or exercise schedules and the details concerning the amount of activity and marine mammal occurrence documented in the previous year’s monitoring and exercise reports. The regulations require the Navy to submit annual monitoring and exercise reports; (2) require that NMFS and the Navy hold annual monitoring and adaptive management meetings; and (3) allow for LOAs to be changed at any time, as appropriate, based on the availability of new information regarding military readiness activities or the marine mammals affected.

In addition, these rules as first issued (a subset have been modified) quantified the specific amounts of individual sound source use that would occur over the course of the 5-year rules, and indicated that marine mammal take could only be authorized in an LOA incidental to the source types and amounts described. No language was initially included expressly allowing for deviation from those precise levels of source use, even if the total number of takes remained within the analyzed and authorized limits. Since the issuance of the rules, the Navy realized that their evolving activities, which are linked to real world events, necessitate greater flexibility in the types and amounts of sound sources that they use. In response to this need, when the Navy requested incidental take authorization for the most recent area (GOA TMAA), NMFS included language explicitly allowing for greater flexibility in both source amount and type. Recently, NMFS amended the HRC, SOCAL Range Complex, AFAST, VACAPES, and JAX regulations to explicitly allow for greater flexibility in the types and amount of sound sources that they use (76 FR 6699, February 8, 2011, and 76 FR 30552, May 26, 2011). The language contained in the regulatory text for the interim final rules issued on February 8, 2011, and May 26, 2011 (76 FR 6699 and 76 FR 30552) remains unchanged from what was initially published. Through this final rule, NMFS now finalizes the aforementioned interim final rules without changes and amends the regulations for the remaining Navy training and RDT&E ranges to allow this same flexibility and ensure consistency.

The USAF regulations for activities at VAFB initially quantified the specific amounts of missiles and rockets that could be launched; however, the 5-year rule and indicated that marine mammal take could only be authorized in LOAs incidental to the amounts described. No language was initially included expressly allowing for deviation from those precise launch levels, even if the total number of takes remained within the analyzed and authorized limits. Since the issuance of the rule, the USAF realized that their evolving training programs, which are linked to real world events, necessitate greater flexibility in the types and amounts of missile and rocket launches that they conduct. NMFS now amends the regulations issued to VAFB in February 2009, to allow for such flexibility.

**Summary of the Navy Modifications**

**Multi-Year LOAs**

On May 4, 2011, NMFS issued 5-year regulations governing the taking of marine mammals incidental to training activities conducted in the GOA TMAA (76 FR 25480). These regulations allow for the issuance of annual or biennial LOAs (only annual LOAs had been allowed for in the previous Navy rules issued), but retain the annual reporting and meeting requirements.

After the issuance of the 2011 GOA TMAA rule, the Navy inquired about proposing amendments to the previously implemented Navy rules that would enable NMFS to renew LOAs for other RDT&E ranges on a multi-year basis. The ability to issue multi-year LOAs reduces administrative burdens on both NMFS and the Navy. In addition, multi-year LOAs would avoid situations where the last minute issuance of LOAs necessitated the commitment of extensive resources by the Navy for contingency planning.

This modification amends the regulations to allow the issuance of multi-year LOAs for all 12 Navy range complexes: HRC, SOCAL, AFAST, JAX, VACAPES, CHPT, NSWC PCD, MIRC, NWTRC, NUWC Keyport, GOA TMAA and GOMEX. The regulations for these range complexes currently limit the period of validity for LOAs to 1 year (2 for GOA TMAA) and the Navy must request renewal of LOAs annually (biennially for GOA TMAA). Although the amendments can increase the period of validity for LOAs, the regulations retain the annual reporting and adaptive management meeting requirements that ensure NMFS is able to evaluate the Navy’s compliance and marine mammal impacts with the same attention and frequency. In addition, a new LOA can be issued to incorporate any needed mitigation or monitoring measures developed through adaptive management, or if the Navy proposes changes to their activity within a given annual reporting period.

**Interannual Flexibility (Source Type and Amount of Use)**

With respect to the second modification regarding the types of sources for which incidental take is authorized, in some cases the Navy’s rules only identified the most representative or highest power source within a group of known similar sources. The Navy regularly modifies or develops new technologies, which often...
results in sound sources that are similar to, but not exactly the same as, existing sources. In order to address these source modifications and the development of new technologies, NMFS includes new regulatory language designed to allow for more flexibility by authorizing take incidental to the previously identified specific sound source or “similar sources” (i.e., those that have similar characteristics to the specific sources and do not change any of the underlying analysis, which NMFS would evaluate and verify upon receipt of an LOA application containing a description of the new similar sound source). In the February 8, 2011, modification to the HRC, SOCAL and AFAST rules and the May 26, 2011, modification to the VACAPES and JAX rules, NMFS increased the flexibility of the regulations by inserting language that explicitly allows for authorization of take incidental to the previously identified specified sound sources or “similar sources” (with similar characteristics that do not change any of the underlying analyses). The language contained in the regulatory text for the interim final rules issued on February 8, 2011, and May 26, 2011 (76 FR 6699 and 76 FR 30552) remains unchanged from what was initially published. NMFS now finalizes these two interim final rules without changes and inserts similar language in the following Navy rules: CHPT; NSWC PCD; MIRC; NUWCC Keyport; GOMEX; and NWTRC.

Finally, regarding amounts of sound source use, the regulations only allow for the authorization of take incidental to a 5-yr maximum amount of use for each specific sound source, even though in most cases our effects analyses do not differentiate the impacts from the majority of the different types of sources. Specifically, although some sonar sources are louder or generate more acoustic energy in a given amount of time, which results in more marine mammal take, we authorize total takes but do not differentiate between the individual takes that result from one source versus another. This final rule amends the Navy rules to allow for inter-annual variability in the amount of source use identified in each LOA. For example, in one year, the Navy could use a lot of one source and a little of another, and the next year those amounts could be reversed; however, the amount of inter-annual variability cannot result in exceeding the total level of incidental take analyzed and identified in the final rules, and the taking can result in more than a negligible impact on affected species or stocks. Language of this nature was included in final regulations governing the authorization of take incidental to the Navy’s training activities in the Mariana Islands and Northwest Training Range Complexes, which were issued in 2010. NMFS issued interim final rules amending the HRC, SOCAL Range Complex, AFAST, VACAPES, and JAX regulations by adding language of this nature to increase operational flexibility in those range complexes (76 FR 6699, February 8, 2011, and 76 FR 30552, May 26, 2011). However, this language has not been adopted in the remaining Navy rules and NMFS now finalizes the aforementioned interim final rules and includes language of this nature in the regulations governing the authorization of take incidental to the additional Navy range complexes not previously addressed by either the final rules or interim final rules mentioned above.

These regulatory amendments do not change the analyses of marine mammal impacts conducted in the original final rules. This is assured and illustrated through: (1) The Navy’s submission of LOAs for individual takes that result from one specific sound source or “similar sources” (with similar characteristics to the specific sources that do not change any of the underlying analyses). These submissions allow NMFS to accurately predict and track the Navy’s activities to ensure that both NMFS’ LOAs and the impacts of the Navy’s activities on marine mammals, remain within what is analyzed and allowed under the 5-year regulations.

Summary of the USAF Modification

In the 5-year regulations issued to the USAF in February 2009, NMFS authorized up to 30 missile launches and up to 20 rocket launches annually from VAFB (74 FR 6236, February 6, 2009). Those regulations analyzed potential impacts from many different types of missiles and rockets, such as the Atlas, Delta, Falcon, and intercontinental ballistic missiles. At the time of issuance of the regulations to the USAF, the Falcon was not yet ready for launch, but it was anticipated that the first launch of such a rocket would occur around August 2009. Information related to this rocket type was analyzed in the proposed and final rulemaking documents. The Falcon has not yet been launched from VAFB, and it is anticipated that the first launch will occur in late 2012 or early 2013. In order to accommodate the necessary launches of the Falcon rocket, the USAF has indicated that it needs to realign the amount of the 50 total launches allowed annually. Instead of the 30 missile and 20 rocket launches currently authorized per year, the USAF has requested that they be permitted to conduct 15 missile launches and 35 rocket launches per year. The total number of annual launches would remain at 50.

As indicated above, this regulatory amendment does not change the analyses of marine mammal impacts conducted in the original final rule. This fact is assured and illustrated through: (1) The USAF’s submission of annual LOA requests for the activities at VAFB related to space vehicle and test flight activities; and (2) their annual submission of monitoring reports, which describe observed responses of marine mammals to USAF missile and rocket launches and aircraft activity collected via visual monitoring and acoustic recording methods. These submissions allow NMFS to accurately predict and track the USAF’s activities to ensure that both NMFS’ LOAs and the impacts of the USAF’s activities on marine mammals remain within what is analyzed and authorized under the 5-year regulations.

Comments and Responses

On November 15, 2011 (76 FR 70695), NMFS published a proposed rule in response to requests by the Navy and USAF to allow for greater flexibility with respect to the regulations and LOAs permitting the types and amounts of sound sources that they use. In addition, the proposed rule responded to the Navy’s request for LOAs with longer periods of validity (i.e., greater than one year). NMFS received comment letters from the Marine Mammal Commission, Department of the Interior, the U.S. Air Force, environmental non-governmental organizations, an interested member of the public, and one member of Congress. The comments are summarized and addressed below. Full copies of the comment letters may be accessed at http://www.regulations.gov. The letter from the Marine Mammal Commission can be accessed at http://mmc.gov/letters/letters_11.shtml, and recommended that NMFS amend the regulations as proposed.

Comment 1: NMFS should delay publishing the final rule until after USAF’s working group on marine mammal hotspots has completed its work.
Response: NMFS does not agree that delaying the publication of the final rule until after the working groups have completed their work is warranted. The results of these working groups will be analyzed by NMFS in an adaptive management context, as related to the Navy final rules and LOAs, and mitigation or monitoring measures may be modified, as appropriate. The timing of potential adaptive management actions identified above would not be changed by delaying the publication of this final rule because LOAs can be modified at any time to include new mitigation or monitoring measures if new information suggests such a change is warranted.

Comment 2: NMFS has not properly assessed the impacts to marine mammals that could result from variability in the amount of source use within a five-year period.

Response: As we stated in the preamble to the proposed rule (76 FR 70695, November 15, 2011), these regulations do not change the analyses of marine mammal impacts conducted in the original final rules. Under the revisions, any variations in sound types or use could not exceed the level of take authorized by the original rules, and individual LOA renewal applications will provide new take estimates for NMFS to review. New information, including results and recommendations from the working groups, would also be taken into consideration. In addition, the submission of annual monitoring and exercise reports by the Navy and USAF allow NMFS to accurately track the military readiness activities and ensure that LOAs issued by NMFS and the impacts of the military readiness activities on marine mammals remain within what is analyzed and allowed under the 5-year regulations.

Comment 3: NMFS must ensure that “similar sources” are truly similar and that the takings of marine mammals resulting from the use of “similar sources” do not exceed the takings that are authorized in the final rules.

Response: NMFS agrees and will evaluate the “similar sources” and their likely impacts on marine mammals when the Navy submits their LOA applications, which include a detailed description of any new sources and a take estimate. NMFS will also review annual monitoring and exercise reports to ensure that takings from similar sources do not exceed those authorized in the final rules.

Comment 4: To maintain a commitment to oversight and adaptive management, NMFS must limit the taking of marine mammals to the annual take amount analyzed in the applicable EISs and final rules.

Response: NMFS’ commitment to oversight and adaptive management is assured and illustrated through the review of annually submitted exercise and monitoring reports, which describe military readiness activities conducted during the reporting periods and observed responses of marine mammals to Navy training exercises and USAF missile and rocket launches and aircraft activity collected via visual monitoring and acoustic recording methods. Together, these submissions allow NMFS to accurately predict and track military readiness activities conducted by the Navy and USAF to ensure that incidental takings remain within what is analyzed and allowed under the 5-year regulations. In addition, NMFS continues to require annual adaptive management meetings with the Navy, which ensures that NMFS is able to evaluate the Navy’s compliance and marine mammal impacts as carefully and as often as NMFS would in the absence of the modifications. Finally, under the modified regulations, NMFS still has the ability to issue a new LOA at any time, pursuant to the adaptive management mechanism, if mitigation or monitoring modifications are needed.

Comment 5: The USAF requested that NMFS include language in the final rule that allows for the issuance of multi-year LOAs to the USAF for space vehicle and test flight activities from VAFB.

Response: The USAF did not make this request to NMFS prior to release of the proposed rule for public comment. The current 5-year rule governing authorizations for take of marine mammals at VAFB expires on February 6, 2014. Therefore, if NMFS were to make this change now, it would make it unnecessary to issue only one remaining LOA, as three LOAs have already been issued to the USAF under the current regulations. NMFS did not include language authorizing LOAs that would cover multiple years for activities at VAFB, and including such language in the final rule would not result in significant time savings or administrative streamlining at this stage in implementation of the current 5-year regulations. Therefore, NMFS has not included language in the final rule for the USAF activities that would allow for the issuance of multi-year LOAs. However, if and when the USAF applies for new 5-year regulations, NMFS will consider issuance of multi-year LOAs in the proposed rule that is released for public comment at that time.

Comment 6: The Office of Management and Budget has determined that this final rule is not significant for purposes of Executive Order 12866.

Response: Pursuant to the Regulatory Flexibility Act (RFA), the Chief Counsel for Regulation of the Department of Commerce has certified to the Chief Counsel for Advocacy of the Small Business Administration that this final rule is not significant for purposes of Executive Order 12866.
entities whenever the agency is required to publish a notice of proposed rulemaking. However, a Federal agency may certify, pursuant to 5 U.S.C. 605 (b), that the action will not have a significant economic impact on a substantial number of small entities. Neither the Navy nor the USAF are small governmental jurisdictions, small organizations, or small businesses, as defined by the RFA. Any requirements imposed by an LOA issued pursuant to these regulations, and any monitoring or reporting requirements imposed by these regulations, will be applicable only to the Navy and USAF. NMFS does not expect the amendments of these regulations or the associated LOAs to result in any impacts to small entities pursuant to the RFA. Because this action would directly affect the Navy and USAF and not a small entity, NMFS concludes the action would not result in a significant economic impact on a substantial number of small entities.

This action does not contain any collection of information requirements for purposes of the Paperwork Reduction Act.

The Assistant Administrator for Fisheries has determined that there is good cause under the Administrative Procedure Act (5 U.S.C. 553(d)(3)) to waive the 30-day delay in effectiveness of the measures contained in the final rule. The Navy and USAF, as the authorized entities, have informed NMFS that any delay of enacting the final rule would result in: (1) A suspension of ongoing or planned military readiness activities, which would disrupt vital training essential to national security; or (2) the Navy and USAF’s procedural non-compliance with the MMPA (should the Navy and USAF conduct activities without an LOA), thereby resulting in the potential for unauthorized takes of marine mammals. Moreover, the Navy and USAF, the only parties directly affected by this rule, are ready to implement the rule immediately; therefore, these measures will become effective upon publication.

List of Subjects in 50 CFR Parts 216 and 218

Exports, Fish, Imports, Incidental take, Indians, Labeling, Marine mammals, Navy, Penalties, Reporting and recordkeeping requirements, Seafood, Sonar, Transportation.


Alan D. Risenhoover,
Acting Deputy Assistant Administrator for Regulatory Programs, National Marine Fisheries Service.

For reasons set forth in the preamble, 50 CFR parts 216 and 218 are amended as follows:

PART 216—REGULATIONS GOVERNING THE TAKING AND IMPORTING OF MARINE MAMMALS

§ 216.120 Specified activity and specified geographical region.

(a) * * *

(1) Launching up to 15 missiles each year from Vandenberg Air Force Base, for a total of up to 75 missiles over the 5-year period of the regulations in this subpart,

(2) Launching up to 35 rockets each year from Vandenberg Air Force Base, for a total of up to 175 rocket launches over the 5-year period of the regulations in this subpart,

* * * * *

§ 216.121 Effective dates.

Amended regulations are effective from February 1, 2012, through February 6, 2014.

§ 216.170 Specified activity and specified geographical region.

(c) * * *

(1) The taking of marine mammals by the Navy is only authorized if it occurs incidental to the following activities: (1) The use of the following mid-frequency active sonar (MFAS) and high frequency active sonar (HFAS) sources, or similar sources, for Navy training activities (estimated amounts below):

* * * * *

(vii) AN/SSQ–125 (AEER sonar sonobuoy)—4800 sonobuoys (total, of IEER/AEER and AEER combined) over the course of 5 years (an average of 960 sonobuoy deployments per year)

(2) The detonation of the underwater explosives indicated in paragraph (c)(2)(i) of this section, or similar explosives, conducted as part of the training exercises indicated in paragraph (c)(2)(ii) of this section:

(ii) * * *

(H) EEER/AEER—4800 sonobuoys (total, of EEER/AEER and AEER combined) over the course of 5 years (an average of 960 sonobuoy deployments per year)

(d) The taking of marine mammals may be authorized in an LOA for the activities and sources listed in § 216.170(c) should the amounts (e.g., hours, dops, or number of exercises) vary from those estimated in § 216.170(c), provided that the variation does not result in exceeding the amount of take indicated in § 216.172(c).

§ 216.171 Effective dates and definitions.

(a) Amended regulations are effective from February 1, 2012, through January 5, 2014.

§ 216.172 Letters of Authorization.

(a) A Letter of Authorization, unless suspended or revoked, will be valid for a period of time not to exceed the period of validity of this subpart, but may be renewed or modified sooner subject to the renewal conditions in § 216.178 and the modification conditions in § 216.179.

§ 216.177 Renewal of Letters of Authorization.

(a) A Letter of Authorization issued under §§ 216.106 and 216.177 for the activity identified in § 216.170(c) may be renewed for an amount of time not to exceed the periods of validity of this subpart upon:

(1) Notification to NMFS that the activity described in the application submitted under § 216.176 will be undertaken and that there will not be a substantial modification to the desired work, mitigation, or monitoring undertaken during the upcoming period of validity;

* * * * *

(3) A determination by NMFS that the mitigation, monitoring and reporting measures required under § 216.174 and the Letter of Authorization issued under §§ 216.106 and 216.177, were undertaken and will be undertaken during the upcoming period of validity of a renewed Letter of Authorization.

* * * * *

§ 216.240, revise paragraphs (c) introductory text and paragraph (d) to read as follows:
§ 216.240 Specified activity and specified geographical region.

* * * * *

(c) The taking of marine mammals by the Navy is only authorized if it occurs incidental to the use of the following mid-frequency active sonar (MFAS) sources, high frequency active sonar (HFAS) sources, explosive sonobuoys, or similar sources, for Navy training, maintenance, or research, development, testing, and evaluation (RDT&E) (estimated amounts below):

* * * * *

(d) The taking of marine mammals may be authorized in an LOA for the activities and sources listed in § 216.240(c) should the amounts (e.g., hours, dips, or number of exercises) vary from those estimated in § 216.240(c), provided that the variation does not result in exceeding the amount of take indicated in § 216.242(c).

■ 9. In § 216.241, paragraph (a) is revised to read as follows:

§ 216.241 Effective dates and definitions.

(a) Amended regulations are effective from February 1, 2012, through January 22, 2014.

* * * * *

■ 10. In § 216.247 paragraph (a) is revised to read as follows:


(a) A Letter of Authorization, unless suspended or revoked, will be valid for a period of time not to exceed the period of validity of this subpart, but may be renewed or modified sooner subject to the renewal conditions in § 216.248 and the modification conditions in § 216.249.

* * * * *

■ 11. In § 216.248, paragraphs (a) introductory text, (a)(1), and (a)(3) are revised to read as follows:


(a) A Letter of Authorization issued under §§ 216.106 and 216.247 for the activity identified in § 216.240(c) may be renewed upon:

1. Notification to NMFS that the activity described in the application submitted under § 216.246 will be undertaken and that there will not be a substantial modification to the desired work, mitigation, or monitoring undertaken during the upcoming period of validity:

* * * * *

3. A determination by NMFS that the mitigation, monitoring and reporting measures required under § 216.244 and the Letter of Authorization issued under §§ 216.106 and 216.247, were

undertaken and will be undertaken during the upcoming period of validity of a renewed Letter of Authorization.

* * * * *

■ 12. In § 216.270, revise paragraphs (c) introductory text, (c)(1), (c)(2) and (d) to read as follows:

§ 216.270 Specified activity and specified geographical region.

* * * * *

(c) The taking of marine mammals by the Navy is only authorized if it occurs incidental to the following activities:

1. The use of the following mid-frequency active sonar (MFAS) and high frequency active sonar (HFAS) sources, or similar sources, for Navy training, maintenance, or research, development, testing, and evaluation (RDT&E) (estimated amounts below):

* * * * *

2. The detonation of the underwater explosives indicated in paragraph (c)(2)(ii) of this section, or similar explosives, conducted as part of the training exercises indicated in paragraph (c)(2)(ii) of this section:

* * * * *

(d) The taking of marine mammals may be authorized in an LOA for the activities and sources listed in § 216.270(c) should the amounts (e.g., hours, dips, or number of exercises) vary from those estimated in § 216.270(c), provided that the variation does not result in exceeding the amount of take indicated in § 216.272(c).

■ 13. In § 216.271, paragraph (a) is revised to read as follows:

§ 216.271 Effective dates and definitions.

(a) Amended regulations are effective from February 1, 2012, through June 4, 2016.

* * * * *

■ 14. In § 216.277, paragraph (a) is revised to read as follows:

§ 216.277 Letters of Authorization.

(a) A Letter of Authorization, unless suspended or revoked, will be valid for a period of time not to exceed the periods of validity of this subpart, but may be renewed or modified sooner subject to the renewal conditions in § 216.278 and the modification conditions in § 216.279.

* * * * *

■ 15. In § 216.278, paragraphs (a) introductory text, (a)(1), and (a)(3) are revised to read as follows:


(a) A Letter of Authorization issued under §§ 216.106 and 216.277 for the activity identified in § 216.270(c) may be renewed upon:

1. Notification to NMFS that the activity described in the application submitted under § 216.276 will be undertaken and that there will not be a substantial modification to the desired work, mitigation, or monitoring undertaken during the upcoming period of validity:

* * * * *

3. A determination by NMFS that the mitigation, monitoring and reporting measures required under § 216.274 and the Letter of Authorization issued under §§ 216.106 and 216.277, were undertaken and will be undertaken during the upcoming period of validity of a renewed Letter of Authorization.

* * * * *

PART 218—REGULATIONS GOVERNING THE TAKING AND IMPORTING OF MARINE MAMMALS

■ 16. The authority citation for part 218 continues to read as follows:

Authority: 16 U.S.C. 1361 et seq.

■ 17. In § 218.1, revise paragraphs (c) introductory text, (c)(1), (c)(1)(i), (c)(1)(ii), (d) introductory text, (d), and (e) to read as follows:

§ 218.1 Specified activity and specified geographical area and effective dates.

* * * * *

(c) The taking of marine mammals by the Navy is only authorized if it occurs incidental to the following activities:

1. The use of the explosive munitions, or similar explosive types, indicated in paragraph (c)(1)(i) of this section conducted as part of the Navy training events, or similar training events, indicated in paragraph (c)(1)(ii) of this section:

* * * * *

(D) Airborne Mine Neutralization system (AMNS)

* * * * *

(ii) Training events (with approximated number of events)

* * * * *

(d) Amended regulations are effective from February 1, 2012, through June 4, 2016.

(e) The taking of marine mammals may be authorized in an LOA for the explosive types and activities, or similar explosives or activities, listed in § 218.1(c) should the amounts (e.g., number of exercises) vary from those estimated in § 218.1(c), provided that the variation does not result in exceeding the amount of take indicated in § 218.2(c).

■ 18. In § 218.7, paragraph (a) is revised to read as follows:
§ 218.7 Letters of Authorization.  
(a) A Letter of Authorization, unless suspended or revoked, will be valid for a period of time not to exceed the periods of validity of this subpart, but may be renewed or modified sooner subject to the renewal conditions in § 218.8 and the modification conditions in § 218.9.

* * * * *

■ 19. In § 218.8, paragraphs (a) introductory text, (a)(1), and (a)(3) are revised to read as follows:

§ 218.8 Renewal of Letters of Authorization and adaptive management.

(a) A Letter of Authorization issued under § 218.106 of this chapter and § 218.7 for the activity identified in § 218.1(c) may be renewed upon:

(1) Notification to NMFS that the activity described in the application submitted under § 218.6 will be undertaken and that there will not be a substantial modification to the desired work, mitigation, or monitoring undertaken during the upcoming period of validity;

* * * * *

(3) A determination by NMFS that the mitigation, monitoring and reporting measures required under § 218.4 and the Letter of Authorization issued under § 218.106 of this chapter and § 218.7 were undertaken and will be undertaken during the upcoming period of validity of a renewed Letter of Authorization.

* * * * *

■ 20. In § 218.10, revise paragraphs (c) introductory text, (c)(1), (d) and (e) to read as follows:

§ 218.10 Specified activity and specified geographical area and effective dates.

* * * * *

(c) The taking of marine mammals by the Navy is only authorized if it occurs incidental to the following activities:

(1) The use of the explosive munitions, or similar explosive types, indicated in paragraph (c)(1)(i) of this section conducted as part of the Navy training events, or similar training events, indicated in paragraph (c)(1)(i) of this section:

* * * * *

(d) Amended regulations are effective February 1, 2012, through June 4, 2016.

(e) The taking of marine mammals may be authorized in an LOA for the explosive types and activities, or similar explosives and activities, listed in § 218.20(c) should the amounts (e.g., number of exercises) vary from those estimated in § 218.20(c), provided that the variation does not result in exceeding the amount of take indicated in § 218.11(c).

■ 21. In § 218.13, paragraph (a)(4)(ii)(A) is revised to read as follows:

§ 218.13 Mitigation.

* * * * *

(A) This activity shall only occur in Areas BB and CC, or in similar areas that will not result in marine mammal takes exceeding the amount indicated in § 216.11(c).

* * * * *

■ 22. In § 218.16, paragraph (a) is revised to read as follows:

§ 218.16 Letters of Authorization.

(a) A Letter of Authorization, unless suspended or revoked, will be valid for a period of time not to exceed the periods of validity of this subpart, but may be renewed or modified sooner subject to the renewal conditions in § 218.17 and modification conditions in § 218.18.

* * * * *

■ 23. In § 218.17, paragraphs (a) introductory text, (a)(1), and (a)(3) are revised to read as follows:

§ 218.17 Renewal of Letters of Authorization and adaptive management.

(a) A Letter of Authorization issued under § 216.106 of this chapter and § 218.16 for the activity identified in § 218.10(c) will be renewed upon:

(1) Notification to NMFS that the activity described in the application submitted under § 218.15 will be undertaken and that there will not be a substantial modification to the desired work, mitigation, or monitoring undertaken during the upcoming period of validity;

* * * * *

(3) A determination by NMFS that the mitigation, monitoring and reporting measures required under § 218.13 and § 216.106 of this chapter and § 218.26, were undertaken and will be undertaken during the upcoming period of validity.

* * * * *

■ 24. In § 218.20, paragraphs (c) introductory text, (c)(1) introductory text, and (d) are revised, and paragraph (e) is added to read as follows:

§ 218.20 Specified activity and specified geographical area and effective dates.

* * * * *

(c) The taking of marine mammals by the Navy is only authorized if it occurs incidental to the following activities:

(1) The use of the explosive munitions, or similar explosive types, indicated in paragraph (c)(1)(i) of this section conducted as part of the Navy training events, or similar training events, indicated in paragraph (c)(1)(ii) of this section:

* * * * *

(d) Amended regulations are effective February 1, 2012, through June 4, 2014.

(e) The taking of marine mammals may be authorized in an LOA for the explosive types and activities, or similar explosives and activities, listed in § 218.20(c) should the amounts (e.g., number of exercises) vary from those estimated in § 218.20(c), provided that the variation does not result in exceeding the amount of take indicated in § 218.21(c).

■ 25. In § 218.23, paragraph (a)(4)(ii)(A) is revised to read as follows:

§ 218.23 Mitigation.

(a) * * * (4) * * *

(i) * * *

(A) This activity shall only occur in Areas 4/5 and 13/14, or in similar areas that will not result in marine mammal takes exceeding the amount indicated in § 218.21(c).

* * * * *

■ 26. In § 218.26, paragraph (a) is revised to read as follows:

§ 218.26 Letters of Authorization.

(a) A Letter of Authorization, unless suspended or revoked, will be valid for a period of time not to exceed the periods of validity of this subpart, but may be renewed or modified sooner subject to the renewal conditions in § 218.27 and the modification conditions in § 218.28.

* * * * *

■ 27. In § 218.27, paragraphs (a) introductory text, (a)(1), and (a)(3) are revised to read as follows:

§ 218.27 Renewal of Letters of Authorization and adaptive management.

(a) A Letter of Authorization issued under § 216.106 of this chapter and § 218.26 for the activity identified in § 218.20(c) will be renewed upon:

(1) Notification to NMFS that the activity described in the application submitted under § 218.25 will be undertaken and that there will not be a substantial modification to the desired work, mitigation, or monitoring undertaken during the upcoming period of validity:

* * * * *

(3) A determination by NMFS that the mitigation, monitoring and reporting measures required under § 218.13 and § 216.106 of this chapter and § 218.26, were undertaken and will be undertaken during the upcoming period of validity of a renewed Letter of Authorization.

* * * * *

(4) * * *

(i) * * *

(A) This activity shall only occur in Areas BB and CC, or in similar areas that will not result in marine mammal takes exceeding the amount indicated in § 218.21(c).

* * * * *

(d) Amended regulations are effective February 1, 2012, through June 4, 2016.

(e) The taking of marine mammals may be authorized in an LOA for the explosive types and activities, or similar explosives and activities, listed in § 218.20(c) should the amounts (e.g., number of exercises) vary from those estimated in § 218.20(c), provided that the variation does not result in exceeding the amount of take indicated in § 218.21(c).

■ 28. In § 218.28, paragraphs (a) introductory text, (a)(1), and (a)(3) are revised to read as follows:
§ 218.106 Renewal of Letters of Authorization and adaptive management.

(a) A Letter of Authorization issued under § 218.106 of this chapter and § 218.107 for the activity identified in § 218.100(c) will be renewed upon:

(1) Notification to NMFS that the activity described in the application submitted under § 218.35 will be undertaken and that there will not be a substantial modification to the desired work, mitigation, or monitoring undertaken during the upcoming period of validity;

(3) A determination by NMFS that the mitigation, monitoring and reporting measures required under § 218.33 and the Letter of Authorization issued under § 218.106 of this chapter and § 218.36, were undertaken and will be undertaken during the upcoming period of validity of a renewed Letter of Authorization.

§ 218.107 Letters of Authorization.

(a) A Letter of Authorization, unless suspended or revoked, will be valid for a period of time not to exceed the periods of validity of this subpart, but may be renewed or modified sooner subject to the renewal conditions in § 218.36 and the modification conditions in § 218.38.

§ 218.108 Effective dates.

Amended regulations are effective February 1, 2012, through August 3, 2015.

§ 218.109 Effective dates.

Amended regulations are effective February 1, 2012, through November 9, 2015.

§ 218.110 Specified activity and specified geographical area.

(c) The taking of marine mammals by the Navy is only authorized if it occurs incidental to the following activities:

(1) The use of the following mid-frequency active sonar (MFAS) and high frequency active sonar (HFAS) sources, or similar sources, for Navy training, maintenance, or research, development, testing, and evaluation (RDT&E) (estimated amounts below):

§ 218.111 Specified activity and specified geographical area.

(c) The taking of marine mammals by the Navy is only authorized if it occurs incidental to the following activities:

(1) The use of the following mid-frequency active sonar (MFAS) and high frequency active sonar (HFAS) sources, or similar sources, for Navy training, maintenance, or research, development, testing, and evaluation (RDT&E) (estimated amounts below):

§ 218.112 Effective dates.

Amended regulations are effective February 1, 2012, through November 9, 2015.

§ 218.113 Effective dates.

Amended regulations are effective February 1, 2012, through December 31, 2015.
§ 218.118 Renewal of Letters of Authorization and adaptive management.

(a) A Letter of Authorization issued under § 216.106 of this chapter and § 218.117 for the activity identified in § 218.110(c) will be renewed upon:

(1) Notification to NMFS that the activity described in the application submitted under § 218.116 will be undertaken and that there will not be a substantial modification to the desired work, mitigation, or monitoring undertaken during the upcoming period of validity;

(3) A determination by NMFS that the mitigation, monitoring and reporting measures required under § 218.124 and the Letter of Authorization issued under § 216.106 of this chapter and § 218.127, were undertaken and will be undertaken during the upcoming period of validity of a renewed Letter of Authorization.

(b) A Letter of Authorization issued under § 216.106 of this chapter and § 218.175 for the activity identified in § 218.170(c) will be renewed upon:

(1) Notification to NMFS that the activity described in the application submitted under § 218.176 will be undertaken and that there will not be a substantial modification to the desired work, mitigation, or monitoring undertaken during the upcoming period of validity;

(3) A determination by NMFS that the mitigation, monitoring and reporting measures required under § 218.124 and the Letter of Authorization issued under § 216.106 of this chapter and § 218.176, were undertaken and will be undertaken during the upcoming period of validity of a renewed Letter of Authorization.

§ 218.170 Specified activity and specified geographical area and effective dates.

(c) These regulations apply only to the taking of marine mammals by the Navy if it occurs incidental to the following activities, or similar activities, and sources, or similar sources (estimate amounts of use below):

(d) Amended regulations are effective February 1, 2012, through April 11, 2016.

(e) The taking of marine mammals may be authorized in an LOA for the activities and sources listed in § 218.170(c) should the amounts (e.g., hours, number of exercises) vary from those estimated in § 218.170(c). Provided that the variation does not result in exceeding the amount of take indicated in § 218.171(c).

§ 218.176 Letters of Authorization.

(a) A Letter of Authorization, unless suspended or revoked, will be valid for a period of time not to exceed the periods of validity of this subpart, but may be renewed or modified sooner subject to the renewal conditions in § 218.128 and the modification conditions in § 218.129.

§ 218.177 Renewal of Letters of Authorization and adaptive management.

(a) A Letter of Authorization issued under § 216.106 of this chapter and § 218.176 for the activity identified in § 218.170(c) will be renewed upon:

(1) Notification to NMFS that the activity described in the application submitted under § 218.175 will be undertaken and that there will not be a substantial modification to the desired work, mitigation, or monitoring undertaken during the upcoming period of validity;

(3) A determination by NMFS that the mitigation, monitoring and reporting measures required under § 218.173 and the Letter of Authorization issued under § 216.106 of this chapter and § 218.176, were undertaken and will be undertaken during the upcoming period of validity of a renewed Letter of Authorization.

(d) Amended regulations are effective February 1, 2012, through January 21, 2015.

(e) The taking of marine mammals by the Navy is only authorized if it occurs incidental to the following activities:

(1) The use of the following mid-frequency active sonar (MFAS) and high frequency active sonar (HFAS) sources, or similar sources, for Navy mission activities in territorial waters (estimated amounts below):

(2) The use of the following mid-frequency active sonar (MFAS) and high frequency active sonar (HFAS) sources, or similar sources, for Navy mission activities in non-territorial waters (estimated amounts below):

(3) Ordnance operations, or similar operations, for Navy mission activities in territorial waters (estimated amounts below):

(4) Ordnance operations, or similar operations, for Navy mission activities in non-territorial waters (estimated amounts below):

(5) Projectile firing operations, or similar operations, for Navy mission activities in non-territorial waters (estimated amounts below):

(d) Amended regulations are effective February 1, 2012, through January 21, 2015.
result in exceeding the amount of take indicated in § 218.181(b).

47. In § 218.186, paragraph (a) is revised to read as follows:

§ 218.186 Letters of Authorization.
(a) A Letter of Authorization, unless suspended or revoked, will be valid for a period of time not to exceed the periods of validity of this subpart, but may be renewed or modified sooner subject to the renewal conditions in § 218.187 and the modification conditions in § 218.188.

48. In § 218.187 paragraphs (a) introductory text, (a)(1), and (a)(3) are revised to read as follows:

§ 218.187 Renewal of Letters of Authorization and adaptive management.
(a) A Letter of Authorization issued under § 216.106 of this chapter and § 218.186 for the activity identified in § 218.180(c) will be renewed upon:
   (1) Notification to NMFS that the activity described in the application submitted under § 218.185 will be undertaken and that there will not be a substantial modification to the desired work, mitigation, or monitoring undertaken during the upcoming period of validity;
   (3) A determination by NMFS that the mitigation, monitoring and reporting measures required under § 218.183 and the Letter of Authorization issued under § 216.106 of this chapter and § 218.186, were undertaken and will be undertaken during the upcoming period of validity of a renewed Letter of Authorization.

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BILLING CODE 3510–22–P
DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

RIN 0648–XA216

Taking and Importing Marine Mammals; Taking Marine Mammals Incidental to Space Vehicle and Missile Launch Operations at Kodiak Launch Complex, Alaska

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

SUMMARY: In accordance with the Marine Mammal Protection Act (MMPA), as amended, and implementing regulations, notification is hereby given that a Letter of Authorization (LOA) has been issued to the Alaska Aerospace Corporation (AAC) to take two species of pinnipeds incidental to space vehicle and missile launch operations at the Kodiak Launch Complex (KLC) in Kodiak, Alaska.


ADDRESSES: The LOA and supporting documentation are available for review by writing to Tammy C. Adams, Acting Chief, Permits and Conservation Division, Office of Protected Resources, National Marine Fisheries Service, 1315 East-West Highway, Silver Spring, MD 20910–3225, by telephoning the contact listed under FOR FURTHER INFORMATION CONTACT, or on the Internet at: http://www.nmfs.noaa.gov/pr/permits/incidental.htm#applications.

FOR FURTHER INFORMATION CONTACT: Michelle Magliocca, Office of Protected Resources, NMFS, 301–427–8401.

SUPPLEMENTARY INFORMATION:

Background

Sections 101(a)(5)(A) of the MMPA (16 U.S.C. 1361 et seq.) directs the Secretary of Commerce to allow, upon request, the incidental, but not intentional, taking of small numbers of marine mammals by U.S. citizens who engage in a specified activity (other than commercial fishing) within a specified geographical region if certain findings are made and either regulations are issued. Under the MMPA, the term “take” means to harass, hunt, capture, or kill marine mammals. Authorization for incidental takings shall be granted if NMFS finds that the taking will have a negligible impact on the identified species or stock(s), will not have an unmitigable adverse impact on the availability of the species or stock(s) for subsistence uses (where relevant), and if the permissible methods of taking and requirements pertaining to the mitigation, monitoring and reporting of such takings are set forth in the regulations. NMFS has defined “negligible impact” in 50 CFR 216.103 as “* * * an impact resulting from the specified activity that cannot be reasonably expected to, adversely affect the species or stock through effects on annual rates of recruitment or survival.”

Regulations governing the taking of Steller sea lions (Eumetopias jubatus), by harassment, and harbor seals (Phoca vitulina) (adults by harassment and pups by injury or mortality), incidental to space vehicle and missile launch operations at the KLC, were issued on March 22, 2011 (76 FR 16311, March 23, 2011), and remain in effect until March 21, 2016. For detailed information on the action, please refer to that document. The regulations include mitigation, monitoring, and reporting requirements for the incidental take of marine mammals during space vehicle and missile launch operations at the KLC.

Summary of Request

On February 27, 2012, NMFS received a request from the AAC for renewal of an LOA issued on April 30, 2011, authorizing the take of marine mammals incidental to a maximum of 12 space launch vehicles, long-range ballistic target missiles, and other smaller missile systems at the KLC. The AAC has complied with the measures required in 50 CFR 217.70–75, as well as the associated 2011–2012 LOA, and submitted the reports and other documentation required by the final rule and the 2011–2012 LOA.

Summary of Activity Under the 2011–2012 LOA

As described in the AAC’s 2011–2012 annual report, launch activities conducted at the KLC were within the scope and amounts authorized by the 2011–2012 LOA and the levels of take remain within the scope and amounts contemplated by the final rule. Only one launch occurred at the KLC under the 2011–2012 LOA.

Planned Activities and Estimated Take for 2012–2013

In 2012–2013, the AAC expects to conduct the same type and amount of launches identified in the 2011–2012 LOA. Similarly, the authorized take will remain within the annual estimates analyzed in the final rule.

Summary of Monitoring and Reporting Under the 2011–2012 LOA

The AAC submitted their annual monitoring report within the required timeframe and the report is posted on NMFS Web site: http://www.nmfs.noaa.gov/pr/permits/incidental.htm#applications. NMFS has reviewed the report and it contains the information required by the 2011–2012 LOA. The AAC’s monitoring activities included a quarterly aerial survey on September 21, 2011, and launch-related monitoring on September 26–27, 2011, using a remote camera system. One of the planned quarterly aerial surveys was postponed twice due to stormy weather. Another aerial survey is scheduled to occur before the 2011–2012 LOA expires. The annual report for last year’s LOA reported no Steller sea lions observed in the area before or after the launch and there were no sightings of injury or mortality to Pacific harbor seals. Last year, no launches occurred during harbor seal pupping season (May 15–June 30).

Authorization

The AAC complied with the requirements of the 2011–2012 LOA. Based on our review of the record, NMFS has determined that the marine mammal take resulting from the 2011–2012 launch operations falls within the levels previously anticipated, analyzed, and authorized. The record supports NMFS’ conclusion that the number of marine mammals taken by the 2012–2013 launch operations will have no more than a negligible impact on the availability of these species or stocks for taking for subsistence uses. Accordingly, NMFS has issued a 1-year LOA for launch operations conducted at the KLC from April 30, 2012, through April 29, 2013.


Helen M. Golde,
Acting Director, Office of Protected Resources, National Marine Fisheries Service.

[FR Doc. 2012–9480 Filed 4–18–12; 8:45 am]

BILLING CODE 3510–22–P
The Honorable Julius Genachowski  
Chairman  
Federal Communications Commission  
445 12th Street SW  
Washington, DC 20554  

Dear Chairman Genachowski:

On behalf of the National Telecommunications and Information Administration (NTIA), I want to update you on our findings regarding the impacts of the proposed LightSquared deployment of terrestrial operations on Global Positioning System (GPS) services. Since I last wrote you in July 2011, federal agencies have performed a substantial amount of testing and analysis. Based on NTIA’s independent evaluation of the testing and analysis performed over the last several months, we conclude that LightSquared’s proposed mobile broadband network will impact GPS services and that there is no practical way to mitigate the potential interference at this time. Furthermore, while GPS equipment developers may be able to mitigate these issues via new technology in the future, the time and money required for federal, commercial, and private sector users to replace technology in the field and the marketplace, on aircraft, and in integrated national security systems cannot support the scheduled deployment of terrestrial services proposed by LightSquared.

Background

On January 26, 2011, the Federal Communications Commission (FCC) granted LightSquared a conditional waiver of the Ancillary Terrestrial Component (ATC) “integrated service” rule.¹ The waiver order required LightSquared to help organize and participate in a working group with the GPS community to study the potential for overload interference to GPS devices and to identify any measures necessary to prevent interference to GPS.² The waiver order also prohibited LightSquared from commencing commercial service until the working group process was complete and harmful interference concerns were resolved.³

On July 6, 2011, NTIA transmitted to the FCC a report of the National Space-Based Positioning, Navigation, and Timing Systems Engineering Forum (NPEF) on testing conducted in the first half of 2011.⁴ The test results demonstrated that LightSquared’s then-planned deployment of terrestrial operations posed a significant potential for harmful interference to GPS services. The July 6 transmittal further noted that LightSquared had proposed a modification to

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¹ LightSquared Subsidiary LLC; Request for Modification of its Authority for an Ancillary Terrestrial Component, SAT-MOD-2010118-00239; Call Sign: S2358, Order and Authorization (Waiver Order), 26 F.C.C. Rcd. 566 (2011).
² Waiver Order at para. 41.
³ Waiver Order at paras. 40, 43.
⁴ Letter from Lawrence E. Strickling, Assistant Secretary for Communications and Information, U.S. Department of Commerce, to Julius Genachowski, Chairman, Federal Communications Commission (July 6, 2011).
its planned deployment, which would require additional testing in order to better determine the impact on GPS services. Accordingly, NTIA recommended that the FCC "continue to withhold authorization for LightSquared to commence commercial operations until all the available test data can be analyzed and all valid concerns have been resolved."³

Thereafter, on September 9, 2011, NTIA requested the Executive Steering Group of the Interagency National Executive Committee for Spaced-Based Positioning, Navigation, and Timing (EXCOM) to work with LightSquared "to develop...a joint testing plan to validate data on the performance of cellular and personal/general navigation...GPS receivers in light of LightSquared’s modified proposal to confine its operations to the lower 10 MHz signal...of the Mobile-Satellite Service frequency band."⁴ In addition, NTIA noted that LightSquared was in separate discussions with the Federal Aviation Administration (FAA) regarding impacts to certified aviation GPS receivers and recommended "the FAA continue to work this issue directly with LightSquared."⁵

Over the past several months, the NPEF, on behalf of EXCOM, tested general/personal navigation GPS receivers. NTIA oversaw the testing of cellular GPS receivers to validate the measurements performed by the Technical Working Group (TWG). The FAA and LightSquared continued to analyze the potential impact to certified aviation GPS receivers. The EXCOM has now reported the results of the testing of general/personal navigation GPS receivers, the validation testing of the cellular GPS receivers has been completed, and the FAA has completed its analysis of certified aviation GPS receivers.⁶

By letter of January 13, 2012, EXCOM Co-Chairs Ashton Carter and John Porcaro reported the conclusion of the EXCOM agencies as follows:

It is the unanimous conclusion of the test findings by the National Spaced-Based PNT EXCOM Agencies that both LightSquared’s original and modified plans for its proposed mobile network would cause harmful interference to many GPS receivers. Additionally, an analysis by the Federal Aviation Administration (FAA) has concluded that the LightSquared proposals are not compatible with several GPS-dependent aircraft safety-of-flight systems. Based upon this testing and analysis, there appear to be no practical solutions or mitigations that would

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⁵ LightSquared’s original network included 10 MHz base station signals in the upper and lower segments of the 1525-1559 MHz mobile satellite service band. LightSquared has since proposed to limit their operation to the lower 10 MHz and a "stand still" in the upper 10 MHz for an unspecified period of time in an attempt to avoid many of the interference issues with GPS receivers. At this time the duration of such a "stand still" period has not been determined.
⁶ Id. at 1.
⁷ Letter from Lawrence E. Strickling, Assistant Secretary for Communications and Information, U.S. Department of Commerce, to William Lynn, Deputy Secretary, U.S. Department of Defense and John Porcari, Deputy Secretary, U.S. Department of Transportation (Sept. 9, 2011).
⁸ Id. at 2.
permit the LightSquared broadband service, as proposed, to operate in the next few months or years without significantly interfering with GPS. As a result, no additional testing is warranted at this time.10

Our summary and evaluation of the testing and analysis for each of the three categories of GPS receivers tested is as follows:

**Cellular GPS Receivers**

NTIA, with LightSquared, developed a plan to validate the TWG measurements of GPS receivers used in cellular devices.11 Two independent test laboratories performed the validation measurements of four devices previously tested by the TWG, along with three new devices.12 To measure the base station power level that caused GPS receiver degradation, the measurements followed industry-specified test procedures and performance metrics for cellular devices.13 The power levels measured in the validation testing were consistent with those measured earlier by the TWG.14

NTIA used the measured power levels, an equivalent isotropically radiated power (EIRP) level of 62 dBm, a representative base station antenna pattern, and base station deployment parameters (antenna height and down-tilt angle) to calculate distance separations necessary to preclude potential interference to GPS receivers used in cellular devices.15 Based on our analysis, we conclude that the lower 10 MHz base station signal does not significantly impact GPS receivers used in cellular devices.16

**Personal/General Navigation GPS Receivers**

The NPEF, on behalf of the EXCOM, worked with LightSquared to develop a plan for the validation measurements of personal/general navigation GPS receivers.17 The NPEF measured 92 personal/general navigation GPS receivers as compared to the earlier TWG tests of

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10 Letter from Ashton B. Carter, EXCOM Co-Chair, Deputy Secretary of Defense and John D. Porcari, EXCOM Co-Chair, Deputy Secretary of Transportation, to Lawrence E. Strickling, Assistant Secretary for Communications and Information (Jan. 13, 2012) (“EXCOM Letter”).
11 The test plan and the cellular devices tested were coordinated with the National Coordination Office for Space-Based Positioning, Navigation, and Timing. Greg Turetsky of SiRF Technology/CSR Group served as an independent observer for the testing of cellular devices.
12 The independent test laboratories for the cellular device testing were InterTek and ETS-Lindgren.
14 A total of 47 cellular devices were measured in the TWG and validation testing.
15 NTIA calculated the propagation losses in the cellular GPS receiver analysis using the free space model for separation distances of less than 1,000 meters and the NTIA Irregular Terrain Model for separation distances greater than 1,000 meters.
16 It is NTIA’s understanding that, in order to avoid self interference, GPS receivers used in cellular phones, typically employ a narrower bandwidth compared with other categories of receivers.
17 At the request of the NPEF, staff members from the Idaho National Laboratory served as independent observers for the testing of personal/general navigation GPS receivers. The NPEF also permitted LightSquared representatives and GPS receiver manufacturers to participate in the tests.
29 receivers. Because there are no industry-specified performance metrics for personal/general navigation GPS receivers, NTIA directed the NPEF to use a 1 dB reduction in the carrier-to-noise density to measure the base station power level that caused GPS receiver degradation. This is the protection criteria used by NTIA and the international community in managing the potential interference to terrestrial GPS receivers. NTIA believes the power levels measured by the NPEF are consistent with those measured by the TWG.

The NPEF concluded that 69 out of 92 of the devices tested were impacted by the lower 10 MHz base station signal at an EIRP of 62 dBm, a representative base station antenna pattern, an antenna height of 15 meters, and an antenna down-tilt angle of six degrees. Of this total, we discounted receivers believed to be outmoded or improperly categorized as personal/general navigation receivers. For example, we are not basing our conclusions on data collected from GPS receivers used for general aviation. Similarly, we are not relying on data from high-precision and timing GPS receivers because all parties have acknowledged that the proposed LightSquared network will have significant impacts on these receivers that need to be analyzed separately.

Using the maximum EIRP and deployment parameters for LightSquared’s network, NTIA concludes that the lower 10 MHz base station signal would impact currently deployed personal/general navigation GPS receivers. However, without detailed product/sales information that is only available from the manufacturers, NTIA cannot determine the likely impact of the lower 10 MHz base station signal on specific personal/general navigation GPS receivers being used today.

NTIA performed its own analysis of the NPEF test data to determine if there might be alternative EIRP, antenna height, and antenna down-tilt angle configurations of LightSquared’s network that would not cause interference to personal/general navigation GPS receivers. We determined that LightSquared could adjust its operating parameters to reduce the impacts on these GPS receivers on the ground to an acceptable level. However, LightSquared concluded that adopting these requirements for limiting the EIRP as a function of antenna height and down-

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18 The NPEF testing also included high-precision, timing, and general aviation GPS receivers.
19 NTIA September 2011 Letter at 3.
20 The interference protection criteria for terrestrial GPS receivers specified by the United States in international spectrum sharing standards is based on limiting the increase in system noise due to interference to 1 dB, which is consistent with a 1 dB degradation in the carrier-to-noise density. See Recommendation ITU-R M.1903, Characteristics and Protection Criteria for Receiving Earth Stations in the RNSS (Space-to-Earth) and Receivers in the ARNS Operating in the Band 1559-1610 MHz (January 2012). This recommendation contains interference protection criteria for various types of terrestrial GPS and other RNSS receivers.
21 The NPEF and TWG measurements for personal/general navigation GPS receivers can be used to analyze the impact of modifications to the base station EIRP or deployment parameters.
22 NTIA calculated the propagation losses in the personal/general navigation GPS receiver analysis using the free space model for separation distances of less than 1,000 meters and the NTIA Irregular Terrain Model for separation distances greater than 1,000 meters.
23 The general aviation GPS receivers were analyzed for a situation where the aircraft is on the ground.
24 Based on NTIA’s analysis, depending on the base station EIRP, deployment parameters, and measured interference level of the GPS receiver, the distance around a base station where personal/general navigation receivers can be impacted ranges from less than 100 meters to several kilometers.
25 For example, several of the personal/general navigation receivers that the NPEF measured are listed as discontinued on the manufacturer’s website. Discontinued GPS receivers may comprise a significant percentage of GPS receivers currently in use, particularly by the federal agencies.
tilt angle would render its network unable to deliver the necessary level of service absent a multi-billion dollar investment in additional base stations, which was financially impractical as well as an action that itself would add to the impacts on GPS receivers.

Accordingly, NTIA concludes that there is no practical way at this time to mitigate the interference that LightSquared’s proposed network would cause to personal/general navigation GPS receivers.  

**Aviation GPS Receivers**

During the last several months, the FAA has worked with LightSquared to analyze data related to LightSquared impacts to certified aviation receivers. This work focused on the protection of FAA-certified aviation receivers operating in accordance with international aviation standards at various altitudes and used during different phases of flight. Certified GPS aviation receivers support three main functions: navigation, surveillance (e.g., automatic dependent surveillance-broadcast or ADS-B), and terrain awareness and warning systems (TAWS). The FAA and LightSquared agreed to use the existing, internationally harmonized standard in the analysis assessing the potential impact to certified aviation GPS receivers.

The analysis examined the impact on certified aviation receivers used in high-altitude scenarios from multiple base stations. The analysis also considered the impact for low-altitude scenarios from multiple and single base station interactions. Based on the analysis, GPS receivers used for low-altitude aviation operations such as terrain awareness navigation and surveillance would not be compatible with a LightSquared base station operating at its maximum proposed EIRP taking into account transmitter and GPS receiver antenna patterns. Interference would occur when the GPS receiver is in the vicinity of a base station, or at lower altitudes in the presence of multiple base stations. The FAA concluded that the compatibility situation improves as the aircraft altitude increases so that at higher altitudes the interference is expected to be acceptable.

Although the FAA and LightSquared worked cooperatively to evaluate compatibility between the lower 10 MHz base station signal and GPS aviation receivers, they could not reach agreement on certain technical issues. In an attempt to address these compatibility issues, LightSquared proposed several mitigation measures. The FAA concluded that these proposals would result in the FAA’s accepting operational impacts, or replacing the avionics of all GPS equipped aircraft operating in compliance with approved and internationally harmonized aviation standards. Specifically, absent replacement receivers, LightSquared’s proposals would require constant, individualized monitoring and adjustment to over 40,000 sites nationwide to ensure

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26 The NPEF measurements also indicated that some personal/general navigation receivers were susceptible to LightSquared handset signals in the 1627.5-1656.7 MHz band. NTIA believes additional analysis is necessary to assess the impact of handsets on personal/general navigation receivers.

27 This analysis does not address non-certified GPS receivers used for general aviation.

28 The standards for aviation GPS receivers are defined in TSO-C145, TSO-C146, TSO-C161, and TSO-C196. These standards invoke industry standards developed through RTCA: RTCA/DO-229, RTCA/DO-253, and RTCA/DO-316.

29 The low-altitude scenarios are those associated with approach and landing operations to any airport or heliport.

30 This would include developing new receiver standards and replacing existing avionics with GPS equipment certified to those new standards.
consistency with air safety requirements. That FAA concluded, and we agree, that this is not a practical solution, particularly where safety of life is involved. Accordingly, NTIA does not believe that base stations can operate in the lower 10 MHz, as proposed, in the next few years, without impacting to some degree safety-critical GPS functionality.

High-Precision and Precision Timing Applications

In addition to the testing and analysis work described above, there have been developments with respect to high-precision and timing applications. All parties participating in the TWG agreed last summer that base station signals in the lower 10 MHz will cause unacceptable interference to GPS receivers used for high-precision and precision timing applications. During the past several months, LightSquared met with NTIA staff members to discuss progress toward development of filter solutions that mitigate the interference from the lower 10 MHz base station signal which LightSquared believes can be implemented without degrading the performance of high-precision and precision timing receivers. In my September 2011 letter to the Departments of Defense and Transportation, I stated that the federal agencies at some point would need to develop and execute a plan to test and analyze LightSquared's proposed interference mitigation solution. However, since LightSquared and the federal agencies have been unable to resolve the interference issues associated with personal/general navigation and aviation GPS receivers, there is no reason for federal agencies to undertake the expense and resource commitment to test high-precision and precision timing GPS receivers at this time.

Space-Based Receivers

In my September 2011 letter, I also highlighted a potential interference problem with current and future space-based GPS receivers operated by the National Aeronautics and Space Administration. The measurements and analysis performed by the TWG showed that current space-based GPS receivers are not impacted by the lower 10 MHz signal. However, the next generation of space-based GPS receivers will have wider front-end filter bandwidths and will be impacted by a signal in the lower 10 MHz.

GPS Receiver Standards

The EXCOM decided during its January 13 meeting that federal agencies will move forward this year to develop and establish new GPS spectrum interference standards that will help inform future proposals for non-space commercial uses in the bands adjacent to the GPS signals and ensure that any such proposals are implemented without affecting existing and evolving uses of space-based PNT services vital to economic, public safety, scientific, and national security needs. This task will require striking the right balance between interference caused by transmitters and performance of GPS receivers. There are currently no federal, FCC, or industry developed GPS receiver standards except for those international standards discussed above for certified aviation devices. Our analysis of the test measurements suggests that GPS

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31 EXCOM Letter.
32 Receiver standards can include limitations on the GPS receiver radio frequency bandwidth and/or specifications defining the radio frequency interference environment GPS receivers must tolerate (e.g., interference rejection levels).
receivers used in cellular devices and personal/general navigation GPS receivers can be designed to be compatible with the lower 10 MHz base station signal and deployed over time without disrupting user requirements. The work performed under the EXCOM will serve as the basis to protect such GPS receivers used by civilian and military federal agencies from outside interference, as well as the basis for standards for the development and procurement of GPS receivers to support their various mission requirements.

FAA standards, codified in international agreements, define the radio frequency interference environment used in the certification of GPS aviation receivers. Changing domestic and international aviation standards for compatible operation with signals in the lower 10 MHz may be possible, but will take many years, and retro-fitting or replacing the GPS receivers to be compliant with the new standards once they are adopted will take many more years. NTIA will request through the Department of Transportation that the FAA initiate an effort to examine what changes could be made to the existing standard to eventually make certified GPS aviation receivers compatible with a signal in the lower 10 MHz.

NTIA will work with federal agencies to review receiver requirements for federal systems, but that will not produce a solution for the majority of devices in the marketplace. Moreover, NTIA recognizes the importance that receiver standards could play as part of a forward-looking model for spectrum management even beyond the immediate issue of GPS. Accordingly, in parallel with our efforts with the federal agencies, NTIA urges the FCC, working with all stakeholders, to explore appropriate actions to mitigate against the impact GPS and other receivers may have to prevent the full utilization of spectrum to meet the nation’s broadband needs. We look forward to working with you on this important issue.

33 The effective date for the existing aviation standard is 2002.
Conclusion

The federal agencies and LightSquared have invested significant time and resources to identify and analyze proposed solutions to address the impact of LightSquared’s planned network implementations. Based on the testing and analyses conducted to date, as well as numerous discussions with LightSquared, it is clear that LightSquared’s proposed implementation plans, including operations in the lower 10 MHz would impact both general/personal navigation and certified aviation GPS receivers. We conclude at this time that there are no mitigation strategies that both solve the interference issues and provide LightSquared with an adequate commercial network deployment.

If you have any questions about our analysis, please do not hesitate to contact me or Karl Nebbia, NTIA Associate Administrator of the Office of Spectrum Management.

Sincerely,

[Signature]

Lawrence E. Strickling

Enclosures: EXCOM Letter
            Cellular Report
            NPEF Report
            FAA Report
The Government obtained a search warrant permitting it to install a Global-Positioning-System (GPS) tracking device on a vehicle registered to respondent Jones's wife. The warrant authorized installation in the District of Columbia and within 10 days, but agents installed the device on the 11th day and in Maryland. The Government then tracked the vehicle's movements for 28 days. It subsequently secured an indictment of Jones and others on drug trafficking conspiracy charges. The District Court suppressed the GPS data obtained while the vehicle was parked at Jones's residence, but held the remaining data admissible because Jones had no reasonable expectation of privacy when the vehicle was on public streets. Jones was convicted. The D. C. Circuit reversed, concluding that admission of the evidence obtained by warrantless use of the GPS device violated the Fourth Amendment.

Held: The Government's attachment of the GPS device to the vehicle, and its use of that device to monitor the vehicle's movements, constitutes a search under the Fourth Amendment. Pp. 3–12.

(a) The Fourth Amendment protects the "right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures." Here, the Government's physical intrusion on an "effect" for the purpose of obtaining information constitutes a "search." This type of encroachment on an area enumerated in the Amendment would have been considered a search within the meaning of the Amendment at the time it was adopted. Pp. 3–4.

(b) This conclusion is consistent with this Court's Fourth Amendment jurisprudence, which until the latter half of the 20th century was tied to common-law trespass. Later cases, which have deviated from that exclusively property-based approach, have applied the
Syllabus

Analysis of Justice Harlan’s concurrence in *Katz v. United States*, 389 U. S. 347, which said that the Fourth Amendment protects a person’s “reasonable expectation of privacy,” *id.*, at 360. Here, the Court need not address the Government’s contention that Jones had no “reasonable expectation of privacy,” because Jones’s Fourth Amendment rights do not rise or fall with the *Katz* formulation. At bottom, the Court must “assur[e] preservation of that degree of privacy against government that existed when the Fourth Amendment was adopted.” *Kyllo v. United States*, 533 U. S. 27, 34. *Katz* did not repudiate the understanding that the Fourth Amendment embodies a particular concern for government trespass upon the areas it enumerates. The *Katz* reasonable-expectation-of-privacy test has been added to, but not substituted for, the common-law trespassory test. See *Alderman v. United States*, 394 U. S. 165, 176; *Soldal v. Cook County*, 506 U. S. 56, 64. *United States v. Knotts*, 460 U. S. 276, and *United States v. Karo*, 468 U. S. 705—post-*Katz* cases rejecting Fourth Amendment challenges to “beepers,” electronic tracking devices representing another form of electronic monitoring—do not foreclose the conclusion that a search occurred here. *New York v. Class*, 475 U. S. 106, and *Oliver v. United States*, 466 U. S. 170, also do not support the Government’s position. Pp. 4–12.

(c) The Government’s alternative argument—that if the attachment and use of the device was a search, it was a reasonable one—is forfeited because it was not raised below. P. 12.

615 F. 3d 544, affirmed.

*Scalia, J.*, delivered the opinion of the Court, in which *ROBERTS*, C. J., and *KENNEDY*, *THOMAS*, and *SOTOMAYOR*, JJ., joined. *SOTOMAYOR*, J., filed a concurring opinion. *ALITO*, J., filed an opinion concurring in the judgment, in which *GINSBURG*, *BREYER*, and *KAGAN*, JJ., joined.
JUSTICE SCALIA delivered the opinion of the Court.

We decide whether the attachment of a Global-Positioning-System (GPS) tracking device to an individual’s vehicle, and subsequent use of that device to monitor the vehicle’s movements on public streets, constitutes a search or seizure within the meaning of the Fourth Amendment.

I

In 2004 respondent Antoine Jones, owner and operator of a nightclub in the District of Columbia, came under suspicion of trafficking in narcotics and was made the target of an investigation by a joint FBI and Metropolitan Police Department task force. Officers employed various investigative techniques, including visual surveillance of the nightclub, installation of a camera focused on the front door of the club, and a pen register and wiretap covering Jones’s cellular phone.

Based in part on information gathered from these sources, in 2005 the Government applied to the United States District Court for the District of Columbia for a warrant authorizing the use of an electronic tracking device on the Jeep Grand Cherokee registered to Jones’s
wife. A warrant issued, authorizing installation of the device in the District of Columbia and within 10 days.

On the 11th day, and not in the District of Columbia but in Maryland, agents installed a GPS tracking device on the undercarriage of the Jeep while it was parked in a public parking lot. Over the next 28 days, the Government used the device to track the vehicle’s movements, and once had to replace the device’s battery when the vehicle was parked in a different public lot in Maryland. By means of signals from multiple satellites, the device established the vehicle’s location within 50 to 100 feet, and communicated that location by cellular phone to a Government computer. It relayed more than 2,000 pages of data over the 4-week period.

The Government ultimately obtained a multiple-count indictment charging Jones and several alleged co-conspirators with, as relevant here, conspiracy to distribute and possess with intent to distribute five kilograms or more of cocaine and 50 grams or more of cocaine base, in violation of 21 U. S. C. §§841 and 846. Before trial, Jones filed a motion to suppress evidence obtained through the GPS device. The District Court granted the motion only in part, suppressing the data obtained while the vehicle was parked in the garage adjoining Jones’s residence. 451 F. Supp. 2d 71, 88 (2006). It held the remaining data admissible, because “‘[a] person traveling in an automobile on public thoroughfares has no reasonable expectation of privacy in his movements from one place to another.’” Ibid. (quoting United States v. Knotts, 460 U. S. 276, 281 (1983)). Jones’s trial in October 2006 produced a hung jury on the conspiracy count.

In March 2007, a grand jury returned another indict-

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1 In this litigation, the Government has conceded noncompliance with the warrant and has argued only that a warrant was not required. United States v. Maynard, 615 F. 3d 544, 566, n. (CADC 2010).
ment, charging Jones and others with the same conspiracy. The Government introduced at trial the same GPS-derived locational data admitted in the first trial, which connected Jones to the alleged conspirators’ stash house that contained $850,000 in cash, 97 kilograms of cocaine, and 1 kilogram of cocaine base. The jury returned a guilty verdict, and the District Court sentenced Jones to life imprisonment.


II
A

The Fourth Amendment provides in relevant part that “[t]he right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures, shall not be violated.” It is beyond dispute that a vehicle is an “effect” as that term is used in the Amendment. *United States v. Chadwick*, 433 U. S. 1, 12 (1977). We hold that the Government’s installation of a GPS device on a target’s vehicle, and its use of that device to monitor the vehicle’s movements, constitutes a “search.”

As we have noted, the Jeep was registered to Jones’s wife. The Government acknowledged, however, that Jones was “the exclusive driver.” *Id.*, at 555, n. (internal quotation marks omitted). If Jones was not the owner he had at least the property rights of a bailee. The Court of Appeals concluded that the vehicle’s registration did not affect his ability to make a Fourth Amendment objection, *ibid.*, and the Government has not challenged that determination here. We therefore do not consider the Fourth Amendment significance of Jones’s status.
Opinion of the Court

It is important to be clear about what occurred in this case: The Government physically occupied private property for the purpose of obtaining information. We have no doubt that such a physical intrusion would have been considered a “search” within the meaning of the Fourth Amendment when it was adopted. *Entick v. Carrington*, 95 Eng. Rep. 807 (C. P. 1765), is a “case we have described as a ‘monument of English freedom’ ‘undoubtedly familiar’ to ‘every American statesman’ at the time the Constitution was adopted, and considered to be ‘the true and ultimate expression of constitutional law’” with regard to search and seizure. *Brower v. County of Inyo*, 489 U. S. 593, 596 (1989) (quoting *Boyd v. United States*, 116 U. S. 616, 626 (1886)). In that case, Lord Camden expressed in plain terms the significance of property rights in search-and-seizure analysis:

“[O]ur law holds the property of every man so sacred, that no man can set his foot upon his neighbour’s close without his leave; if he does he is a trespasser, though he does no damage at all; if he will tread upon his neighbour’s ground, he must justify it by law.” *Entick*, supra, at 817.

The text of the Fourth Amendment reflects its close connection to property, since otherwise it would have referred simply to “the right of the people to be secure against unreasonable searches and seizures”; the phrase “in their persons, houses, papers, and effects” would have been superfluous.

Consistent with this understanding, our Fourth Amendment jurisprudence was tied to common-law trespass, at least until the latter half of the 20th century. *Kyllo v. United States*, 533 U. S. 27, 31 (2001); Kerr, The Fourth Amendment and New Technologies: Constitutional Myths and the Case for Caution, 102 Mich. L. Rev. 801, 816 (2004). Thus, in *Olmstead v. United States*, 277 U. S.
438 (1928), we held that wiretaps attached to telephone wires on the public streets did not constitute a Fourth Amendment search because “[t]here was no entry of the houses or offices of the defendants,” id., at 464.

Our later cases, of course, have deviated from that exclusively property-based approach. In *Katz v. United States*, 389 U. S. 347, 351 (1967), we said that “the Fourth Amendment protects people, not places,” and found a violation in attachment of an eavesdropping device to a public telephone booth. Our later cases have applied the analysis of Justice Harlan’s concurrence in that case, which said that a violation occurs when government officers violate a person’s “reasonable expectation of privacy,” id., at 360. See, e.g., *Bond v. United States*, 529 U. S. 334 (2000); *California v. Ciraolo*, 476 U. S. 207 (1986); *Smith v. Maryland*, 442 U. S. 735 (1979).

The Government contends that the Harlan standard shows that no search occurred here, since Jones had no “reasonable expectation of privacy” in the area of the Jeep accessed by Government agents (its underbody) and in the locations of the Jeep on the public roads, which were visible to all. But we need not address the Government’s contentions, because Jones’s Fourth Amendment rights do not rise or fall with the *Katz* formulation. At bottom, we must “assur[e] preservation of that degree of privacy against government that existed when the Fourth Amendment was adopted.” *Kyllo*, supra, at 34. As explained, for most of our history the Fourth Amendment was understood to embody a particular concern for government trespass upon the areas (“persons, houses, papers, and effects”) it enumerates. *Katz* did not repudiate

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3JUSTICE ALITO’s concurrence (hereinafter concurrence) doubts the wisdom of our approach because “it is almost impossible to think of late-18th-century situations that are analogous to what took place in this case.” *Post*, at 3 (opinion concurring in judgment). But in fact it posits a situation that is not far afield—a constable’s concealing himself
that understanding. Less than two years later the Court upheld defendants’ contention that the Government could not introduce against them conversations between other people obtained by warrantless placement of electronic surveillance devices in their homes. The opinion rejected the dissent’s contention that there was no Fourth Amendment violation “unless the conversational privacy of the homeowner himself is invaded.”4 Alderman v. United States, 394 U. S. 165, 176 (1969). “[W]e [do not] believe that Katz, by holding that the Fourth Amendment protects persons and their private conversations, was intended to withdraw any of the protection which the Amendment extends to the home . . . .” Id., at 180.

More recently, in Soldal v. Cook County, 506 U. S. 56 (1992), the Court unanimously rejected the argument that although a “seizure” had occurred “in a ‘technical’ sense” when a trailer home was forcibly removed, id., at 62, no Fourth Amendment violation occurred because law enforcement had not “invade[d] the [individuals’] privacy,” id., at 60. Katz, the Court explained, established that “property rights are not the sole measure of Fourth

in the target’s coach in order to track its movements. Ibid. There is no doubt that the information gained by that trespassory activity would be the product of an unlawful search—whether that information consisted of the conversations occurring in the coach, or of the destinations to which the coach traveled.

In any case, it is quite irrelevant whether there was an 18th-century analog. Whatever new methods of investigation may be devised, our task, at a minimum, is to decide whether the action in question would have constituted a “search” within the original meaning of the Fourth Amendment. Where, as here, the Government obtains information by physically intruding on a constitutionally protected area, such a search has undoubtedly occurred.

4Thus, the concurrence’s attempt to recast Alderman as meaning that individuals have a “legitimate expectation of privacy in all conversations that [take] place under their roof,” post, at 6–7, is foreclosed by the Court’s opinion. The Court took as a given that the homeowner’s “conversational privacy” had not been violated.
Amendment violations,” but did not “snuff[f] out the previously recognized protection for property.” 506 U. S., at 64. As Justice Brennan explained in his concurrence in Knotts, Katz did not erode the principle “that, when the Government does engage in physical intrusion of a constitutionally protected area in order to obtain information, that intrusion may constitute a violation of the Fourth Amendment.” 460 U. S., at 286 (opinion concurring in judgment). We have embodied that preservation of past rights in our very definition of “reasonable expectation of privacy” which we have said to be an expectation “that has a source outside of the Fourth Amendment, either by reference to concepts of real or personal property law or to understandings that are recognized and permitted by society.” Minnesota v. Carter, 525 U. S. 83, 88 (1998) (internal quotation marks omitted). Katz did not narrow the Fourth Amendment’s scope.5

The Government contends that several of our post-Katz cases foreclose the conclusion that what occurred here constituted a search. It relies principally on two cases in

5The concurrence notes that post-Katz we have explained that “an actual trespass is neither necessary nor sufficient to establish a constitutional violation.” Post, at 6 (quoting United States v. Karo, 468 U. S. 705, 713 (1984)). That is undoubtedly true, and undoubtedly irrelevant. Karo was considering whether a seizure occurred, and as the concurrence explains, a seizure of property occurs, not when there is a trespass, but “when there is some meaningful interference with an individual’s possessory interests in that property.” Post, at 2 (internal quotation marks omitted). Likewise with a search. Trespass alone does not qualify, but there must be conjoined with that what was present here: an attempt to find something or to obtain information.

Related to this, and similarly irrelevant, is the concurrence’s point that, if analyzed separately, neither the installation of the device nor its use would constitute a Fourth Amendment search. See ibid. Of course not. A trespass on “houses” or “effects,” or a Katz invasion of privacy, is not alone a search unless it is done to obtain information; and the obtaining of information is not alone a search unless it is achieved by such a trespass or invasion of privacy.
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which we rejected Fourth Amendment challenges to “beepers,” electronic tracking devices that represent another form of electronic monitoring. The first case, *Knotts*, upheld against Fourth Amendment challenge the use of a “beeper” that had been placed in a container of chloroform, allowing law enforcement to monitor the location of the container. 460 U. S., at 278. We said that there had been no infringement of Knotts’ reasonable expectation of privacy since the information obtained—the location of the automobile carrying the container on public roads, and the location of the off-loaded container in open fields near Knotts’ cabin—had been voluntarily conveyed to the public.6 Id., at 281–282. But as we have discussed, the *Katz* reasonable-expectation-of-privacy test has been added to, not substituted for, the common-law trespassory test. The holding in *Knotts* addressed only the former, since the latter was not at issue. The beeper had been placed in the container before it came into Knotts’ possession, with the consent of the then-owner. 460 U. S., at 278. Knotts did not challenge that installation, and we specifically declined to consider its effect on the Fourth Amendment analysis. Id., at 279, n. *Knotts* would be relevant, perhaps, if the Government were making the argument that what would otherwise be an unconstitutional search is not such where it produces only public information. The Government does not make that argument, and we know of no case that would support it.

The second “beeper” case, *United States v. Karo*, 468 U. S. 705 (1984), does not suggest a different conclusion. There we addressed the question left open by *Knotts*, whether the installation of a beeper in a container

6 *Knotts* noted the “limited use which the government made of the signals from this particular beeper,” 460 U. S., at 284; and reserved the question whether “different constitutional principles may be applicable” to “dragnet-type law enforcement practices” of the type that GPS tracking made possible here, ibid.
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amounted to a search or seizure. 468 U. S., at 713. As in
*Knotts*, at the time the beeper was installed the container
belonged to a third party, and it did not come into possess-
ion of the defendant until later. 468 U. S., at 708. Thus,
the specific question we considered was whether the in-
stallation “with the consent of the original owner consti-
tute[d] a search or seizure. . . . when the container is deliv-
ered to a buyer having no knowledge of the presence of the
beeper.” *Id.*, at 707 (emphasis added). We held not. The
Government, we said, came into physical contact with
the container only before it belonged to the defendant Karo;
and the transfer of the container with the unmonitored
beeper inside did not convey any information and thus did
not invade Karo’s privacy. See *id.*, at 712. That conclu-
sion is perfectly consistent with the one we reach here.
Karo accepted the container as it came to him, beeper and
all, and was therefore not entitled to object to the beeper’s
presence, even though it was used to monitor the contain-
er’s location. Cf. *On Lee v. United States*, 343 U. S. 747,
751–752 (1952) (no search or seizure where an informant,
who was wearing a concealed microphone, was invited into
the defendant’s business). Jones, who possessed the Jeep
at the time the Government trespassorily inserted the
information-gathering device, is on much different footing.

The Government also points to our exposition in *New
York v. Class*, 475 U. S. 106 (1986), that “[t]he exterior of
a car . . . is thrust into the public eye, and thus to examine
it does not constitute a ‘search.’” *Id.*, at 114. That state-
ment is of marginal relevance here since, as the Govern-
ment acknowledges, “the officers in this case did more
than conduct a visual inspection of respondent’s vehicle,”
Brief for United States 41 (emphasis added). By attaching
the device to the Jeep, officers encroached on a protected
area. In *Class* itself we suggested that this would make a
difference, for we concluded that an officer’s momentary
reaching into the interior of a vehicle did constitute a
Opinion of the Court

Finally, the Government’s position gains little support from our conclusion in *Oliver v. United States*, 466 U. S. 170 (1984), that officers’ information-gathering intrusion on an “open field” did not constitute a Fourth Amendment search even though it was a trespass at common law, id., at 183. Quite simply, an open field, unlike the curtilage of a home, see *United States v. Dunn*, 480 U. S. 294, 300 (1987), is not one of those protected areas enumerated in the Fourth Amendment. *Oliver, supra*, at 176–177. See also *Hester v. United States*, 265 U. S. 57, 59 (1924). The Government’s physical intrusion on such an area—unlike its intrusion on the “effect” at issue here—is of no Fourth Amendment significance.8

The concurrence begins by accusing us of applying “18th-century tort law.” *Post*, at 1. That is a distortion. What we apply is an 18th-century guarantee against unreasonable searches, which we believe must provide at

7 The Government also points to *Cardwell v. Lewis*, 417 U. S. 583 (1974), in which the Court rejected the claim that the inspection of an impounded vehicle’s tire tread and the collection of paint scrapings from its exterior violated the Fourth Amendment. Whether the plurality said so because no search occurred or because the search was reasonable is unclear. Compare id., at 591 (opinion of Blackmun, J.) (“[W]e fail to comprehend what expectation of privacy was infringed”), with id., at 592 (“Under circumstances such as these, where probable cause exists, a warrantless examination of the exterior of a car is not unreasonable . . .”).

8 Thus, our theory is not that the Fourth Amendment is concerned with “any technical trespass that led to the gathering of evidence.” *Post*, at 3 (ALITO, J., concurring in judgment) (emphasis added). The Fourth Amendment protects against trespassory searches only with regard to those items (“persons, houses, papers, and effects”) that it enumerates. The trespass that occurred in *Oliver* may properly be understood as a “search,” but not one “in the constitutional sense.” 466 U. S., at 170, 183.
a minimum the degree of protection it afforded when it was adopted. The concurrence does not share that belief. It would apply exclusively Katz’s reasonable-expectation-of-privacy test, even when that eliminates rights that previously existed.

The concurrence faults our approach for “present[ing] particularly vexing problems” in cases that do not involve physical contact, such as those that involve the transmission of electronic signals. Post, at 9. We entirely fail to understand that point. For unlike the concurrence, which would make Katz the exclusive test, we do not make trespass the exclusive test. Situations involving merely the transmission of electronic signals without trespass would remain subject to Katz analysis.

In fact, it is the concurrence’s insistence on the exclusivity of the Katz test that needlessly leads us into “particularly vexing problems” in the present case. This Court has to date not deviated from the understanding that mere visual observation does not constitute a search. See Kyllo, 533 U.S., at 31–32. We accordingly held in Knotts that “[a] person traveling in an automobile on public thoroughfares has no reasonable expectation of privacy in his movements from one place to another.” 460 U.S., at 281. Thus, even assuming that the concurrence is correct to say that “[t]raditional surveillance” of Jones for a 4-week period “would have required a large team of agents, multiple vehicles, and perhaps aerial assistance,” post, at 12, our cases suggest that such visual observation is constitutionally permissible. It may be that achieving the same result through electronic means, without an accompanying trespass, is an unconstitutional invasion of privacy, but the present case does not require us to answer that question.

And answering it affirmatively leads us needlessly into additional thorny problems. The concurrence posits that “relatively short-term monitoring of a person’s movements
on public streets” is okay, but that “the use of longer term GPS monitoring in investigations of most offenses” is no good. Post, at 13 (emphasis added). That introduces yet another novelty into our jurisprudence. There is no precedent for the proposition that whether a search has occurred depends on the nature of the crime being investigated. And even accepting that novelty, it remains unexplained why a 4-week investigation is “surely” too long and why a drug-trafficking conspiracy involving substantial amounts of cash and narcotics is not an “extraordinary offense” which may permit longer observation. See post, at 13–14. What of a 2-day monitoring of a suspected purveyor of stolen electronics? Or of a 6-month monitoring of a suspected terrorist? We may have to grapple with these “vexing problems” in some future case where a classic trespassory search is not involved and resort must be had to Katz analysis; but there is no reason for rushing forward to resolve them here.

III

The Government argues in the alternative that even if the attachment and use of the device was a search, it was reasonable—and thus lawful—under the Fourth Amendment because “officers had reasonable suspicion, and indeed probable cause, to believe that [Jones] was a leader in a large-scale cocaine distribution conspiracy.” Brief for United States 50–51. We have no occasion to consider this argument. The Government did not raise it below, and the D. C. Circuit therefore did not address it. See 625 F. 3d, at 767 (Ginsburg, Tatel, and Griffith, JJ., concurring in denial of rehearing en banc). We consider the argument forfeited. See Sprietsma v. Mercury Marine, 537 U. S. 51, 56, n. 4 (2002).

*   *   *

The judgment of the Court of Appeals for the D. C. Circuit is affirmed.

It is so ordered.
SOTOMAYOR, J., concurring.

SUPREME COURT OF THE UNITED STATES

No. 10–1259

UNITED STATES, PETITIONER v. ANTOINE JONES

ON WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE DISTRICT OF COLUMBIA CIRCUIT

[January 23, 2012]

JUSTICE SOTOMAYOR, concurring.

I join the Court’s opinion because I agree that a search within the meaning of the Fourth Amendment occurs, at a minimum, “[w]here, as here, the Government obtains information by physically intruding on a constitutionally protected area.” Ante, at 6, n. 3. In this case, the Government installed a Global Positioning System (GPS) tracking device on respondent Antoine Jones’ Jeep without a valid warrant and without Jones’ consent, then used that device to monitor the Jeep’s movements over the course of four weeks. The Government usurped Jones’ property for the purpose of conducting surveillance on him, thereby invading privacy interests long afforded, and undoubtedly entitled to, Fourth Amendment protection. See, e.g., Silverman v. United States, 365 U. S. 505, 511–512 (1961).

Of course, the Fourth Amendment is not concerned only with trespassory intrusions on property. See, e.g., Kyllo v. United States, 533 U. S. 27, 31–33 (2001). Rather, even in the absence of a trespass, “a Fourth Amendment search occurs when the government violates a subjective expectation of privacy that society recognizes as reasonable.” Id., at 33; see also Smith v. Maryland, 442 U. S. 735, 740–741 (1979); Katz v. United States, 389 U. S. 347, 361 (1967) (Harlan, J., concurring). In Katz, this Court enlarged its then-prevailing focus on property rights by announcing...
SOTOMAYOR, J., concurring

that the reach of the Fourth Amendment does not “turn upon the presence or absence of a physical intrusion.” Id., at 353. As the majority’s opinion makes clear, however, Katz’s reasonable-expectation-of-privacy test augmented, but did not displace or diminish, the common-law trespassory test that preceded it. Ante, at 8. Thus, “when the Government does engage in physical intrusion of a constitutionally protected area in order to obtain information, that intrusion may constitute a violation of the Fourth Amendment.” United States v. Knotts, 460 U. S. 276, 286 (1983) (Brennan, J., concurring in judgment); see also, e.g., Rakas v. Illinois, 439 U. S. 128, 144, n. 12 (1978). JUSTICE ALITO’s approach, which discounts altogether the constitutional relevance of the Government’s physical intrusion on Jones’ Jeep, erodes that longstanding protection for privacy expectations inherent in items of property that people possess or control. See post, at 5–7 (opinion concurring in judgment). By contrast, the trespassory test applied in the majority’s opinion reflects an irreducible constitutional minimum: When the Government physically invades personal property to gather information, a search occurs. The reaffirmation of that principle suffices to decide this case.

Nonetheless, as JUSTICE ALITO notes, physical intrusion is now unnecessary to many forms of surveillance. Post, at 9–12. With increasing regularity, the Government will be capable of duplicating the monitoring undertaken in this case by enlisting factory- or owner-installed vehicle tracking devices or GPS-enabled smartphones. See United States v. Pineda-Moreno, 617 F. 3d 1120, 1125 (CA9 2010) (Kozinski, C. J., dissenting from denial of rehearing en banc). In cases of electronic or other novel modes of surveillance that do not depend upon a physical invasion on property, the majority opinion’s trespassory test may provide little guidance. But “[s]ituations involving merely the transmission of electronic signals without trespass
SOTOMAYOR, J., concurring

would remain subject to Katz analysis.” Ante, at 11. As JUSTICE ALITO incisively observes, the same technological advances that have made possible nontrespassory surveillance techniques will also affect the Katz test by shaping the evolution of societal privacy expectations. Post, at 10–11. Under that rubric, I agree with JUSTICE ALITO that, at the very least, “longer term GPS monitoring in investigations of most offenses impinges on expectations of privacy.” Post, at 13.

In cases involving even short-term monitoring, some unique attributes of GPS surveillance relevant to the Katz analysis will require particular attention. GPS monitoring generates a precise, comprehensive record of a person’s public movements that reflects a wealth of detail about her familial, political, professional, religious, and sexual associations. See, e.g., People v. Weaver, 12 N. Y. 3d 433, 441–442, 909 N. E. 2d 1195, 1199 (2009) (“Disclosed in [GPS] data . . . will be trips the indisputably private nature of which takes little imagination to conjure: trips to the psychiatrist, the plastic surgeon, the abortion clinic, the AIDS treatment center, the strip club, the criminal defense attorney, the by-the-hour motel, the union meeting, the mosque, synagogue or church, the gay bar and on and on”). The Government can store such records and efficiently mine them for information years into the future. Pineda-Moreno, 617 F. 3d, at 1124 (opinion of Kozinski, C. J.). And because GPS monitoring is cheap in comparison to conventional surveillance techniques and, by design, proceeds surreptitiously, it evades the ordinary checks that constrain abusive law enforcement practices: “limited police resources and community hostility.” Illinois v. Lidster, 540 U. S. 419, 426 (2004).

Awareness that the Government may be watching chills associational and expressive freedoms. And the Government’s unrestrained power to assemble data that reveal private aspects of identity is susceptible to abuse. The net
result is that GPS monitoring—by making available at a relatively low cost such a substantial quantum of intimate information about any person whom the Government, in its unfettered discretion, chooses to track—may “alter the relationship between citizen and government in a way that is inimical to democratic society.” United States v. Cuevas-Perez, 640 F. 3d 272, 285 (CA7 2011) (Flaum, J., concurring).

I would take these attributes of GPS monitoring into account when considering the existence of a reasonable societal expectation of privacy in the sum of one’s public movements. I would ask whether people reasonably expect that their movements will be recorded and aggregated in a manner that enables the Government to ascertain, more or less at will, their political and religious beliefs, sexual habits, and so on. I do not regard as dispositive the fact that the Government might obtain the fruits of GPS monitoring through lawful conventional surveillance techniques. See Kyllo, 533 U. S., at 35, n. 2; ante, at 11 (leaving open the possibility that duplicating traditional surveillance “through electronic means, without an accompanying trespass, is an unconstitutional invasion of privacy”). I would also consider the appropriateness of entrusting to the Executive, in the absence of any oversight from a coordinate branch, a tool so amenable to misuse, especially in light of the Fourth Amendment’s goal to curb arbitrary exercises of police power to and prevent “a too permeating police surveillance,” United States v. Di Re, 332 U. S. 581, 595 (1948).*

*United States v. Knotts, 460 U. S. 276 (1983), does not foreclose the conclusion that GPS monitoring, in the absence of a physical intrusion, is a Fourth Amendment search. As the majority’s opinion notes, Knotts reserved the question whether “‘different constitutional principles may be applicable’” to invasive law enforcement practices such as GPS tracking. See ante, at 8, n. 6 (quoting 460 U. S., at 284).

United States v. Karo, 468 U. S. 705 (1984), addressed the Fourth
SOTOMAYOR, J., concurring

More fundamentally, it may be necessary to reconsider the premise that an individual has no reasonable expectation of privacy in information voluntarily disclosed to third parties. E.g., Smith, 442 U. S., at 742; United States v. Miller, 425 U. S. 435, 443 (1976). This approach is ill suited to the digital age, in which people reveal a great deal of information about themselves to third parties in the course of carrying out mundane tasks. People disclose the phone numbers that they dial or text to their cellular providers; the URLs that they visit and the e-mail addresses with which they correspond to their Internet service providers; and the books, groceries, and medications they purchase to online retailers. Perhaps, as JUSTICE ALITO notes, some people may find the “tradeoff” of privacy for convenience “worthwhile,” or come to accept this “diminution of privacy” as “inevitable,” post, at 10, and perhaps not. I for one doubt that people would accept without complaint the warrantless disclosure to the Government of a list of every Web site they had visited in the last week, or month, or year. But whatever the societal expectations, they can attain constitutionally protected status only if our Fourth Amendment jurisprudence ceases

Amendment implications of the installation of a beeper in a container with the consent of the container's original owner, who was aware that the beeper would be used for surveillance purposes. Id., at 707. Owners of GPS-equipped cars and smartphones do not contemplate that these devices will be used to enable covert surveillance of their movements. To the contrary, subscribers of one such service greeted a similar suggestion with anger. Quain, Changes to OnStar's Privacy Terms Rile Some Users, N. Y. Times (Sept. 22, 2011), online at http://wheels.blogs.nytimes.com/2011/09/22/changes-to-onstars-privacy-terms-rile-some-users (as visited Jan. 19, 2012, and available in Clerk of Court’s case file). In addition, the bugged container in Karo lacked the close relationship with the target that a car shares with its owner. The bugged container in Karo was stationary for much of the Government's surveillance. See 468 U. S., at 708–710. A car's movements, by contrast, are its owner's movements.
to treat secrecy as a prerequisite for privacy. I would not assume that all information voluntarily disclosed to some member of the public for a limited purpose is, for that reason alone, disentitled to Fourth Amendment protection. See *Smith*, 442 U. S., at 749 (Marshall, J., dissenting) ("Privacy is not a discrete commodity, possessed absolutely or not at all. Those who disclose certain facts to a bank or phone company for a limited business purpose need not assume that this information will be released to other persons for other purposes"); see also *Katz*, 389 U. S., at 351–352 ("[W]hat [a person] seeks to preserve as private, even in an area accessible to the public, may be constitutionally protected").

Resolution of these difficult questions in this case is unnecessary, however, because the Government’s physical intrusion on Jones’ Jeep supplies a narrower basis for decision. I therefore join the majority’s opinion.
SUPREME COURT OF THE UNITED STATES

No. 10–1259

UNITED STATES, PETITIONER v. ANTOINE JONES

ON WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE DISTRICT OF COLUMBIA CIRCUIT

[January 23, 2012]

JUSTICE ALITO, with whom JUSTICE GINSBURG, JUSTICE BREYER, and JUSTICE KAGAN join, concurring in the judgment.

This case requires us to apply the Fourth Amendment’s prohibition of unreasonable searches and seizures to a 21st-century surveillance technique, the use of a Global Positioning System (GPS) device to monitor a vehicle’s movements for an extended period of time. Ironically, the Court has chosen to decide this case based on 18th-century tort law. By attaching a small GPS device1 to the underside of the vehicle that respondent drove, the law enforcement officers in this case engaged in conduct that might have provided grounds in 1791 for a suit for trespass to chattels.2 And for this reason, the Court concludes, the installation and use of the GPS device constituted a search. Ante, at 3–4.

1Although the record does not reveal the size or weight of the device used in this case, there is now a device in use that weighs two ounces and is the size of a credit card. Tr. of Oral Arg. 27.

2At common law, a suit for trespass to chattels could be maintained if there was a violation of “the dignitary interest in the inviolability of chattels,” but today there must be “some actual damage to the chattel before the action can be maintained.” W. Keeton, D. Dobbs, R. Keeton, & D. Owen, Prosser & Keeton on Law of Torts 87 (5th ed. 1984) (hereinafter Prosser & Keeton). Here, there was no actual damage to the vehicle to which the GPS device was attached.
ALITO, J., concurring in judgment

This holding, in my judgment, is unwise. It strains the language of the Fourth Amendment; it has little if any support in current Fourth Amendment case law; and it is highly artificial.

I would analyze the question presented in this case by asking whether respondent's reasonable expectations of privacy were violated by the long-term monitoring of the movements of the vehicle he drove.

I

A

The Fourth Amendment prohibits “unreasonable searches and seizures,” and the Court makes very little effort to explain how the attachment or use of the GPS device fits within these terms. The Court does not contend that there was a seizure. A seizure of property occurs when there is “some meaningful interference with an individual's possessory interests in that property,” United States v. Jacobsen, 466 U. S. 109, 113 (1984), and here there was none. Indeed, the success of the surveillance technique that the officers employed was dependent on the fact that the GPS did not interfere in any way with the operation of the vehicle, for if any such interference had been detected, the device might have been discovered.

The Court does claim that the installation and use of the GPS constituted a search, see ante, at 3–4, but this conclusion is dependent on the questionable proposition that these two procedures cannot be separated for purposes of Fourth Amendment analysis. If these two procedures are analyzed separately, it is not at all clear from the Court's opinion why either should be regarded as a search. It is clear that the attachment of the GPS device was not itself a search; if the device had not functioned or if the officers had not used it, no information would have been obtained. And the Court does not contend that the use of the device constituted a search either. On the contrary, the Court
ALITO, J., concurring in judgment

accepts the holding in United States v. Knotts, 460 U. S. 276 (1983), that the use of a surreptitiously planted electronic device to monitor a vehicle’s movements on public roads did not amount to a search. See ante, at 7.

The Court argues—and I agree—that “we must ‘assur[e] preservation of that degree of privacy against government that existed when the Fourth Amendment was adopted.’” Ante, at 5 (quoting Kyllo v. United States, 533 U. S. 27, 34 (2001)). But it is almost impossible to think of late-18th-century situations that are analogous to what took place in this case. (Is it possible to imagine a case in which a constable secreted himself somewhere in a coach and remained there for a period of time in order to monitor the movements of the coach’s owner?) The Court’s theory seems to be that the concept of a search, as originally understood, comprehended any technical trespass that led to the gathering of evidence, but we know that this is incorrect. At common law, any unauthorized intrusion on private property was actionable, see Prosser & Keeton 75, but a trespass on open fields, as opposed to the “curtilage” of a home, does not fall within the scope of the Fourth Amendment because private property outside the curtilage is not part of a “hous[e]” within the meaning of the Fourth Amendment. See Oliver v. United States, 466 U. S. 170 (1984); Hester v. United States, 265 U. S. 57 (1924).

B

The Court’s reasoning in this case is very similar to that in the Court’s early decisions involving wiretapping and electronic eavesdropping, namely, that a technical trespass followed by the gathering of evidence constitutes a

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3 The Court suggests that something like this might have occurred in 1791, but this would have required either a gigantic coach, a very tiny constable, or both—not to mention a constable with incredible fortitude and patience.
search. In the early electronic surveillance cases, the Court concluded that a Fourth Amendment search occurred when private conversations were monitored as a result of an “unauthorized physical penetration into the premises occupied” by the defendant. Silverman v. United States, 365 U. S. 505, 509 (1961). In Silverman, police officers listened to conversations in an attached home by inserting a “spike mike” through the wall that this house shared with the vacant house next door. Id., at 506. This procedure was held to be a search because the mike made contact with a heating duct on the other side of the wall and thus “usurp[ed] . . . an integral part of the premises.” Id., at 511.

By contrast, in cases in which there was no trespass, it was held that there was no search. Thus, in Olmstead v. United States, 277 U. S. 438 (1928), the Court found that the Fourth Amendment did not apply because “[t]he taps from house lines were made in the streets near the houses.” Id., at 457. Similarly, the Court concluded that no search occurred in Goldman v. United States, 316 U. S. 129, 135 (1942), where a “detectaphone” was placed on the outer wall of defendant’s office for the purpose of overhearing conversations held within the room.

This trespass-based rule was repeatedly criticized. In Olmstead, Justice Brandeis wrote that it was “immaterial where the physical connection with the telephone wires was made.” 277 U. S., at 479 (dissenting opinion). Although a private conversation transmitted by wire did not fall within the literal words of the Fourth Amendment, he argued, the Amendment should be understood as prohibiting “every unjustifiable intrusion by the government upon the privacy of the individual.” Id., at 478. See also, e.g., Silverman, supra, at 513 (Douglas, J., concurring) (“The concept of ‘an unauthorized physical penetration into the premises,’ on which the present decision rests seems to me beside the point. Was not the wrong . . . done when the
intimacies of the home were tapped, recorded, or revealed? The depth of the penetration of the electronic device—even the degree of its remoteness from the inside of the house—is not the measure of the injury”); Goldman, supra, at 139 (Murphy, J., dissenting) (“[T]he search of one’s home or office no longer requires physical entry, for science has brought forth far more effective devices for the invasion of a person’s privacy than the direct and obvious methods of oppression which were detested by our forebears and which inspired the Fourth Amendment”).

Katz v. United States, 389 U. S. 347 (1967), finally did away with the old approach, holding that a trespass was not required for a Fourth Amendment violation. Katz involved the use of a listening device that was attached to the outside of a public telephone booth and that allowed police officers to eavesdrop on one end of the target’s phone conversation. This procedure did not physically intrude on the area occupied by the target, but the Katz Court, “repudiate[ed]” the old doctrine, Rakas v. Illinois, 439 U. S. 128, 143 (1978), and held that “[t]he fact that the electronic device employed . . . did not happen to penetrate the wall of the booth can have no constitutional significance,” 389 U. S., at 353 (“[T]he reach of th[e] [Fourth] Amendment cannot turn upon the presence or absence of a physical intrusion into any given enclosure”); see Rakas, supra, at 143 (describing Katz as holding that the “capacity to claim the protection for the Fourth Amendment depends not upon a property right in the invaded place but upon whether the person who claims the protection of the Amendment has a legitimate expectation of privacy in the invaded place”); Kyllo, supra, at 32 (“We have since decoupled violation of a person’s Fourth Amendment rights from trespassory violation of his property”). What mattered, the Court now held, was whether the conduct at issue “violated the privacy upon which [the defendant] justifiably relied while using the telephone booth.” Katz, supra,
at 353.


“The existence of a property right is but one element in determining whether expectations of privacy are legitimate. ‘The premise that property interests control the right of the Government to search and seize has been discredited.’ Katz, 389 U. S., at 353, (quot-ing Warden v. Hayden, 387 U. S. 294, 304 (1967); some internal quotation marks omitted).” 466 U. S., at 183.

II

The majority suggests that two post-Katz decisions—Soldal v. Cook County, 506 U. S. 56 (1992), and Alderman v. United States, 394 U. S. 165 (1969)—show that a technical trespass is sufficient to establish the existence of a search, but they provide little support.

In Soldal, the Court held that towing away a trailer home without the owner’s consent constituted a seizure even if this did not invade the occupants’ personal privacy. But in the present case, the Court does not find that there was a seizure, and it is clear that none occurred.

In Alderman, the Court held that the Fourth Amendment rights of homeowners were implicated by the use of a surreptitiously planted listening device to monitor third-party conversations that occurred within their home. See 394 U. S., at 176–180. Alderman is best understood to
mean that the homeowners had a legitimate expectation of privacy in all conversations that took place under their roof. See *Rakas*, 439 U. S., at 144, n. 12 (citing *Alderman* for the proposition that “the Court has not altogether abandoned use of property concepts in determining the presence or absence of the privacy interests protected by that Amendment”); 439 U. S., at 153 (Powell, J., concurring) (citing *Alderman* for the proposition that “property rights reflect society’s explicit recognition of a person’s authority to act as he wishes in certain areas, and therefore should be considered in determining whether an individual’s expectations of privacy are reasonable); *Karo*, *supra*, at 732 (Stevens, J., concurring in part and dissenting in part) (citing *Alderman* in support of the proposition that “a homeowner has a reasonable expectation of privacy in the contents of his home, including items owned by others”).

In sum, the majority is hard pressed to find support in post-*Katz* cases for its trespass-based theory.

III

Disharmony with a substantial body of existing case law is only one of the problems with the Court’s approach in this case.

I will briefly note four others. First, the Court’s reasoning largely disregards what is really important (the use of a GPS for the purpose of long-term tracking) and instead attaches great significance to something that most would view as relatively minor (attaching to the bottom of a car a small, light object that does not interfere in any way with the car’s operation). Attaching such an object is generally regarded as so trivial that it does not provide a basis for recovery under modern tort law. See Prosser & Keeton §14, at 87 (harmless or trivial contact with personal property not actionable); D. Dobbs, Law of Torts 124 (2000) (same). But under the Court’s reasoning, this conduct
may violate the Fourth Amendment. By contrast, if long-term monitoring can be accomplished without committing a technical trespass—suppose, for example, that the Federal Government required or persuaded auto manufacturers to include a GPS tracking device in every car—the Court’s theory would provide no protection.

Second, the Court’s approach leads to incongruous results. If the police attach a GPS device to a car and use the device to follow the car for even a brief time, under the Court’s theory, the Fourth Amendment applies. But if the police follow the same car for a much longer period using unmarked cars and aerial assistance, this tracking is not subject to any Fourth Amendment constraints.

In the present case, the Fourth Amendment applies, the Court concludes, because the officers installed the GPS device after respondent’s wife, to whom the car was registered, turned it over to respondent for his exclusive use. See ante, at 8. But if the GPS had been attached prior to that time, the Court’s theory would lead to a different result. The Court proceeds on the assumption that respondent “had at least the property rights of a bailee,” ante, at 3, n. 2, but a bailee may sue for a trespass to chattel only if the injury occurs during the term of the bailment. See 8A Am. Jur. 2d, Bailment §166, pp. 685–686 (2009). So if the GPS device had been installed before respondent’s wife gave him the keys, respondent would have no claim for trespass—and, presumably, no Fourth Amendment claim either.

Third, under the Court’s theory, the coverage of the Fourth Amendment may vary from State to State. If the events at issue here had occurred in a community property State or a State that has adopted the Uniform Marital
Property Act, respondent would likely be an owner of the vehicle, and it would not matter whether the GPS was installed before or after his wife turned over the keys. In non-community-property States, on the other hand, the registration of the vehicle in the name of respondent’s wife would generally be regarded as presumptive evidence that she was the sole owner. See 60 C. J. S., Motor Vehicles §231, pp. 398–399 (2002); 8 Am. Jur. 2d, Automobiles §1208, pp. 859–860 (2007).

Fourth, the Court’s reliance on the law of trespass will present particularly vexing problems in cases involving surveillance that is carried out by making electronic, as opposed to physical, contact with the item to be tracked. For example, suppose that the officers in the present case had followed respondent by surreptitiously activating a stolen vehicle detection system that came with the car when it was purchased. Would the sending of a radio signal to activate this system constitute a trespass to chattels? Trespass to chattels has traditionally required a physical touching of the property. See Restatement (Second) of Torts §217 and Comment e (1963 and 1964); Dobbs, supra, at 123. In recent years, courts have wrestled with the application of this old tort in cases involving unwanted electronic contact with computer systems, and some have held that even the transmission of electrons that occurs when a communication is sent from one computer to another is enough. See, e.g., CompuServe, Inc. v. Cyber Promotions, Inc. 962 F. Supp. 1015, 1021 (SD Ohio 1997); Thrifty-Tel, Inc. v. Bezenek, 46 Cal. App. 4th 1559, 1566, n. 6 (1996). But may such decisions be followed in applying the Court’s trespass theory? Assuming that what matters under the Court’s theory is the law of trespass as it existed at the time of the adoption of the Fourth

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Amendment, do these recent decisions represent a change in the law or simply the application of the old tort to new situations?

IV
A

The *Katz* expectation-of-privacy test avoids the problems and complications noted above, but it is not without its own difficulties. It involves a degree of circularity, see *Kyllo*, 533 U. S., at 34, and judges are apt to confuse their own expectations of privacy with those of the hypothetical reasonable person to which the *Katz* test looks. See *Minnesota v. Carter*, 525 U. S. 83, 97 (1998) (SCALIA, J., concurring). In addition, the *Katz* test rests on the assumption that this hypothetical reasonable person has a well-developed and stable set of privacy expectations. But technology can change those expectations. Dramatic technological change may lead to periods in which popular expectations are in flux and may ultimately produce significant changes in popular attitudes. New technology may provide increased convenience or security at the expense of privacy, and many people may find the tradeoff worthwhile. And even if the public does not welcome the diminution of privacy that new technology entails, they may eventually reconcile themselves to this development as inevitable.6

On the other hand, concern about new intrusions on privacy may spur the enactment of legislation to protect against these intrusions. This is what ultimately happened with respect to wiretapping. After *Katz*, Congress

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ALITO, J., concurring in judgment

did not leave it to the courts to develop a body of Fourth Amendment case law governing that complex subject. Instead, Congress promptly enacted a comprehensive statute, see 18 U. S. C. §§2510–2522 (2006 ed. and Supp. IV), and since that time, the regulation of wiretapping has been governed primarily by statute and not by case law.\(^7\)

In an ironic sense, although *Katz* overruled *Olmstead*, Chief Justice Taft’s suggestion in the latter case that the regulation of wiretapping was a matter better left for Congress, see 277 U. S., at 465–466, has been borne out.

B

Recent years have seen the emergence of many new devices that permit the monitoring of a person’s movements. In some locales, closed-circuit television video monitoring is becoming ubiquitous. On toll roads, automatic toll collection systems create a precise record of the movements of motorists who choose to make use of that convenience. Many motorists purchase cars that are equipped with devices that permit a central station to ascertain the car’s location at any time so that roadside assistance may be provided if needed and the car may be found if it is stolen.

Perhaps most significant, cell phones and other wireless devices now permit wireless carriers to track and record the location of users—and as of June 2011, it has been reported, there were more than 322 million wireless devices in use in the United States.\(^8\) For older phones, the accuracy of the location information depends on the density of the tower network, but new “smart phones,” which


ALITO, J., concurring in judgment

are equipped with a GPS device, permit more precise tracking. For example, when a user activates the GPS on such a phone, a provider is able to monitor the phone's location and speed of movement and can then report back real-time traffic conditions after combining (“crowdsourcing”) the speed of all such phones on any particular road.9

Similarly, phone-location-tracking services are offered as “social” tools, allowing consumers to find (or to avoid) others who enroll in these services. The availability and use of these and other new devices will continue to shape the average person's expectations about the privacy of his or her daily movements.

V

In the pre-computer age, the greatest protections of privacy were neither constitutional nor statutory, but practical. Traditional surveillance for any extended period of time was difficult and costly and therefore rarely undertaken. The surveillance at issue in this case—constant monitoring of the location of a vehicle for four weeks—would have required a large team of agents, multiple vehicles, and perhaps aerial assistance.10 Only an investigation of unusual importance could have justified such an

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10Even with a radio transmitter like those used in United States v. Knotts, 460 U.S. 276 (1983), or United States v. Karo, 468 U.S. 705 (1984), such long-term surveillance would have been exceptionally demanding. The beepers used in those cases merely emitted periodic signals that could be picked up by a radio receiver. Knotts, 460 U.S., at 277. The signal had a limited range and could be lost if the police did not stay close enough. Indeed, in Knotts itself, officers lost the signal from the beeper, and only “with the assistance of a monitoring device located in a helicopter [was] the approximate location of the signal . . . picked up again about one hour later.” Id., at 278.
expenditure of law enforcement resources. Devices like the one used in the present case, however, make long-term monitoring relatively easy and cheap. In circumstances involving dramatic technological change, the best solution to privacy concerns may be legislative. See, e.g., Kerr, 102 Mich. L. Rev., at 805–806. A legislative body is well situated to gauge changing public attitudes, to draw detailed lines, and to balance privacy and public safety in a comprehensive way.

To date, however, Congress and most States have not enacted statutes regulating the use of GPS tracking technology for law enforcement purposes. The best that we can do in this case is to apply existing Fourth Amendment doctrine and to ask whether the use of GPS tracking in a particular case involved a degree of intrusion that a reasonable person would not have anticipated.

Under this approach, relatively short-term monitoring of a person’s movements on public streets accords with expectations of privacy that our society has recognized as reasonable. See Knotts, 460 U. S., at 281–282. But the use of longer term GPS monitoring in investigations of most offenses impinges on expectations of privacy. For such offenses, society’s expectation has been that law enforcement agents and others would not—and indeed, in the main, simply could not—secretly monitor and catalogue every single movement of an individual’s car for a very long period. In this case, for four weeks, law enforcement agents tracked every movement that respondent made in the vehicle he was driving. We need not identify with precision the point at which the tracking of this vehicle became a search, for the line was surely crossed before the 4-week mark. Other cases may present more difficult questions. But where uncertainty exists with respect to whether a certain period of GPS surveil
ALITO, J., concurring in judgment

lance is long enough to constitute a Fourth Amendment search, the police may always seek a warrant.\textsuperscript{11} We also need not consider whether prolonged GPS monitoring in the context of investigations involving extraordinary offenses would similarly intrude on a constitutionally protected sphere of privacy. In such cases, long-term tracking might have been mounted using previously available techniques.

* * *

For these reasons, I conclude that the lengthy monitoring that occurred in this case constituted a search under the Fourth Amendment. I therefore agree with the majority that the decision of the Court of Appeals must be affirmed.

\textsuperscript{11} In this case, the agents obtained a warrant, but they did not comply with two of the warrant's restrictions: They did not install the GPS device within the 10-day period required by the terms of the warrant and by Fed. Rule Crim. Proc. 41(e)(2)(B)(i), and they did not install the GPS device within the District of Columbia, as required by the terms of the warrant and by 18 U. S. C. §3117(a) and Rule 41(b)(4). In the courts below the Government did not argue, and has not argued here, that the Fourth Amendment does not impose these precise restrictions and that the violation of these restrictions does not demand the suppression of evidence obtained using the tracking device. See, e.g., \textit{United States v. Gerber}, 994 F. 2d 1556, 1559–1560 (CA11 1993); \textit{United States v. Burke}, 517 F. 2d 377, 386–387 (CA2 1975). Because it was not raised, that question is not before us.
United States Introduced Legislation 2012

H.R.4233: Map It Once, Use It Many Times Act
Introduced: 3/21/2012

H.R.4158: To confirm full ownership rights for certain United States astronauts to artifacts from the astronauts' space missions.
Introduced: 3/7/2012
Latest Major Action: Became Public Law No: 112-185 9/25/2012

H.R.4401: RACE for Space Act
Introduced: 4/19/2012
Latest Major Action: 7/10/2012 Referred to House subcommittee. Status: Referred to the Subcommittee on Strategic Forces.

Introduced: 3/29/2012
Latest Major Action: Became Public Law No: 112-239

Introduced: 9/21/2012
Latest Major Action: 10/10/2012 Referred to House subcommittee. Status: Referred to the Subcommittee on Space and Aeronautics.

H.R.6540: Common Sense USA Act
Introduced: 9/21/2012
Latest Major Action: 10/10/2012 Referred to House subcommittee. Status: Referred to the Subcommittee on Space and Aeronautics.

H.R.6586: To extend the application of certain space launch liability provisions through 2014.
Introduced: 11/9/2012

H.R.6612: To redesignate the Dryden Flight Research Center as the Neil A. Armstrong Flight Research Center and the Western Aeronautical Test Range as the Hugh L. Dryden Aeronautical Test Range.
Introduced: 11/29/2012
Latest Major Action: 1/1/2013 Referred to Senate committee. Status: Received in the Senate and Read twice and referred to the Committee on Commerce, Science, and Transportation.

Introduced: 6/19/2012
H.RES.784: Celebrating the life and achievements of Neil A. Armstrong, a United States patriot who humbly and selflessly served his country, State, and community as a naval aviator, test pilot, astronaut, aeronautical engineer, university professor, and businessman.

Introduced: 9/13/2012
Latest Major Action: 9/13/2012 Referred to House committee. Status: Referred to the House Committee on Science, Space, and Technology.

H.CON.RES.102: Commemorating and praising the Honorable John Glenn on the 50th anniversary of his historic orbital space flight

Introduced: 2/16/2012
Last Action: 2/16/2012 Referred to House committee.

H.CON.RES.124: Expressing the sense of the Congress that President Obama's delays in implementing a clear mission for the American space program represent a clear threat to American exceptionalism.

Introduced: 5/15/2012
Latest Major Action: 5/15/2012 Referred to House committee. Status: Referred to the House Committee on Science, Space, and Technology.


Introduced: 12/17/2012
Latest Major Action: 1/2/2013 Received in the Senate.


Introduced: 5/21/2012
Latest Major Action: 5/21/2012 Referred to Senate committee. Status: Read twice and referred to the Committee on Foreign Relations.

S.3661: Space Exploration Sustainability Act

Introduced: 12/5/2012
Latest Major Action: 12/5/2012 Referred to Senate committee. Status: Read twice and referred to the Committee on Commerce, Science, and Transportation.
Public Law 112–185
112th Congress

An Act

To confirm full ownership rights for certain United States astronauts to artifacts from the astronauts’ space missions.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. DEFINITION OF ARTIFACT.

For purposes of this Act, the term “artifact” means, with respect to an astronaut described in section 2(a), any expendable item utilized in missions for the Mercury, Gemini, or Apollo programs through the completion of the Apollo-Soyuz Test Project not expressly required to be returned to the National Aeronautics and Space Administration at the completion of the mission and other expendable, disposable, or personal-use items utilized by such astronaut during participation in any such program. The term includes personal logs, checklists, flight manuals, prototype and proof test articles used in training, and disposable flight hardware salvaged from jettisoned lunar modules. The term does not include lunar rocks and other lunar material.

SEC. 2. FULL OWNERSHIP OF ARTIFACTS.

(a) In General.—A United States astronaut who participated in any of the Mercury, Gemini, or Apollo programs through the completion of the Apollo-Soyuz Test Project, who received an artifact during his participation in any such program, shall have full ownership of and clear title to such artifact.

(b) No Federal Government Claim.—The Federal Government shall have no claim or right to ownership, control, or use of any artifact in possession of an astronaut as described in subsection (a) or any such artifact that was subsequently transferred,
sold, or assigned to a third party by an astronaut described in subsection (a).

Approved October 5, 2012.
COMMERCIAL SPACE LAUNCH ACT

Preliminary Information on Issues to Consider for Reauthorization

Statement of Alicia Puente Cackley, Director
Financial Markets and Community Investment
Why GAO Did This Study

A catastrophic commercial launch accident could result in injuries or property damage to the uninvolved public, or “third parties.” In anticipation of such an event, a launch company must purchase a fixed amount of insurance for each launch, per calculation by FAA; the federal government is potentially liable for claims above that amount up to an additional $1.5 billion, adjusted for inflation, subject to congressional appropriations. As of 2012, the inflation-adjusted amount is about $2.7 billion. CSLA provides for this payment, called indemnification. The indemnification provision, unless reauthorized, expires this year.

This testimony provides preliminary information on, among other things, (1) a comparison of the U.S. government’s indemnification policy to policies of other countries, (2) the federal government’s potential costs for indemnification, (3) the ability and willingness of the insurance market to provide additional coverage, and (4) the effects of ending indemnification on the competitiveness of U.S. launch companies. This testimony is based on ongoing work that includes a review of FAA data and documents and relevant literature and interviews with officials from FAA, National Aeronautics and Space Administration, insurers, brokers, launch companies, launch customers, risk modelers, and experts.

What GAO Found

GAO’s work to date indicates that the United States provides less indemnification for third party losses than China, France, and Russia, according to studies. These countries put no limit on the amount of government indemnification coverage currently available through the Commercial Space Launch Act Amendments of 1988 (CSLA) which is about $2.7 billion per launch. These commitments to pay have never been tested because there has never been a third party claim that exceeded the launch company’s insurance and thus reached the level of government indemnification.

The potential cost to the federal government of indemnification for third party losses is currently unclear. This is because it depends in part on the method used by the Federal Aviation Administration (FAA) to calculate the amount of insurance that launch companies must purchase, which may not be sound. FAA has used the same method since 1988 and has not updated crucial components, such as the cost of a casualty. Estimating probable losses from a rare catastrophic event is difficult, and insurance industry officials and risk modeling experts said that FAA’s method is outdated. FAA, however, has not had outside experts or risk modelers review its appropriateness. An inaccurate calculation that understates the amount of insurance a launch provider must obtain would increase the likelihood of costs to the federal government, whereas a calculation that overstates the amount of insurance would decrease the likelihood of federal costs. FAA officials said that their method was reasonable and conservative, but they agreed that a review could be beneficial and that involvement of outside experts might be helpful for improving their methodology. Overall, they said use of more sophisticated methodologies would have to be balanced with the additional costs to both FAA and the launch companies that would result from requiring and analyzing additional data.

The insurance market is generally willing and able to provide up to $500 million per launch as coverage for third party liability, according to industry representatives GAO contacted. Because the amount of insurance FAA requires launch providers to obtain averages about $99 million per launch, and coverage available through CSLA is about $2.7 billion above that, insurers could provide some of the coverage currently available through CSLA. However, the amount and price of insurance that could be provided could change quickly if a large loss were to occur, according to insurance industry representatives.

The actual effects on competition of eliminating CSLA indemnification are currently unknown. However, launch companies and customers GAO contacted believe that ending federal indemnification could lead to higher launch prices for U.S. launch companies, making them less competitive than foreign launch companies. Although the cost of third party liability insurance coverage for launch companies has been about 1 percent the dollar amount of coverage they purchased, how much this cost might increase in the absence of federal coverage is not clear. Launch customers said that price and vehicle reliability were key factors in their choice of a launch company. Launch companies reported that additional costs would be passed along to customers, but whether this increase alone would be sufficient reason for a launch customer to choose a foreign launch company over a U.S. company is also not clear.

View GAO-12-767T. For more information, contact Alicia Puente Cackley at (202) 512-8678 or cackleya@gao.gov.
Chairman Palazzo, Ranking Member Costello, and Members of the Subcommittee:

Thank you for the opportunity to testify today on commercial space launch indemnification as you consider the upcoming reauthorization of the federal coverage provided through the Commercial Space Launch Act Amendments of 1988 (CSLA).¹ This legislation made the federal government responsible, subject to an appropriation provided by Congress, for a portion of third party liability claims that arise from a catastrophic launch-related incident that results in injury or damage to uninvolved people or property.² The goal was to provide a competitive environment for the U.S. commercial space launch industry by providing, among other things, government indemnity while still minimizing the cost to taxpayers. As figure 1 shows, the number of U.S. commercial launches, which are licensed by the Federal Aviation Administration (FAA), has generally declined since its peak of 17 in 1998.

¹Pub. L. No. 100-657.
²51 USC 50915.
Although the number of U.S. commercial space launches has fallen in recent years, it is reasonable to expect an increase in the years ahead. The National Aeronautics and Space Administration (NASA) plans to begin procuring commercial cargo transportation services to the International Space Station (ISS) in 2012 and intends to procure commercial manned launches to carry its astronauts to the ISS beginning in 2017.\(^3\) A number of companies are developing new launch vehicles that could provide these orbital services. Other companies are developing suborbital vehicles that could carry passengers for space tourism flights.

\(^3\)All commercial missions for NASA thus far have been demonstration missions conducted under Space Act agreements, which involve NASA providing significant funds to private industry partners to stimulate the development of large-scale commercial space transportation capabilities. NASA has procured transportation services to the ISS to begin later in 2012 through traditional contractual arrangements. For more information on Space Act agreements, please see GAO, *Key Controls NASA Employs to Guide Use and Management of Funded Space Act Agreements Are Generally Sufficient, but Some Could Be Strengthened and Clarified*, GAO-12-230R (Washington, D.C.: Nov. 17, 2011).
As you consider reauthorizing CSLA, our testimony today provides preliminary information on the following issues: (1) how the current U.S. commercial space launch indemnification policy compares to policies in other countries; (2) the federal government’s potential costs under CSLA; (3) the extent to which the insurance market is able and willing to provide third party liability insurance at levels currently provided by CSLA; (4) the implications of commercial manned launches for the current federal indemnification policy, including the gaps, if any, that exist in that policy and the potential financial risks those gaps pose; and (5) what is known about the direct and indirect effects that ending indemnification would have on the competitiveness of U.S. commercial launch companies.

This statement is based on ongoing work we are conducting at the request of this committee and the Senate Committee on Commerce, Science, and Transportation; we expect to issue a final report later this year with recommendations, as appropriate. We reviewed launch data from FAA and performed a literature search. We also reviewed documents from and conducted interviews with insurance brokers and underwriters who provide commercial launch companies with coverage for third party liability, experts in commercial space launch liability issues and risk management, representatives from launch companies and customers, and officials from FAA and NASA. Additional information on our methodology is provided in appendix I.

We conducted this performance audit from November 2011 to June 2012 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

### Background

<table>
<thead>
<tr>
<th>U.S. Indemnification Policy</th>
<th>The 1988 amendments to CSLA established the current U.S. policy to provide federal payment, subject to appropriation—known as indemnification—for a portion of claims by third parties for injury, damage,</th>
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or loss that result from a commercial launch-related incident.\textsuperscript{4} All FAA-licensed commercial launches and landings by U.S. companies, whether unmanned or manned and from the United States or overseas, are covered by federal indemnification for third party damages that result from the launch or landing.\textsuperscript{5} Parties involved in launches—for example, passengers and crew—are not eligible for indemnification coverage.\textsuperscript{6}

U.S. indemnification policy has a three-tier approach for sharing liability between the government and the private sector to cover third party claims:

- The first tier of coverage is the responsibility of the launch company and is handled under an insurance policy purchased by the launch company. As part of FAA’s process for issuing a license for a commercial launch or landing, the agency determines the amount of third party liability insurance a launch company is required to purchase so the launch company can compensate third parties for any claims for damages that occur as a result of activities carried out under the license.\textsuperscript{7} FAA calculates the insurance amount to reflect the maximum probable loss that is likely to occur because of an accident that results in third party damages, including deaths and injuries on the ground and damage to property from spacecraft debris.\textsuperscript{8,9} FAA uses a statistical approach to estimate expected losses based on estimated probabilities that a catastrophic incident could occur and the estimated costs of a catastrophic incident given the details of the

\textsuperscript{4}Pub. L. No. 100-657.

\textsuperscript{5}51 USC 50914(a)(1)(A).

\textsuperscript{6}A crew includes any employee who performs activities directly relating to the launch, reentry, or other operation relating to the vehicle that carries human beings. 51 USC 50902(2). A passenger—also called a spaceflight participant—is an individual who is not crew, carried aboard a launch vehicle or reentry vehicle. 51 USC 50902(17).

\textsuperscript{7}51 USC 50914.

\textsuperscript{8}51 USC 50914(c).

\textsuperscript{9}FAA makes this determination for each space launch by reviewing the specific circumstances of the launch, including the planned launch vehicle, launch site, payload, flight path, and the potential casualties and fatalities that could result from varying types of launch failures at different points along that path. FAA estimates the total cost of estimated casualties from a launch failure and uses this information as the basis for determining property damage.
specific launch. This first tier of required insurance coverage is capped at a maximum of $500 million for third party damages.\(^{10}\)

- The second tier of coverage is provided by the U.S. government, and it covers any third party claims in excess of the specific first tier amount up to a limit of $1.5 billion adjusted for post-1988 inflation; in 2012, the inflation-adjusted amount was approximately $2.7 billion.\(^{11}\) For the federal government to be liable for these claims, Congress would need to appropriate funds. This second tier of coverage will expire in December 2012 unless Congress reauthorizes it.\(^{12}\) (The other two tiers have no expiration date.)

- The third tier of coverage is for third party claims in excess of the second tier—that is, the federal coverage of $1.5 billion above the first tier, adjusted for inflation. Like the first tier, this third tier is the responsibility of the launch company, which may seek insurance above the required first tier amount for this coverage. Unlike the first tier, no insurance is required under federal law.

Another component of U.S. indemnification policy for commercial space launches is cross waivers. They provide that each party involved in a launch (such as the launch company, the spacecraft manufacturer, and the customer) agrees not to bring claims against the other parties and assumes financial responsibility for damage to its own property or loss or injury sustained by its own employees.\(^{13}\) Cross waivers also do not have an expiration date.

According to FAA, no FAA-licensed commercial space launch since 1989 has resulted in casualties or substantial property damage to third parties. In the event of a third party claim that exceeded the launch provider’s first-tier coverage, FAA would be involved in any negotiations, according to FAA officials, and the Secretary of Transportation must approve any settlement.\(^{14}\)

\(^{10}\)51 USC 50914(a)(3)(A)(i).
\(^{11}\)51 USC 50915(a)(1).
\(^{12}\)51 USC 50915(f).
\(^{13}\)51 USC 50914(a)(4).
\(^{14}\)51 USC 50915(b)(3).
Global Commercial Space Launch Industry

From 2002 through 2011, U.S. companies conducted approximately 17 percent of commercial space launches worldwide, while Russia conducted 43 percent and France’s launch company conducted 24 percent. Figure 2 shows the trend in number of commercial space launches over the last 10 years.

Figure 2: Number of Commercial Space Launches Worldwide, 2002-2011

![Bar chart showing the number of commercial space launches worldwide from 2002 to 2011. The chart indicates the number of launches for India, China, Russia, Multinational, France, and the United States by year.]

Over the past several years Russian and French launches have generated the most revenues, followed by U.S. launches. In 8 of the last 10 years, U.S. commercial launch companies generated less revenue than launches in either Russia or France. U.S. companies generated no commercial launch revenue in 2011 because they conducted no launches. (See fig. 3.)
Figure 3: Commercial Space Launch Revenues Worldwide, 2002-2011

Commercial revenue (in millions of dollars)

2,500

2,000

1,500

1,000

500

0

Year

2002 2003 2004 2005 2006 2007 2008 2009 2010 2011

Source: GAO analysis of FAA data.

Note: India is not included in this figure due to its small amount of revenues.
The United States Provides Less Liability Coverage Than Foreign Competitors Due to a Cap on Government Indemnification

Our work to date indicates that the United States provides less total third party liability coverage than China, France, or Russia—the primary countries that have conducted commercial space launches in the last 5 years—according to published reports. These countries each have an indemnification regime in which the government states that it will assume a greater share of the risk compared to that of the United States because each country has a two-tiered system with no limit on the amount of government indemnification. By comparison, the United States caps government indemnification at $1.5 billion adjusted for inflation beyond the first-tier insurance amount. However, U.S. government coverage, in some cases, begins at a lower level than that of the other countries because U.S. coverage begins above the maximum probable loss, which averaged about $99 million for active FAA launch and reentry licenses as of January 2012 and ranged from about $23 million to $267 million. The level at which government coverage begins for the other four countries ranged from $79 million to $300 million.

China, France, and Russia have a first tier of insurance coverage that a commercial launch company must obtain, similar to the United States. The second tier of government indemnification varies for these countries:

- The Chinese government provides indemnification for third party claims over $100 million.
- The French government provides indemnification for third party claims over 60 million euros (about $75 million as of May 2012).
- The Russian government provides indemnification for third party claims over $80 million for the smaller Start launch vehicles and $300 million for the larger Soyuz and Proton vehicles.

For all these countries, their commitments to pay have never been tested. Globally, there has never been a third party claim for damages from a commercial space launch failure that reached second-tier coverage.

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15In addition, India conducted one commercial space launch during this period, but we found conflicting information on the Indian government’s indemnification coverage, and therefore we are not including it in this discussion.

1651 USC 50915(a)(1)(B).

The federal government’s potential costs under CSLA depend on (1) the occurrence of a catastrophic launch failure with third party claims that exceed the first tier of coverage and (2) Congress appropriating funds to cover the government’s liability under the second tier of coverage. FAA officials stated that no FAA-licensed commercial space launches have resulted in casualties or substantial property damage to third parties. As a result, FAA believes that it is highly unlikely that there will be any costs to the federal government under CSLA. In the event that a catastrophic failure did occur, FAA’s maximum probable loss calculation is intended to estimate the maximum losses likely to occur from a commercial space launch and determine the amount of third party losses against which launch companies must protect. In calculating maximum probable loss, FAA aims to include estimates of losses from events having greater than a 1 in 10 million chance of occurring, meaning that losses are very unlikely to exceed launch companies’ private insurance and become potential costs for the government under CSLA.

Under CSLA, if a rare catastrophic event were to occur whose losses exceeded private insurance coverage, the government would be responsible for paying claims that exceeded FAA’s maximum probable loss only if Congress provided appropriations for this purpose. Under CSLA, the federal government does not incur a legal liability unless an appropriation is made for this purpose. Accordingly, an obligation would not be recorded in the federal budget unless and until such an appropriation is made. While an obligation is not incurred or recorded for

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18 CSLA requires the Secretary of Transportation to provide for the payment of specific types of successful third party claims to the extent provided in advance in an appropriation law or to the extent additional legislative authority is enacted providing for paying for claims in a compensation plan submitted to Congress by the President. 51 U.S.C. § 50915 (a)(1).
potential CSLA losses until an appropriation is provided, some insurance companies told us that they expect the government to pay losses that become eligible for coverage under CSLA.

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<tr>
<th>Maximum Probable Loss Soundness</th>
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<tr>
<td>While it is very difficult to assess catastrophic failures that have low probabilities but potentially high losses, FAA’s use of an appropriate process for determining the maximum probable loss is important because the maximum probable loss sets the point at which losses become potential costs to the government under CSLA. Our preliminary work identified several issues that raise questions about the soundness of FAA’s maximum probable loss methodology:</td>
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- FAA uses a figure of $3 million when estimating the cost of a single potential casualty—that includes either injury or death—which FAA officials said has not been updated since they began using it in 1988. Two insurers, as well as representatives of two companies that specialize in estimating damages from catastrophic events (modeling companies), said that this figure is likely understated. Because this number has not been adjusted for inflation or updated in other ways, it may not adequately represent the current cost of injury or death caused by commercial space launch failures. Having a reasonable casualty estimate can affect FAA’s maximum probable loss calculation and could affect the potential cost to the government from third party claims.

- FAA’s methodology for determining potential property damage from a commercial space launch starts with the total cost of casualties and adds a flat 50 percent to that cost as the estimate of property damage, rather than specifically analyzing the number and value of properties that could be affected in the event of a launch failure. One insurer and two risk modelers said that FAA’s approach is unusual and generally not used to estimate potential losses from catastrophic events. For example, officials from both modeling companies noted that the more common approach is to model the property losses first and derive the casualty estimates from the estimated property losses. For example, if a property loss scenario involves the collapse of a building, that scenario would have a different casualty expectation than a scenario that did not involve such a collapse. One modeler stated that FAA’s method might significantly understate the number of potential casualties, noting that an event that has a less than 1 in 10 million chance of occurring is likely to involve significantly more casualties than predicted under FAA’s approach. Moreover, a 2007 FAA review
conducted with outside consultants said that this approach is not recommended because of observed instances where casualties were low yet forecasted property losses were very large.19

- More broadly, FAA’s method does not incorporate what is known in the insurance industry as “catastrophe modeling.” One modeler told us that catastrophe modeling has matured over the last 25 years—as a result of better data, more scientific research, and advances in computing—and has become standard practice in the insurance and reinsurance industries.20 Catastrophe models consist of two components: a computer program that mathematically simulates the type of event being insured against and a highly detailed database of properties that could potentially be exposed to loss. Tens of thousands or more computer simulations are generated to create a distribution of potential losses and the simulated probability of different levels of loss.21 In contrast, FAA’s method involves estimating a single loss scenario.

FAA officials told us that they have considered the possibility of using a catastrophe model. However, they expressed concern about whether the more sophisticated approach would be more accurate, given the great uncertainty about the assumptions, such as the probability and size of potential damages, that must be made with any model. Also, industry experts told us that a significant cost factor in catastrophe modeling is creating and maintaining a detailed database of exposed properties. One expert told us that in order for FAA to do such modeling, it would need to purchase a property exposure database, which could cost hundreds of thousands of dollars. Experts also disagreed on how feasible it would be to mathematically model the potential damages associated with space launches. One expert thought such modeling would not be credible because the necessary knowledge of the factors that can influence a space launch is not at the same level as the more developed research for modeling hurricanes, for example. Another expert thought that it would be


20Reinsurance is essentially insurance for insurers—that is, companies buy coverage for all or a part of a policy’s liability from other insurers in order to offset exposure.

21The probability distribution of losses is typically presented in what is known as an exceedance probability curve, which shows the probability of losses exceeding various levels.
possible to develop credible space launch simulation models. Another expert stated that such models have not been developed to date because of the government-provided indemnity coverage; this expert believed that if such coverage were the responsibility of the private sector, the necessary models might be developed.

FAA officials also said that they believe the maximum probable loss methodology is reasonable and produces conservative results for several reasons. First, FAA officials described a 2002 study on aviation casualty costs to support its use of a $3 million casualty figure for its calculation. Use of a casualty estimate that is based on 2002 data, however, still raises questions about whether this figure is outdated, which could result in underestimating the cost of casualties. Second, to support basing the potential cost of property damage on the potential cost of casualties, FAA officials said that they have conducted internal analyses using alternative methodologies—including some that assessed property values in the vicinity of launches—and compared them to their current methodology. In each case, officials said that the current methodology produced higher, or more conservative, maximum probable losses. We were unable to review or verify these analyses, however, because FAA officials said that these analyses were done informally and were not documented.

FAA officials acknowledged that updating the $3 million casualty figure and conducting analyses of potential property damage (rather than using a casualty cost adjustment factor of 50 percent) might produce more precise estimates of maximum probable losses. However, they said that because the probabilities assigned to such losses are still rough estimates, whether taking these actions would increase the accuracy of their maximum probable loss calculations is uncertain. Overall, they said, use of more sophisticated methodologies would have to be balanced with the additional costs to both FAA and the launch companies that would result from requiring and analyzing additional data. For example, a new methodology might require either FAA or the launch company to gather current property information, and might necessitate that FAA construct a statistical model for analyzing potential losses.

The same officials noted that they periodically evaluate their current maximum probable loss methodology, but acknowledged that they have not used outside experts or risk modelers for this purpose. They agreed that such a review could be beneficial, and that involvement of outside experts might be helpful for improving their maximum probable loss methodology. FAA’s 2007 review of potential alternatives identified a number of criteria for a sound maximum probable loss methodology that
could be useful in such a review. These included, among other things, that the process use a valid risk analysis, be logical and lead to a rational conclusion, and avoid being overly conservative or under conservative. A sound maximum probable loss calculation can be beneficial to both the government and launch companies because it can help ensure that the government is not exposed to greater costs than intended (such as might occur through an understated maximum probable loss) and help ensure that launch companies are not required to purchase more insurance coverage than necessary (such as might occur through an overstated maximum probable loss).

Current Private Market Capacity for Coverage Is Generally $500 Million per Launch, but a Large Loss Could Decrease Capacity

Private Capacity

Our preliminary work found that some insurers and brokers suggested that the maximum amount of private sector third party liability coverage the industry is currently willing to provide is generally around $500 million per launch. This amount, or capacity, is determined by the amount of their own capital that individual insurers are willing to risk by selling this type of coverage. According to some insurers and brokers with whom we spoke, commercial space launch third party liability coverage is a specialized market involving a relatively small number of insurers that each assume a portion of the risk for each launch. One broker said that no launch company thus far has pursued private sector insurance protection above $500 million. Two insurers said that there might be slightly more coverage available beyond $500 million, and one said that up to $1 billion per launch in liability coverage might be possible in the private insurance market.

The cost to launch companies for purchasing third party liability insurance, according to some brokers and one insurer, is approximately 1 percent or less of the total coverage amount. According to FAA data on commercial launches, the average maximum probable loss is about $99
million. As a result, in the absence of CSLA indemnification, insurers could still provide some of the coverage currently available through the government under CSLA. For example, if the maximum probable loss for a launch is $100 million and the insurance industry is willing to offer up to $500 million in coverage, the private market could potentially provide $400 million in additional coverage.

According to some insurers, brokers, and insurance experts with whom we spoke, there are a number of reasons why private sector insurers are generally unwilling to offer more third party liability coverage than $500 million per launch.

- First, these brokers and insurers said that worldwide capacity for third party liability coverage is generally limited to $500 million per launch, which some considered a significant amount of coverage and a challenging amount to put together—particularly given that the number of insurers in the space launch market is relatively small.
- Second, according to these same officials, insurers are unwilling to expose their capital above certain amounts for coverage that at least currently brings in small amounts of premium relative to the potential payouts for losses. For example, they said that losses from a catastrophic launch accident could exceed many years of third party liability policy premiums and jeopardize insurers’ solvency.
- Third, according to some insurers and brokers with whom we spoke, to have sufficient capital to pay for losses above $500 million per launch would require insurers to charge policy premiums that would likely be unaffordable for space launch companies.

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<tr>
<th>Changes to Market Capacity</th>
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<td>Our preliminary work also indicates that the current amount of private market capacity could change due to loss events and changing market conditions, according to some insurance industry participants. Some insurers and brokers said that a launch failure could affect the level and cost of coverage offered, and that a launch failure with significant losses could quickly raise insurance prices and reduce capacity, potentially below levels required by FAA’s maximum probable loss calculation. However, one risk expert suggested that a space launch failure would likely cause liability insurance rates to rise and that this might encourage insurers and capital to enter the space launch market and cause liability insurance capacity to increase. According to FAA, insurers have paid no claims for U.S. commercial launches to date, but they have paid some relatively small third party claims for U.S. military and NASA launch failures. For example, according to an insurance broker, a U.S. Air Force launch failure in 2006 resulted in property damage of approximately $30</td>
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million. According to NASA, the Space Shuttle Columbia accident in 2003 resulted in property damage of approximately $1.2 million. Two brokers said that given the low number of launches and low probability of catastrophic events, total worldwide premiums for space liability coverage are approximately $25 million annually, amounts insurers believe are adequate to cover expected losses. However, if a large loss occurs, according to two insurers, they would likely increase their estimates of the potential losses associated with all launches.

Under CSLA, launch companies must purchase coverage to meet FAA’s maximum probable loss amount or purchase the maximum amount of coverage available in the world market at reasonable cost, as determined by FAA.\(^2\) The potential cost to the government could increase if losses caused insurance prices to rise and insurance amounts available at reasonable cost to decrease. Some insurers and brokers also said that the amount of insurance the private market is willing to sell for third party liability coverage for space launches can also be affected by changes in other insurance markets. For example, large losses in aviation insurance or in reinsurance markets could decrease the amount of capital insurers would be willing to commit to launch events because losses in the other markets would decrease the total pools of capital available.

### Alternatives for Addressing Space Launch Risk

Because launch failures and changing market conditions could change the amounts of coverage available in the private market, you have expressed interest in other possible ways of managing catastrophic risk. While we have not conducted specific work to analyze the feasibility of alternative approaches for providing coverage currently available through CSLA, FAA and others have looked at possible alternatives to CSLA indemnification and we have examined different methods for addressing the risk of catastrophic losses associated with natural disasters and acts of terrorism.\(^3\) These events, like space launch failures, have a low

\(^2\)51 USC 50914(a)(3).

probability of occurrence but potentially high losses. Some methods involve the private sector, including going beyond the traditional insurance industry, in providing coverage, and include the use of catastrophe bonds or tax incentives to insurers to develop catastrophe surplus funds. Other methods aid those at risk in setting aside funds to cover their own and possibly others’ losses, such as through self-insurance or risk pools. Still other methods, such as those used for flood and terrorism insurance, involve the government in either providing subsidized coverage or acting as a backstop to private insurers.

Use of any such alternatives could be complex and would require a systematic consideration of their feasibility and appropriateness for third party liability insurance for space launches. For example, according to a broker and a risk expert, a lack of loss experience complicates possible ways of addressing commercial space launch third party liability risk, and according to another risk expert, any alternative approaches for managing this risk would need to consider key factors, including the

- number of commercial space launch companies and insurers and annual launches among which to spread risk and other associated costs;
- lack of launch and loss experience and its impact on predicting and measuring risk, particularly for catastrophic losses; and
- potential cost to private insurers, launch companies and their customers, and the federal government.

As such, alternatives could potentially require a significant amount of time to implement.

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24 See GAO, Catastrophe Insurance Risks: Status of Efforts to Securitize Natural Catastrophe and Terrorism Risk, GAO-03-1033 (Washington, D.C.: Sept. 24, 2003). Self-insurance occurs when an entity assumes the risk for its losses and can involve the formation of an insurance company solely for that purpose. Risk pooling occurs when two or more entities agree to set aside funds to help pay for the others’ losses.

### Forecasted Increase in Manned Launches and Landings Could Increase the Potential Costs for the Federal Government, and Current Coverage Has a Gap

| Issues and Implications Relating to Commercial Manned Launches | Our preliminary work indicates the planned increase in manned commercial launches raises a number of issues that have implications for the federal government’s indemnification policy for third party liability, according to insurance officials and experts with whom we spoke. NASA expects to begin procuring manned commercial launches to transport astronauts to the ISS in 2017. In addition, private companies are also developing space launch vehicles that could carry passengers for space tourism flights.  
First, the number of launches and landings covered by federal indemnification will increase with NASA’s planned manned launches if they are determined to be FAA-licensed commercial launches. NASA expects to procure from private launch companies 2 manned launches per year to the ISS from 2017 to 2020. NASA and FAA have not yet determined if those launches will be covered under NASA’s procurement policy or FAA’s licensing regulations.  
In addition, the development of a space tourism industry may also increase the number of launches and landings covered by federal indemnification, but the timing of tourism  
26 NASA-contracted launches for NASA’s science missions are not currently covered by CSLA; rather, NASA requires its launch contractors to obtain insurance coverage for third party losses. The amount of the insurance required by NASA is the maximum amount available in the commercial marketplace at reasonable cost, but does not exceed $500 million for each launch. The facts and circumstances for claims in excess of this amount would be forwarded by NASA to the Congress for its consideration 51 U.S.C. § 20113 (m) (2). NASA-contracted launches for the Commercial Resupply Services to the ISS will be licensed by the FAA under CSLA, and will be covered by CSLA indemnification. NASA has not yet determined if its commercially procured manned launches to the ISS will be FAA licensed. If they become FAA licensed, then third party claims for those launches would be covered by the CSLA indemnification policy. |
|---|---|
launches and landings is uncertain. Among the potential space tourism companies, Virgin Galactic is the closest to conducting suborbital, manned launches, according to FAA. Virgin Galactic forecasts launches starting in 2014 and, according to the company, 500 individuals have made deposits for the $200,000 fare. However, Virgin Galactic has not yet applied to FAA for a launch license and its planned schedule for flights has experienced delays in the past.

According to insurance company officials with whom we spoke, the potential volume of manned launches for NASA and for space tourism could increase the overall amount of insurance coverage needed by launch companies, which could raise insurance costs, including those for third party liability. By increasing the volume of launches, the probability of a catastrophe occurring is also increased and any accident that occurs could also increase future insurance costs, according to insurance company officials with whom we spoke. A catastrophic accident could also result in third party losses over the maximum probable loss, which would invoke federal indemnification.

Second, because newly developed manned launch vehicles have less launch history they are viewed by the insurance industry as more risky than “legacy” launch vehicles. Insurance company officials told us that launch vehicles such as United Launch Alliance’s Atlas V, which launches satellites and may be used for future manned missions, is seen as less risky than new launch vehicles, such as SpaceX’s Falcon 9, which could also be used for manned missions. As of May 2012, Atlas V has had over two dozen launches with a 100 percent launch success rate; Falcon 9 has had 3 successful launches. According to insurance company officials with whom we spoke, they expect to charge higher insurance premiums for newly developed launch vehicles than legacy launch vehicles given their different risk profiles. Insurance company officials’ opinions varied as to when a launch vehicle is deemed reliable—from 5 to 10 successful launches. They also told us that whether vehicles are manned is secondary to the launch vehicle’s history and the launch’s trajectory—over water or land—in determining risk and the price and amount of third party liability coverage.

Launch providers obtain insurance in addition to that for third party liability, including coverage of assets, such as the launch vehicle.
Third, having any people on board a space vehicle raises issues of informed consent and cross waivers, which could affect third party liability and the potential cost to the federal government. CSLA requires passengers and crew on spaceflights to be informed by the launch company of the risks involved and to sign a reciprocal waiver of claims (also called a cross waiver) with the federal government—which means that the party agrees not to seek claims against the federal government if an accident occurs. CSLA also requires cross waivers among all involved parties in a launch. Two key issues dealing with cross waivers include the estates of spaceflight passengers and crew and limits on liability for involved parties.

- The estates of spaceflight passengers and crew, which are considered third parties to a launch, are not covered by the informed consent and cross waiver of claims, according to two insurance companies and one legal expert. Although an insurance company said that it would be difficult for estates to seek damages in case of an accident, the legal expert said that the informed consent requirement does not address future litigation issues. Officials from two insurance companies and one expert told us that they expect spaceflight passengers to be high-income individuals, which could result in large insurance claims by estates of the passengers, as determination of the amount of claims is based on an individual’s expected earning capacity over his or her lifetime.

- According to two insurance companies and two legal experts, requiring cross waivers among passengers, crew, the launch company, and other involved parties may not minimize potential third party claims as they would not place limitations on liability. An insurance company and a legal expert stated that, without a limitation on liability, insurance premiums for third party and other launch insurance coverage could increase as the same small number of insurance companies insures passengers, crew, launch vehicles, as well as third parties to a launch. According to FAA, putting a limitation on spaceflight passenger liability could foster the development of the commercial space launch industry through lower costs for insurance and liability exposure. Liability exposure and the related litigation

28 51 USC 50905(b)(5).
29 51 USC 50914(b)(1).
impose costs on industries and the limitation on liability shifts the risk to spaceflight passengers, who have been informed of the launch risks. If limitations on liability were set by federal legislation, it could conflict with state law because at least five states currently have their own space liability and indemnity laws limiting liability.\(^\text{30}\) Launch and insurance companies believe that a limit or cap on passenger liability could decrease uncertainty and consequently decrease the price of insurance, according to a FAA task force report.\(^\text{31}\)

As previously discussed, the potential cost to the government depends on the accuracy of the maximum probable loss calculation, which assesses a launch’s risk. If the calculation is understated, then the government’s exposure to liability is higher. Thus, whether the launch vehicle is newly developed or manned, the effect on the government’s potential cost for third party claims is still based on how accurately the maximum probable loss calculation assesses launch risks. FAA officials told us that they intend to use the same maximum probable loss assessment method for manned launches as they currently do with unmanned launches.

**Gap in Federal Indemnification**

Officials from the insurance industry and space launch companies and an expert told us that a gap in federal indemnification is the lack of coverage of on-orbit activities—that is, activities not related to launch or reentry, such as docking with the ISS and relocating a satellite from one orbit to another orbit—but they did not agree on the need to close this gap. FAA licenses commercial launches and reentries, but does not license on-orbit activities. Federal indemnification only applies to FAA-licensed space activities. NASA’s commercial manned launches to the ISS will involve on-orbit activities, including docking with the ISS, will be subject to the cross waivers of liability required by agreements with participating countries. This cross waiver is not applicable when CSLA is applicable, such as during a licensed launch or reentry, and it does not address liability for damage to non-ISS parties such as other orbiting spacecraft. Claims between NASA and the launch company are not affected by the ISS cross waiver and are historically addressed as a contractual agreement. In addition, Virgin Galactic operations will only have suborbital launches and reentries and no on-orbit activities that require

\(^\text{30}\)Those states are Colorado, Florida, New Mexico, Texas, and Virginia.

regulation. Therefore, according to officials from two launch companies, they did not believe that on-orbit activities need to be regulated by FAA or that federal indemnification coverage should be provided. However, one insurer noted that other proposed manned launches—such as Bigelow’s planned on-orbit “hotel”—will not be NASA related and therefore will not covered by any regulatory regime. An expert noted that such a proposal for an on-orbit hotel remains an open question regarding regulation and liability exposure. In addition, the expert noted that federal oversight of on-orbit activities may be needed to provide consistency and coordination among agencies that have on-orbit jurisdiction. He pointed out that the Federal Communications Commission and the National Oceanic and Atmospheric Administration have jurisdiction over their satellites and NASA has jurisdiction over the ISS. Thus, according to the expert, there should be one federal agency that coordinates regulatory authority over on-orbit activities.

FAA may seek statutory authority over on-orbit activities, according to senior agency officials. They further explained that they are not seeking on-orbit authority for satellite or spectrum usage. An insurer told us that having FAA in charge from launch to landing would help ensure that there were no gaps in coverage. According to this insurer, this would help bring stability to the insurance market in the event of an accident as involved parties would be clear on which party is liable for which activities. However, having FAA license on-orbit activities would increase the potential costs to the federal government for third party claims. If FAA obtains authority to license on-orbit activities then the potential costs to the government may increase as its exposure to risk increases.

Our work to date suggests that while the actual effects on competition of eliminating CSLA indemnification are unknown, several launch companies and customers with whom we spoke said that in the absence of CSLA indemnification, increased risk and higher costs would directly affect launch companies and indirectly affect their customers and suppliers. The same participants said that two key factors—launch price and launch vehicle reliability—generally determine the competitiveness of launch companies. According to two launch customers, launch prices for similar missions can vary dramatically across countries. For example, two customers said that a similar launch might cost about $40 million to $60 million with a Chinese launch company, about $80 million to $100 million with a French launch company, and approximately $120 million with a U.S. launch company. However, another U.S. launch company told us that it is developing a vehicle for a similar launch for which it intends to
charge about $50 million. Other considerations also would be involved in selecting a launch company, according to launch customers with whom we spoke. For example, some said that export restrictions for U.S. customers could add to their costs or prevent them from using certain launch companies. One launch customer also said that it considers the costs of transporting the satellite to the launch site as well as other specific aspects of a given launch.

Launch company officials said that the lack of government indemnification would decrease their global competitiveness by increasing launch costs. Launch company officials said their costs would increase as a result of their likely purchase of greater levels of insurance to protect against the increased potential for third party losses, as the launch companies themselves would be responsible for all potential third party claims, not just those up to the maximum probable loss amount. As previously discussed, whether the private insurance market has the capacity to provide coverage at levels currently provided by the government, or at what price they might sell such coverage, is uncertain. Some launch company officials said that their costs may also increase if their suppliers decided to charge more for their products or services as a result being at greater risk from a lack of CSLA indemnification. That is, to compensate for their greater exposure to potential third party claims, some suppliers might determine that they need to charge more for their products to cover the increased risks they are now assuming. Some launch companies told us that they would likely pass additional costs on to their customers by increasing launch prices. Two launch customers told us that in turn, they would pass on additional costs to their customers. Several also told us that they might increase the amount of their own third party liability insurance, another cost they might pass on to their customers. Two said they might be more likely to choose a foreign provider if the price of U.S. launches rose.

According to launch companies and customers we spoke with, ending CSLA indemnification would also decrease the competitiveness of U.S. launch companies because launch customers would be exposed to more risk than if they used launch companies in countries with government indemnification. For example, officials from several launch companies and customers said that if some aspect of the launch payload is determined to have contributed to a launch failure, they could be exposed to claims for damages from third parties. Launch customers are currently protected from such claims through the CSLA indemnification program. Several launch customers with whom we spoke said that without CSLA
indemnification they might be more likely to use a launch company in a country where the government provides third party indemnification.

According to launch companies with whom we spoke, ending CSLA indemnification could also have other negative effects. For example, some said that the increased potential for significant financial loss for third party claims could cause launch companies, customers, or suppliers to reassess whether the benefits of staying in the launch business outweigh the risks. If some companies decided it was no longer worthwhile to be involved in the launch business, it could result in lost jobs and industrial capacity. Lastly, one industry participant pointed out that some suppliers, such as those that build propulsion systems, have to maintain significant amounts of manufacturing capacity whether they build one product or many. If there are fewer launches, the cost of maintaining that capacity will be spread among these fewer launches, resulting in a higher price for each launch. To the extent that the federal government is a customer that relies on private launch companies for its space launch needs, it too could face potentially higher launch costs.

The actual effects of eliminating CSLA indemnification are unknown. For example, we do not know how insurance premiums or other costs might change as well as the availability of coverage. In addition, we do not know whether or to what extent launch customers might choose foreign launch companies over U.S. companies. Furthermore, it is difficult to separate out the effects of withdrawing indemnification on the overall competitiveness of the U.S. commercial space launch industry. Many factors affect the industry’s competitiveness, including other U.S. government support, such as research and development funds, government launch contracts, and use of its launch facilities, in addition to the third party indemnification.

Concluding Observations

Although the number of commercial launches by U.S. companies has generally decreased over the past few years, commercial space is a dynamic industry with newly developing space vehicles and missions. With the termination of the shuttle program, NASA plans to procure cargo delivery to the ISS from private launch companies later in 2012 and intends to use private companies to carry astronauts to the ISS starting in 2017. In addition, private launch companies have been developing launch vehicles that will eventually carry passengers as part of an emerging space tourism industry. Our work to date suggests that both of these developments may increase the number and type of flights eligible for third party liability indemnification under CSLA. As the industry changes
and grows, continually assessing federal liability indemnification policy to ensure that it protects both launch companies and the federal government will be important. As we complete our analysis, we will more fully address any additional federal actions needed in response to these developments.

**Agency Comments**

We provided a draft of this statement to FAA and NASA. FAA provided no comments and NASA provided technical comments which we incorporated as appropriate.

Chairman Palazzo, Ranking Member Costello, and Members of the Subcommittee, this concludes my prepared statement. I would be pleased to respond to any questions that you may have at this time.

**GAO Contacts and Staff**

If you or your staff have any questions about this testimony, please contact Alicia Puente Cackley at (202) 512-8678 or cackleya@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this statement. GAO staff who made key contributions to this testimony are listed in appendix II.
Appendix I: Scope and Methodology

To determine how the current U.S. commercial space launch indemnification policy compares to policies in other countries we conducted a literature review and selected four countries for comparison—China, France, India, and Russia—because they are the only countries other than the United States that have conducted commercial space launches in the last 5 years. Our source for the amounts of government indemnification provided by these countries is a 2006 Aerospace Corporation report and a 2002 Federal Aviation Administration (FAA) report. To the extent possible, we verified information from the literature review through discussions with officials from FAA, insurance companies, launch companies, and experts. We did not find sufficiently reliable information about India to report on its government indemnification.

To determine the federal government’s potential costs under the Commercial Space Launch Act Amendments of 1988 (CSLA), we reviewed CSLA, our past work on the budget treatment of insurance programs, and FAA’s maximum probable loss calculation. We also interviewed FAA officials and experts in risk modeling. To determine the extent to which the insurance market is able and willing to provide third party liability insurance at levels currently provided by CSLA, we reviewed CSLA to determine the amount of coverage the act provides commercial launch companies; reviewed relevant industry reports; and interviewed officials from FAA, insurance companies, and brokerage companies. We also interviewed launch company officials to determine the additional coverage they might seek absent CSLA indemnification. To determine a range of paid claims, we reviewed data from the National Aeronautics and Space Administration (NASA) on third party claims that have been paid as the result of the Space Shuttle Columbia accident and from an insurance official on third party claims paid as a result of a U.S. Air Force launch accident. We found the data sufficiently reliable for our purposes.

To determine issues and implications of commercial manned launches for the current federal indemnification policy, including the gaps, if any, that exist in that policy and the potential financial risks those gaps pose, we interviewed officials from FAA, NASA, insurance companies, brokerage

companies, and launch companies, and experts. To determine what is known about the effects of ending indemnification on the competitiveness of U.S. commercial launch companies, we obtained information from FAA on launches, payloads, and revenues from 1997 through 2011. As the information was used for background, we did not assess the reliability of the data. We also conducted interviews with officials from launch companies, launch customers, and industry associations, and experts.

We selected launch companies, insurance companies, brokerage companies, and launch customers for interviews that had conducted or participated in commercial launches in the past 5 years. In addition, we selected launch companies that are competing to conduct commercial launches as part of NASA’s Commercial Crew Development program or plan to conduct launches for space tourism. We also selected launch customers to include U.S. companies and foreign companies and those that had used both U.S. and foreign launch companies. We selected experts to interview to provide a variety of expertise, including space liability, risk modeling, and space law issues. Table 1 lists the organizations and agencies whose officials we interviewed as well as the experts we interviewed.

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We conducted this performance audit from November 2011 to June 2012 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.
Appendix II: GAO Contacts and Staff Acknowledgments

GAO Contacts

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Staff Acknowledgments

In addition to the contacts named above, individuals making key contributions to this testimony include Dr. Gerald L. Dillingham (Director), Teresa Spisak and Patrick Ward (Assistant Directors), Maureen Luna-Long, James Geibel, Carol Henn, David Hooper, Shelby Oakley, Susan Offutt, Amy Rosewarne, Steve Ruszczyk, Melvin Thomas, and Frank Todisco.
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COMMERCIAL SPACE LAUNCHES

FAA Should Update How It Assesses Federal Liability Risk
Why GAO Did This Study

A catastrophic commercial launch accident could result in injuries or property damage to the uninvolved public, or "third parties." In anticipation of such an event, a launch company must purchase a fixed amount of insurance for each launch and reentry, per calculation by FAA; the federal government is potentially liable for claims above that amount up to an additional $1.5 billion, adjusted for inflation and subject to congressional appropriations. As of 2012, the inflation-adjusted amount is about $2.7 billion. CSLAA provides for this payment, called indemnification. The indemnification provision, unless reauthorized, expires this year.

GAO was asked to address, among other things, (1) the U.S. government's indemnification policy compared to policies of other countries, (2) the federal government's potential costs for indemnification, (3) the ability and willingness of the insurance market to provide additional coverage, and (4) the effects of ending indemnification on the competitiveness of U.S. launch companies. GAO reviewed FAA data and documents and relevant literature and conducted interviews with officials from FAA and the National Aeronautics and Space Administration, insurers, brokers, launch companies, launch customers, risk modelers, and experts.

What GAO Found

According to studies, the United States provides less commercial space launch indemnification for third party losses than China, France, and Russia. These countries put no limit on the amount of government indemnification coverage, which in the United States is limited by the Commercial Space Launch Act Amendments of 1988 (CSLAA). Governments' commitments to pay have never been tested because there has not been a third party claim that exceeded a private launch company's insurance.

The potential cost to the federal government of indemnifying third party losses is currently unclear because it depends in part on the method used by the Federal Aviation Administration (FAA) to calculate the amount of insurance that launch companies must purchase, a calculation that may not be sound. FAA has used the same method since 1988 and has not updated crucial components, such as the cost of a casualty. Estimating probable losses from a rare catastrophic event is difficult, and insurance industry officials and risk modeling experts said that FAA's method is outdated. FAA, however, has not had outside experts or risk modelers review the appropriateness of its method. An inaccurate calculation that understates the amount of insurance a launch provider must obtain would increase the likelihood of costs to the federal government; a calculation that overstates the amount of insurance needed would raise the cost of insurance for the launch provider. FAA officials said that their method was reasonable and conservative, but they agreed that a review could be beneficial and that involving outside experts might be helpful. Overall, they said use of more sophisticated methodologies would have to be balanced with the additional costs to both FAA and the launch companies that would result from generating and analyzing additional data.

The insurance market is generally willing and able to provide up to $500 million per launch as coverage for third party liability, according to industry representatives. Because the amount of insurance FAA requires launch providers to obtain averages about $99 million per launch, and coverage available through CSLAA is about $2.7 billion above that, insurers could provide some of the coverage currently available through CSLAA. However, the amount and price of insurance that could be provided could change quickly if a large loss were to occur, according to insurance industry representatives.

The effects on global competition from the United States eliminating CSLAA indemnification are unknown. However, launch companies and customers GAO contacted believe that ending federal indemnification could lead to higher launch prices for U.S.-based launch companies, making them less price competitive than foreign launch companies. Although the cost of third party liability insurance for launch companies has been about 1 percent of the dollar amount of coverage they purchased, how much this cost might increase in the absence of federal coverage is not clear. Launch customers said that price and vehicle reliability were key factors in their choice of a launch company. Launch companies reported that additional costs would be passed along to customers, but whether this increase alone would be sufficient reason for a launch customer to choose a foreign company over a U.S. company is unclear.

What GAO Recommends

GAO recommends that FAA periodically review and update as appropriate its methodology for calculating launch providers' insurance requirements. The Department of Transportation provided technical clarifications, which GAO incorporated.
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Abbreviations

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<th>Abbreviation</th>
<th>Description</th>
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<tr>
<td>CSLAA</td>
<td>Commercial Space Launch Act Amendments of 1988</td>
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<tr>
<td>FAA</td>
<td>Federal Aviation Administration</td>
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<td>ISS</td>
<td>International Space Station</td>
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<td>NASA</td>
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July 30, 2012

The Honorable John D. Rockefeller IV
Chairman
The Honorable Kay Bailey Hutchison
Ranking Member
Committee on Commerce, Science, and Transportation
United States Senate

The Honorable Ralph M. Hall
Chairman
The Honorable Eddie Bernice Johnson
Ranking Member
Committee on Science, Space, and Technology
House of Representatives

The Commercial Space Launch Act Amendments of 1988 (CSLAA)\(^1\) made the federal government responsible, subject to an appropriation provided by Congress, for a portion of third party liability claims that arise from a catastrophic launch-related incident that results in injury or damage to uninvolved people or property, or “third parties.”\(^2\) This indemnification provision will expire at the end of 2012. The goal was to provide a competitive environment for the U.S. commercial space launch industry by providing, among other things, government indemnity while still minimizing the cost to taxpayers. As figure 1 shows, the number of U.S. commercial launches, which are licensed by the Federal Aviation Administration (FAA), reached a peak of 17 in 1998.

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Although the number of U.S. commercial space launches has fallen in recent years, it is reasonable to expect an increase in the years ahead. The National Aeronautics and Space Administration (NASA) plans to begin procuring commercial cargo transportation services to the International Space Station (ISS) in 2012 and intends to procure commercial manned launches to carry its astronauts to the ISS beginning in 2017. A number of companies are developing new launch vehicles that could provide these orbital services. Other companies are developing suborbital vehicles that could carry passengers for space tourism flights.

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3All commercial missions for NASA thus far have been demonstration missions conducted under Space Act agreements, which involve NASA providing significant funds to private industry partners to stimulate the development of large-scale commercial space transportation capabilities. NASA has procured transportation services to the ISS to begin later in 2012 through traditional contractual arrangements. For more information on Space Act agreements, see GAO, Key Controls NASA Employs to Guide Use and Management of Funded Space Act Agreements Are Generally Sufficient, but Some Could Be Strengthened and Clarified, GAO-12-230R (Washington, D.C.: Nov. 17, 2011).
In this context, you asked us to address the following objectives:

- how the current U.S. commercial space launch indemnification policy compares to other countries’ policies;
- the federal government’s potential costs under CSLAA;
- the extent to which the insurance market is able and willing to provide third party liability insurance at levels currently provided by CSLAA;
- the implications of commercial manned launches for the current federal indemnification policy, including the gaps, if any, that exist in that policy and the potential financial risks those gaps pose; and
- what is known about the direct and indirect effects that ending indemnification would have on the competitiveness of U.S. commercial launch companies.

For this work, we reviewed launch data from FAA and performed a literature search. We also reviewed documents from and conducted interviews with insurance brokers and underwriters who provide commercial launch companies with coverage for third party liability, experts in commercial space launch liability issues and risk management, representatives from launch companies and customers, and officials from FAA and NASA. We also reviewed past GAO work. Additional information on our methodology is provided in appendix I.

We conducted this performance audit from November 2011 to July 2012 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

U.S. Indemnification Policy

CSLAA established the current U.S. policy to provide federal payment, subject to appropriation—known as indemnification—for a portion of claims by third parties for injury, damage, or loss that result from a commercial launch-related incident. All FAA-licensed commercial launches and reentries by U.S. companies, whether unmanned or manned and from the United States or overseas, are covered by federal indemnification for third party damages that result from the launch or reentry.\(^5\) Launches and reentries by foreign entities are also licensed by the FAA if they take place from or into the United States and are covered by federal indemnification. Parties involved in launches and reentries—for example, passengers and crew—are not eligible for indemnification coverage.\(^6\)

U.S. indemnification policy has a three-tier approach for sharing liability between the government and the private sector to cover third party claims:

- The first tier of coverage is the responsibility of the launch company and is handled under an insurance policy purchased by the launch company. As part of FAA’s process for issuing a license for a commercial launch or reentry, the agency determines the amount of third party liability insurance a launch company is required to purchase so the launch company can compensate third parties for any claims for damages that occur as a result of activities carried out under the license. FAA calculates the insurance amount to reflect the maximum probable loss that is likely to occur because of an accident that results in third party damages, including deaths and injuries on


\(^6\)A crew includes any employee who performs activities directly relating to the launch, reentry, or other operation relating to the vehicle that carries human beings. 51 U.S.C. § 50902(2). A passenger—also called a spaceflight participant—is an individual who is not crew, carried aboard a launch vehicle or reentry vehicle. 51 U.S.C. § 50902(17).
the ground and damage to property from spacecraft debris. FAA uses a statistical approach to estimate expected losses based on estimated probabilities that a catastrophic incident could occur and the estimated costs of a catastrophic incident given the details of the specific launch. This first tier of required insurance coverage is capped at a maximum of $500 million for third party damages.

- The second tier of coverage is provided by the U.S. government, and covers any third party claims in excess of the specific first tier amount up to a limit of $1.5 billion adjusted for post-1988 inflation; in 2012, the inflation-adjusted amount was approximately $2.7 billion. For the federal government to be liable for these claims, Congress would need to appropriate funds. This second tier of coverage will expire in December 2012 unless Congress reauthorizes it. (The other two tiers have no expiration date.)

- The third tier of coverage is for third party claims in excess of the second tier—that is, the federal coverage of $1.5 billion above the first tier, adjusted for inflation. Like the first tier, this third tier is the responsibility of the launch company, which may seek insurance above the required first tier amount for this coverage. Unlike the first tier, no insurance is required under federal law.

Another component of U.S. indemnification policy for commercial space launches and reentries is cross waivers. They provide that each party involved in a launch (such as the launch company, the spacecraft manufacturer, and the customer) agrees not to bring claims against the other parties and assumes financial responsibility for damage to its own

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7 FAA makes this determination for each space launch by reviewing the specific circumstances of the launch, including the planned launch vehicle, launch site, payload, flight path, and the potential casualties and fatalities that could result from varying types of launch failures at different points along that path. FAA estimates the total cost of estimated casualties from a launch failure and uses this information as the basis for determining property damage. 51 U.S.C. § 50914(c).


property or loss or injury sustained by its own employees.\textsuperscript{11} Cross waivers also do not have an expiration date.

According to FAA, no FAA-licensed commercial space launch since 1989 has resulted in casualties or substantial property damage to third parties. Orbital launches have taken place over the ocean from launch sites not located near densely populated urban areas. In the event of a third party claim that exceeded the launch provider’s first-tier coverage, FAA would be involved in any negotiations, according to FAA officials, and the Secretary of Transportation must approve any settlement.\textsuperscript{12}

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Global Commercial Space Launch Industry & From 2002 through 2011, U.S. companies conducted approximately 17 percent of commercial space launches worldwide, while Russia conducted 43 percent and France’s launch company conducted 24 percent. Figure 2 shows the trend in number of commercial space launches over the last 10 years. \\
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\textsuperscript{11}51 U.S.C. § 50914(a)(4).
\textsuperscript{12}51 U.S.C. § 50915(b)(3).
Figure 2: Number of Commercial Space Launches Worldwide, 2002 to 2011

Over the past several years, Russian and French launches have generated the most revenues, followed by U.S. launches. Moreover, in 8 of the last 10 years, U.S. commercial launch companies generated less revenue than launches in either Russia or France. U.S. companies generated no commercial launch revenue in 2011 because they conducted no launches. (See fig. 3.)
Figure 3: Commercial Space Launch Revenues Worldwide, 2002 to 2011

Commercial revenue (in millions of dollars)

2,500

2,000

1,500

1,000

500

0

Year

2002 2003 2004 2005 2006 2007 2008 2009 2010 2011

Source: GAO analysis of FAA data.
Note: India is not included in this figure because it earned a small amount of revenue—$11 million in 2007—the only year it had a commercial launch.
The United States provides less total third party liability coverage than China, France, or Russia—the primary countries that have conducted commercial space launches in the last 5 years—according to published reports. These countries each have an indemnification regime in which the government states that it will assume a greater share of the risk compared to that of the United States because each country has a two-tiered system with no limit on the amount of government indemnification. By comparison, the United States caps government indemnification at $1.5 billion adjusted for inflation beyond the first-tier insurance amount. However, U.S. government coverage, in some cases, begins at a lower level than that of the other countries because U.S. coverage begins above the estimated maximum probable loss, which averaged about $99 million for active FAA launch and reentry licenses as of January 2012 and ranged from about $23 million to $267 million. The level at which government coverage begins for the other three countries ranged from $79 million to $300 million.

China, France, and Russia have a first tier of insurance coverage that a commercial launch company must obtain, similar to the United States. The second tier of government indemnification varies for these countries:

- The Chinese government provides indemnification for third party claims over $100 million.
- The French government provides indemnification for third party claims over 60 million euros (about $75 million in foreign exchange conversion as of May 2012).
- The Russian government provides indemnification for third party claims over $80 million for the smaller Start launch vehicles and $300 million for the larger Soyuz and Proton vehicles.

For all these countries, their commitments to pay have never been tested. Globally, there has never been a third party claim for damages from a

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13In addition, India conducted one commercial space launch during this period, but we found conflicting information on the Indian government’s indemnification coverage, and therefore, we are not including it in this discussion.

commercial space launch failure that reached second-tier government coverage.

Potential Cost of Indemnification by the Federal Government Depends on a Variety of Factors

| Catastrophic Events and Congressional Appropriations | The federal government’s potential costs under CSLAA depend on (1) the occurrence of a catastrophic launch failure with third party claims that exceed the first tier of coverage and (2) Congress appropriating funds to cover the government’s liability under the second tier of coverage. FAA officials stated that no FAA-licensed commercial space launches or reentries have resulted in casualties or substantial property damage to third parties. As a result, FAA believes that it is highly unlikely that there will be any costs to the federal government under CSLAA. In the event that a catastrophic failure did occur, FAA’s maximum probable loss calculation is intended to estimate the maximum losses likely to occur from a commercial space launch or reentry and determine the amount of third party losses against which launch companies must protect. In calculating maximum probable loss, FAA aims to include estimates of losses from events having greater than a 1 in 10 million chance of occurring, meaning that losses are very unlikely to exceed launch companies’ private insurance and become potential costs for the government under CSLAA. Under CSLAA, if a rare catastrophic event were to occur whose losses exceeded private insurance coverage, the government would be responsible for paying claims that exceeded FAA’s maximum probable loss only if Congress provided appropriations for this purpose. Under CSLAA, the federal government does not incur a legal liability unless an |
appropriation is made for this purpose. Accordingly, an obligation would not be recorded in the federal budget unless and until such an appropriation is made. While an obligation is not incurred or recorded for potential CSLAA losses until an appropriation is provided, some insurance companies told us that they expect the government to pay losses that become eligible for coverage under CSLAA.

<table>
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<tr>
<th>Maximum Probable Loss Soundness</th>
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<td>While it is very difficult to assess catastrophic failures that have low probabilities but potentially high losses, FAA’s use of an appropriate process for determining the maximum probable loss is important because the maximum probable loss sets the point at which losses become potential costs to the government under CSLAA. Several issues raise questions about the soundness of FAA’s maximum probable loss methodology:</td>
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<td>• FAA uses a figure of $3 million when estimating the cost of a single potential casualty—that includes either injury or death—which FAA officials said has not been updated since they began using it in 1988. Two insurers, as well as representatives of two companies that specialize in estimating damages from catastrophic events (modeling companies), said that this figure is likely understated. Because this number has not been adjusted for inflation or updated in other ways, it may not adequately represent the current cost of injury or death caused by commercial space launch failures. Having a reasonable casualty estimate can affect FAA’s maximum probable loss calculation and could affect the potential cost to the government from third party claims.</td>
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<td>• FAA’s methodology for determining potential property damage from a commercial space launch starts with the total cost of casualties and adds a flat 50 percent to that cost as the estimate of property damage, rather than specifically analyzing the number and value of properties that could be affected in the event of a launch failure. One insurer and two risk modelers said that FAA’s approach is unusual and generally not used to estimate potential losses from catastrophic events. For</td>
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15CSLAA requires the Secretary of Transportation to provide for the payment of specific types of successful third party claims to the extent provided in advance in an appropriation law or to the extent additional legislative authority is enacted providing for paying for claims in a compensation plan submitted to Congress by the President. 51 U.S.C. § 50915 (a)(1).
example, officials from both modeling companies noted that the more common approach is to model the property losses first and derive the casualty estimates from the estimated property losses. For example, if a property loss scenario involves the collapse of a building, that scenario would have a different casualty expectation than a scenario that did not involve such a collapse. One modeler stated that FAA’s method might significantly understate the number of potential casualties, noting that an event that has a less than 1 in 10 million chance of occurring is likely to involve significantly more casualties than predicted under FAA’s approach. Moreover, a 2007 FAA review conducted with outside consultants said that this approach is not recommended because of observed instances where casualties were low yet forecasted property losses were very large.16


• More broadly, FAA’s method does not incorporate what is known in the insurance industry as “catastrophe modeling.” One modeler told us that catastrophe modeling has matured over the last 25 years—as a result of better data, more scientific research, and advances in computing—and has become standard practice in the insurance and reinsurance industries.17 Catastrophe models consist of two components: a computer program that mathematically simulates the type of event being insured against and a highly detailed database of properties that could potentially be exposed to loss. Tens of thousands or more computer simulations are generated to create a distribution of potential losses and the simulated probability of different levels of loss.18 In contrast, FAA’s method involves estimating a single loss scenario.

FAA officials told us that they have considered the possibility of using a catastrophe model. However, they expressed concern about whether the more sophisticated approach would be more accurate, given the great uncertainty about the assumptions, such as the probability and size of

17 Reinsurance is essentially insurance for insurers—that is, insurance companies buy coverage for all or a part of a policy’s liability from other insurers in order to offset exposure.

18 The probability distribution of losses is typically presented in what is known as an exceedance probability curve, which shows the probability of losses exceeding various levels.
potential damages that must be made with any model. Also, industry experts told us that a significant cost factor in catastrophe modeling is creating and maintaining a detailed database of exposed properties. One expert told us that for FAA to do such modeling, it would need to purchase a property exposure database, which could cost hundreds of thousands of dollars. Experts also disagreed about how feasible it would be to mathematically model the potential damages associated with space launches. One expert thought such modeling would not be credible because the necessary knowledge of the factors that can influence a space launch is not at the same level as the more developed research for modeling hurricanes, for example. Another expert thought that it would be possible to develop credible space launch simulation models. Another expert stated that such models have not been developed to date because of the government-provided indemnity coverage; this expert believed that if such coverage were the responsibility of the private sector, the necessary models might be developed.

FAA officials also said that they believe the maximum probable loss methodology is reasonable and produces conservative results for several reasons. First, FAA officials described a 2002 study on aviation casualty costs to support its use of a $3 million casualty figure in its methodology. Use of a casualty estimate that is based on 2002 data, however, still raises questions about whether this figure is outdated, which could result in underestimating the cost of casualties. Second, to support basing the potential cost of property damage on the potential cost of casualties, FAA officials said that they have conducted internal analyses using alternative methodologies—including some that assessed property values in the vicinity of launches—and compared them to their current methodology. In each case, officials said that the current methodology produced higher, or more conservative, maximum probable losses. We were unable to review or verify these analyses, however, because FAA officials said that these analyses were done informally and were not documented.

FAA officials acknowledged that updating the $3 million casualty figure and conducting analyses of potential property damage (rather than using a casualty cost adjustment factor of 50 percent) might produce more precise estimates of maximum probable losses. However, they said that because the probabilities assigned to such losses are still rough estimates, whether taking these actions would increase the accuracy of their maximum probable loss calculations is uncertain. Overall, they said, use of more sophisticated methodologies would have to be balanced with the additional costs to both FAA and the launch companies that would result from requiring and analyzing additional data. For example, a new
methodology might require either FAA or the launch company to gather current property information, and might necessitate that FAA construct a statistical model for analyzing potential losses.

The same officials noted that they periodically evaluate their current maximum probable loss methodology, but acknowledged that they have not used outside experts or risk modelers for this purpose. They agreed that such a review could be beneficial, and that involvement of outside experts might be helpful for improving their maximum probable loss methodology. FAA’s 2007 review of potential alternatives identified a number of criteria for a sound maximum probable loss methodology that could be useful in such a review. These included, among other things, that the process use a valid risk analysis, be logical and lead to a rational conclusion, and avoid being overly conservative or under conservative. A sound maximum probable loss calculation can be beneficial to both the government and launch companies because it can help ensure that the government is not exposed to greater costs than intended (such as might occur through an understated maximum probable loss) and help ensure that launch companies are not required to purchase more insurance coverage than necessary (such as might occur through an overstated maximum probable loss).

Private Market
Generally Offers $500 Million in Coverage per Launch

Private Capacity

Some insurers and brokers suggested that the maximum amount of private sector third party liability coverage the industry is currently willing to provide is generally around $500 million per launch. This amount, or capacity, is determined by the amount of their own capital that individual insurers are willing to risk by selling this type of coverage. According to some insurers and brokers with whom we spoke, commercial space launch third party liability coverage is a specialized market involving a relatively small number of insurers that each assume a portion of the risk for each launch. One broker said that no launch company thus far has pursued private sector insurance protection above $500 million. Two insurers said that there might be slightly more coverage available beyond $500 million, and one said that up to $1 billion per launch in liability coverage might be possible in the private insurance market.
The cost to launch companies for purchasing third party liability insurance, according to some brokers and one insurer, is approximately 1 percent or less of the total coverage amount. According to FAA data on commercial launches, the average maximum probable loss is about $99 million. As a result, in the absence of CSLAA indemnification, insurers could still provide some of the coverage currently available through the government under CSLAA. For example, if the maximum probable loss for a launch is $100 million and the insurance industry is willing to offer up to $500 million in coverage, the private market could potentially provide $400 million in additional coverage.

According to some insurers, brokers, and insurance experts with whom we spoke, there are a number of reasons why private sector insurers are generally unwilling to offer more third party liability coverage than $500 million per launch.

- First, these brokers and insurers said that worldwide capacity for third party liability coverage is generally limited to $500 million per launch, which some considered a significant amount of coverage and a challenging amount to put together—particularly given that the number of insurers in the space launch market is relatively small.

- Second, according to these same officials, insurers are unwilling to expose their capital above certain amounts for coverage that at least currently brings in small amounts of premium relative to the potential payouts for losses. For example, they said that losses from a catastrophic launch accident could exceed many years of third party liability policy premiums and jeopardize insurers' solvency.

- Third, according to some insurers and brokers with whom we spoke, to have sufficient capital to pay for losses above $500 million per launch would require insurers to charge policy premiums that would likely be unaffordable for space launch companies.

Changes to Market Capacity

The current amount of private market capacity could change due to loss events and changing market conditions, according to some insurance industry participants. Some insurers and brokers said that a launch failure could affect the level and cost of coverage offered, and that a launch failure with significant losses could quickly raise insurance prices and reduce capacity, potentially below levels required by FAA’s maximum probable loss calculation. However, one risk expert suggested that a space launch failure would likely cause liability insurance rates to rise and that this might encourage insurers and capital to enter the space launch
market and cause liability insurance capacity to increase. According to FAA, insurers have paid no claims for U.S. commercial launches to date, but they have paid some relatively small third party claims for U.S. military and NASA launch failures. For example, according to an insurance broker, a U.S. Air Force launch failure in 2006 resulted in property damage of approximately $30 million. According to NASA, the Space Shuttle Columbia accident in 2003 resulted in property damage of approximately $1.2 million. Two brokers said that given the low number of launches and low probability of catastrophic events, total worldwide premiums for space liability coverage are approximately $25 million annually, amounts insurers believe are adequate to cover expected losses. However, if a large loss occurs, according to two insurers, they would likely increase their estimates of the potential losses associated with all launches.

Under CSLAA, launch companies must purchase coverage to meet FAA’s maximum probable loss amount or purchase the maximum amount of coverage available in the world market at reasonable cost, as determined by FAA. The potential cost to the government could increase if losses caused insurance prices to rise and insurance amounts available at reasonable cost to decrease. Some insurers and brokers also said that the amount of insurance the private market is willing to sell for third party liability coverage for space launches can also be affected by changes in other insurance markets. For example, large losses in aviation insurance or in reinsurance markets could decrease the amount of capital insurers would be willing to commit to launch events because losses in the other markets would decrease the total pools of capital available.

| Alternatives for Addressing Space Launch Risk | Because launch failures and changing market conditions could change the amounts of coverage available in the private market, we identified other possible ways of managing catastrophic risk. While we have not conducted specific work to analyze the feasibility of alternative approaches for providing coverage currently available through CSLAA, FAA and others have looked at possible alternatives to CSLAA indemnification and we have examined different methods for addressing the risk of catastrophic losses associated with natural disasters and acts |
of terrorism. These events, like space launch failures, have a low probability of occurrence but potentially high losses. Some methods involve the private sector, including going beyond the traditional insurance industry, in providing coverage, and include the use of catastrophe bonds or tax incentives to insurers to develop catastrophe surplus funds. Other methods aid those at risk in setting aside funds to cover their own and possibly others’ losses, such as through self-insurance or risk pools. Still other methods, such as those used for flood and terrorism insurance, involve the government in either providing subsidized coverage or acting as a backstop to private insurers.

Use of any such alternatives could be complex and would require a systematic consideration of their feasibility and appropriateness for third party liability insurance for space launches. For example, according to a broker and a risk expert, a lack of loss experience complicates possible ways of addressing commercial space launch third party liability risk, and according to another risk expert, any alternative approaches for managing this risk would need to consider key factors, including the

- number of commercial space launch companies and insurers and annual launches among which to spread risk and other associated costs;
- lack of launch and loss experience and its impact on predicting and measuring risk, particularly for catastrophic losses; and
- potential cost to private insurers, launch companies and their customers, and the federal government.

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20See GAO, Catastrophe Insurance Risks: Status of Efforts to Securitize Natural Catastrophe and Terrorism Risk, GAO-03-1033 (Washington, D.C.: Sept. 24, 2003). Self-insurance occurs when an entity assumes the risk for its losses and can involve the formation of an insurance company solely for that purpose. Risk pooling occurs when two or more entities agree to set aside funds to help pay for the others’ losses.

As such, alternatives could potentially require a significant amount of time to implement.

Forecasted Increase in Manned Launches and Reentries Could Increase Potential Federal Government Costs; Current Coverage Has a Gap

Issues and Implications for Commercial Manned Launches and Reentries

The planned increase in manned commercial launches and reentries raises a number of issues that have implications for the federal government’s indemnification policy for third party liability, according to insurance officials and experts with whom we spoke. NASA expects to begin procuring manned commercial launches to transport astronauts to the ISS in 2017. In addition, private companies are also developing space launch vehicles that could carry passengers for space tourism flights.

First, the number of launches and reentries covered by federal indemnification will increase with NASA’s planned manned launches, which will be FAA-licensed commercial launches and reentries. NASA expects to procure from private launch companies 2 manned launches per year to the ISS from 2017 to 2020. In addition, a space tourism industry may also increase the number of launches and reentries covered by federal indemnification, but the timing of these launches and reentries

22NASA-contracted launches for NASA’s science missions are not currently covered by CSLAA; rather, NASA requires its launch contractors to obtain insurance coverage for third party losses. The amount of the insurance required by NASA is the maximum amount available in the commercial marketplace at reasonable cost, but does not exceed $500 million for each launch. The facts and circumstances for claims in excess of this amount would be forwarded by NASA to the Congress for its consideration. 51 U.S.C. § 20113 (m) (2). NASA-contracted launches for the Commercial Resupply Services to the ISS will be licensed by the FAA under CSLAA, and will be covered by CSLAA indemnification.
is uncertain. Virgin Galactic plans to conduct suborbital, manned launches and reentries. Virgin Galactic forecasts launches starting in 2014 and, according to the company, 500 individuals have made deposits for the $200,000 fare. However, Virgin Galactic has not yet applied to FAA for a launch license and its planned schedule for flights has experienced delays in the past.

According to insurance company officials with whom we spoke, the potential volume of manned launches and reentries for NASA and for space tourism could increase the overall amount of insurance coverage needed by launch companies, which could raise insurance costs, including those for third party liability. By increasing the volume of launches and reentries, the probability of a catastrophe occurring is also increased and any accident that occurs could also increase future insurance costs, according to insurance company officials with whom we spoke. A catastrophic accident could also result in third party losses over the maximum probable loss, which would invoke federal indemnification.

Second, because newly developed manned launch vehicles have less launch history they are viewed by the insurance industry as more risky than “legacy” launch vehicles. Insurance company officials told us that launch vehicles such as United Launch Alliance’s Atlas V, which launches satellites and may be used for future manned missions, is seen as less risky than new launch vehicles, such as SpaceX’s Falcon 9, which could also be used for manned missions. As of May 2012, Atlas V has had over two dozen launches with a 100 percent launch success rate; Falcon 9 has had 3 successful launches and 2 successful reentries. According to insurance company officials with whom we spoke, they expect to charge higher insurance premiums for newly developed launch vehicles than legacy launch vehicles given their different risk profiles. Insurance company officials’ opinions varied as to when a launch vehicle is deemed reliable—from 5 to 10 successful launches. They also told us that whether vehicles are manned is secondary to the launch vehicle’s history and the launch’s trajectory—over water or land—in determining risk and the price and amount of third party liability coverage.

Launch providers obtain insurance in addition to that for third party liability, including coverage of assets, such as the launch vehicle.
Third, having people on board a space vehicle raises issues of informed consent and cross waivers, which could affect third party liability and the potential cost to the federal government. CSLAA requires passengers and crew on spaceflights to be informed by the launch company of the risks involved and to sign a reciprocal waiver of claims (also called a cross waiver) with the federal government—which means that if an accident occurs the party agrees not to seek claims against the federal government, which would have licensed the launch. CSLAA also requires cross waivers among involved parties in a launch except for spaceflight passengers. Two key issues dealing with cross waivers include the heirs of spaceflight passengers and crew and limits on liability for involved parties.

- The heirs of spaceflight passengers and crew, which are considered third parties to a launch and part of the general public as they are not involved in a launch, are not covered by the informed consent and cross waiver of claims, according to two insurance companies and one legal expert. Although an insurance company said that it would be difficult for heirs to seek damages in case of an accident, the legal expert said that the informed consent requirement does not address future litigation issues. Officials from two insurance companies and one expert told us that they expect spaceflight passengers to be high-income individuals, which could result in large insurance claims by heirs of the passengers, as determination of the amount of claims is based on an individual’s expected earning capacity over his or her lifetime.

- According to two insurance companies and two legal experts, requiring cross waivers among the crew, the launch company, and other involved parties may not minimize potential third party claims as they would not place limitations on liability. An insurance company and a legal expert stated that, without a limitation on liability, insurance premiums for third party and other launch insurance coverage could increase as the same small number of insurance companies insures passengers, crew, launch vehicles, as well as third parties to a launch. According to FAA, putting a limitation on spaceflight passenger liability could foster the development of the commercial space launch industry through lower costs for insurance and liability exposure. Liability exposure and the related litigation impose costs on industries and the limitation on liability shifts the risk to spaceflight passengers, who have been informed of the launch risks. If limitations on liability were set by federal legislation, it could conflict with state law because at least five states currently have their
own space liability and indemnity laws limiting liability.\textsuperscript{24} Launch and insurance companies believe that a limit or cap on passenger liability could decrease uncertainty and consequently decrease the price of insurance, according to an FAA task force report.\textsuperscript{25}

As previously discussed, the potential cost to the government depends on the accuracy of the maximum probable loss calculation, which assesses a launch’s risk. If the calculation is understated, then the government’s exposure to liability is higher. Thus, whether the launch vehicle is newly developed or manned, the effect on the government’s potential cost for third party claims is still based on how accurately the maximum probable loss calculation assesses launch risks. FAA officials told us that they intend to use the same maximum probable loss assessment method for manned launches and reentries as they currently do with unmanned launches.

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\textbf{Gap in Federal Indemnification} & Officials from the insurance industry and space launch companies and an expert told us that a gap in federal indemnification is the lack of coverage of on-orbit activities—that is, activities not related to launch or reentry, such as docking with the ISS and relocating a satellite from one orbit to another orbit—but they did not agree on the need to close this gap. FAA licenses commercial launches and reentries, but does not license on-orbit activities. Federal indemnification only applies to FAA-licensed space activities. NASA’s commercial manned launches to the ISS will involve on-orbit activities, including docking with the ISS, will be subject to the cross waivers of liability required by agreements with participating countries. This cross waiver is not applicable when CSLAA is applicable, such as during a licensed launch or reentry, and it does not address liability for damage to non-ISS parties such as other orbiting spacecraft. Claims between NASA and the launch company are not affected by the ISS cross waiver and are historically addressed as a contractual agreement. In addition, Virgin Galactic operations will only have suborbital launches and reentries and no on-orbit activities that require regulation. Therefore, according to officials from two launch companies, they do not believe that on-orbit activities need to be regulated by FAA or that federal indemnification coverage should be provided. However, one\\
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\textsuperscript{24}Those states are Colorado, Florida, New Mexico, Texas, and Virginia.

An insurer noted that other proposed manned launches—such as an on-orbit “hotel” that is in development—will not be NASA related and therefore will not be covered by any regulatory regime. An expert noted that such a proposal for an on-orbit hotel remains an open question regarding regulation and liability exposure. In addition, the expert noted that federal oversight of on-orbit activities may be needed to provide consistency and coordination among agencies that have on-orbit jurisdiction. He pointed out that the Federal Communications Commission and the National Oceanic and Atmospheric Administration have jurisdiction over their satellites and NASA has jurisdiction over the ISS. Thus, according to the expert, there should be one U.S. agency that coordinates regulatory authority over on-orbit activities. If such authority were granted to one agency, then that agency may need to establish memorandums of understanding with other agencies involved in on-orbit activities.

FAA may seek statutory authority over on-orbit activities, according to senior agency officials. They further explained that they are not seeking on-orbit authority for satellite or spectrum usage. An insurer told us that having FAA in charge from launch to reentry would help ensure that there were no gaps in coverage. According to this insurer, this would help bring stability to the insurance market in the event of an accident as involved parties would be clear on which party is liable for which activities. However, having FAA license on-orbit activities would increase the potential costs to the federal government for third party claims. If FAA obtains authority to license on-orbit activities then the potential costs to the government may increase as its exposure to risk increases.

The actual effects that eliminating CSLAA indemnification would have on the competitiveness of U.S. commercial launch companies are unknown. For example, we do not know how insurance premiums or other costs might change as well as the availability of coverage. In addition, we do not know whether or to what extent launch customers might choose foreign launch companies over U.S. companies. Furthermore, it is difficult to separate out the effects of withdrawing indemnification on the overall competitiveness of the U.S. commercial space launch industry. Many factors affect the industry’s competitiveness, including other U.S. government support, such as research and development funds, government launch contracts, and use of its launch facilities, in addition to the third party indemnification.

While the actual effects on competition of eliminating CSLAA indemnification are unknown, several launch companies and customers...
with whom we spoke said that in the absence of CSLAA indemnification, increased risk and higher costs would directly affect launch companies and indirectly affect their customers and suppliers. The same participants said that two key factors—launch price and launch vehicle reliability—generally determine the competitiveness of launch companies. According to two launch customers, launch prices for similar missions can vary dramatically across countries. For example, two customers said that a similar launch might cost about $40 million to $60 million with a Chinese launch company, about $80 million to $100 million with a French launch company, and approximately $120 million with a U.S. launch company. However, another U.S. launch company told us that it is developing a vehicle for a similar launch for which it intends to charge about $50 million. Other considerations also would be involved in selecting a launch company, according to launch customers with whom we spoke. For example, some said that export restrictions for U.S. customers could add to their costs or prevent them from using certain launch companies. One launch customer also said that it considers the costs of transporting the satellite to the launch site as well as other specific aspects of a given launch.

Launch company officials said that the lack of government indemnification would decrease their global competitiveness by increasing launch costs. Launch company officials said their costs would increase as a result of their likely purchase of greater levels of insurance to protect against the increased potential for third party losses, as the launch companies themselves would be responsible for all potential third party claims, not just those up to the maximum probable loss amount. As previously discussed, whether the private insurance market has the capacity to provide coverage at levels currently provided by the government, or at what price they might sell such coverage, is uncertain. Some launch company officials said that their costs may also increase if their suppliers decided to charge more for their products or services as a result of being at greater risk from a lack of CSLAA indemnification. That is, to compensate for their greater exposure to potential third party claims, some suppliers might determine that they need to charge more for their products to cover the increased risks they are now assuming. Some launch companies told us that they would likely pass additional costs on to their customers by increasing launch prices. Two launch customers told us that in turn, they would pass on additional costs to their customers. Several also told us that they might increase the amount of their own third party liability insurance, another cost they might pass on to their customers. Two said they might be more likely to choose a foreign provider if the price of U.S. launches rose.
According to launch companies and customers we spoke with, ending CSLAA indemnification would also decrease the competitiveness of U.S. launch companies because launch customers would be exposed to more risk than if they used launch companies in countries with government indemnification. For example, officials from several launch companies and customers said that if some aspect of the launch payload is determined to have contributed to a launch failure, they could be exposed to claims for damages from third parties. Launch customers are currently protected from such claims through the CSLAA indemnification program. Several launch customers with whom we spoke said that without CSLAA indemnification they might be more likely to use a launch company in a country where the government provides third party indemnification.

According to launch companies with whom we spoke, ending CSLAA indemnification could also have other negative effects. For example, some said that the increased potential for significant financial loss for third party claims could cause launch companies, customers, or suppliers to reassess whether the benefits of staying in the launch business outweigh the risks. If some companies decided it was no longer worthwhile to be involved in the launch business, it could result in lost jobs and industrial capacity. Lastly, one industry participant pointed out that some suppliers, such as those that build propulsion systems, have to maintain significant amounts of manufacturing capacity whether they build one product or many. If there are fewer launches, the cost of maintaining that capacity will be spread among these fewer launches, resulting in a higher price for each launch. To the extent that the federal government is a customer that relies on private launch companies for its space launch needs, it too could face potentially higher launch costs.

Conclusions

Although the number of commercial launches by U.S. companies has generally declined since 2008, commercial space is a dynamic industry with newly developing space vehicles and missions. With the termination of the shuttle program, NASA plans to procure cargo delivery to the ISS from private launch companies in 2012 and intends to use private companies to carry astronauts to the ISS starting in 2017. In addition, private launch companies have been developing launch vehicles that will eventually carry passengers as part of an emerging space tourism industry. Both of these developments would increase the number and type of flights eligible for third party liability indemnification under CSLAA. As the industry changes and grows, periodically assessing federal liability indemnification policy to ensure that it protects both launch companies and the federal government will be important. This assessment would be
affected by the amount of coverage the insurance industry is willing to provide for space launches. This amount depends on a number of factors including the number of launches and reentries and insurers’ ability to evaluate the underlying risks. To the extent private insurance capacity might increase, it could reduce the need for indemnification under CSLAA. It is also possible, however, that certain events, such as a launch failure with large losses, could reduce insurance industry capacity for this type of coverage. Review of potential alternative means for addressing the financial risks associated with space launches, while beyond the scope of this work, would also be an important part of any periodic assessment of CSLAA indemnification.

Several factors raise questions about FAA’s methodology for determining the maximum probable loss for a commercial space launch or reentry, which determines the amount of insurance coverage launch companies must buy and the amount above which government indemnification begins. Although FAA believes its approach is conservative, we believe that the maximum probable loss methodology needs to be updated. For example, FAA uses a dollar amount for estimating space launch losses from casualties and fatalities that the insurance industry says is outdated. Moreover, FAA has not had outside experts and risk modelers review its methodology. In addition, FAA uses this estimate of losses from casualties and fatalities as the basis for estimating potential property damage, an approach that could underestimate property losses. We agree with FAA that the benefits of developing and implementing a potentially more comprehensive maximum probable loss methodology need to be balanced against the possible increased costs to the agency and launch companies. However, the importance of a sound calculation suggests that a review of the current methodology would be a worthwhile effort. An inaccurate maximum probable loss value could increase the cost to launch companies by requiring them to purchase more coverage than is necessary, or result in greater federal government exposure to expenditures.

Recommendation for Executive Action

To better ensure the accuracy of FAA’s determination of the amount of insurance coverage required for an FAA commercial space launch license, we recommend that the Secretary of Transportation direct the Associate Administrator for Commercial Space Transportation to review and periodically reassess FAA’s maximum probable loss methodology—including assessing the reasonableness of the assumptions used. For these reviews, the Associate Administrator should consider using external
experts such as risk modelers, document the outcomes, and adjust the methodology, as appropriate, considering the costs.

We provided a draft of this report to the Department of Transportation and NASA for their review and comment. The Department of Transportation provided technical clarifications, which we incorporated as appropriate. NASA had no comments.

We are sending copies of this report to interested congressional committees, the Secretary of the Department of Transportation, and the Administrator of the National Aeronautics and Space Administration. In addition, this report will be available at no charge on GAO’s Web site at http://www.gao.gov.

If you or your staff have any questions or would like to discuss this work, please contact Alicia Puente Cackley at (202) 512-8678 or cackleya@gao.gov or Gerald L. Dillingham, Ph.D. at (202) 512-2834 or dillinghamg@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. Individuals making key contributions to this report are listed in appendix II.

Alicia Puente Cackley
Director, Financial Markets and Community Investment

Gerald L. Dillingham, Ph.D.
Director, Physical Infrastructure Issues
Appendix I: Objectives, Scope, and Methodology

Our objective was to assess the Commercial Space Launch Act Amendments of 1988 (CSLAA) indemnification policy. To accomplish this, we addressed the following: (1) how the current U.S. commercial space launch indemnification policy compares to other countries' policies; (2) the federal government's potential costs under CSLAA; (3) the extent to which the insurance market is able and willing to provide third party liability insurance at levels currently provided by CSLAA; (4) the implications of commercial manned launches for the current federal indemnification policy, including the gaps, if any, that exist in that policy and the potential financial risks those gaps pose; and (5) what is known about the direct and indirect effects that ending indemnification would have on the competitiveness of U.S. commercial launch companies.

To determine how the current U.S. commercial space launch indemnification policy compares to policies in other countries, we conducted a literature review and selected four countries for comparison—China, France, India, and Russia—because they are the only countries other than the United States that have conducted commercial space launches in the last 5 years. Our source for the amounts of government indemnification provided by these countries is a 2006 Aerospace Corporation report and a 2002 Federal Aviation Administration (FAA) report. To the extent possible, we verified information from the literature review through discussions with officials from FAA, insurance companies, launch companies, and experts. We did not find sufficiently reliable information about India to report on its government indemnification.

To determine the federal government’s potential costs under CSLAA, we reviewed CSLAA, our past work on the budget treatment of insurance programs, and FAA’s maximum probable loss calculation. We also interviewed FAA officials and experts in risk modeling. To determine the extent to which the insurance market is able and willing to provide third party liability insurance at levels currently provided by CSLAA, we reviewed CSLAA to determine the amount of coverage the act provides commercial launch companies; reviewed relevant industry reports; and interviewed officials from FAA, insurance companies, and brokerage

companies. We also interviewed launch company officials to determine the additional coverage they might seek absent CSLAA indemnification. To determine a range of paid claims, we reviewed data from the National Aeronautics and Space Administration (NASA) on third party claims that have been paid as the result of the Space Shuttle Columbia accident and from an insurance official on third party claims paid as a result of a U.S. Air Force launch accident. Based on our discussions with NASA officials and an insurance broker involved in the U.S. Air Force claims, we found the data sufficiently reliable for our purposes.

To determine issues and implications of commercial manned launches for the current federal indemnification policy, including the gaps, if any, that exist in that policy and the potential financial risks those gaps pose, we interviewed officials from FAA, NASA, insurance companies, brokerage companies, and launch companies; and experts. To determine what is known about the effects of ending indemnification on the competitiveness of U.S. commercial launch companies, we conducted interviews with officials from launch companies, launch customers, and industry associations, and experts. We also obtained information from FAA on launches and revenues from 2002 through 2011. As the information was used for background, we did not assess the reliability of the data.

We selected launch companies, insurance companies, brokerage companies, and launch customers for interviews that had conducted or participated in commercial launches in the past 5 years. In addition, we selected launch companies that are competing to conduct commercial launches as part of NASA’s Commercial Crew Development program or plan to conduct launches and reentries for space tourism. We also selected launch customers to include U.S. companies and foreign companies and those that had used both U.S. and foreign launch companies. We selected experts to interview to provide a variety of expertise, including space liability, risk modeling, and space law issues. Table 1 lists the organizations and agencies whose officials we interviewed as well as the experts we interviewed.
### Table 1: Organizations, Agencies, and Experts Interviewed

<table>
<thead>
<tr>
<th>Category</th>
<th>Organization, agency, or individual</th>
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<tr>
<td>Brokerage company</td>
<td>AON</td>
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<td></td>
<td>Marsh USA</td>
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<td></td>
<td>Willis Inspace</td>
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<td>Insurance company</td>
<td>Chartis Europe Limited</td>
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<td></td>
<td>Global Aerospace</td>
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<td></td>
<td>XL Insurance</td>
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<td>Launch company</td>
<td>The Boeing Company</td>
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<td></td>
<td>Orbital Sciences Corporation</td>
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<td></td>
<td>Sierra Nevada Corporation Space Systems</td>
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<td></td>
<td>Space Exploration Technologies Corp (SpaceX)</td>
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<tr>
<td>Launch customer</td>
<td>Digital Globe</td>
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<td></td>
<td>GeoEye</td>
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<tr>
<td>Risk modeling company</td>
<td>AIR Worldwide</td>
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<td></td>
<td>Risk Management Solutions</td>
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<tr>
<td>Industry association</td>
<td>The American Academy of Actuaries</td>
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<tr>
<td></td>
<td>Aerospace Industries Association&lt;sup&gt;b&lt;/sup&gt;</td>
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<tr>
<td></td>
<td>Satellite Industry Association</td>
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<tr>
<td>Federal agency</td>
<td>FAA</td>
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<tr>
<td></td>
<td>NASA</td>
</tr>
<tr>
<td>Expert</td>
<td>Henry R. Hertzfeld, Research Professor, Elliott School of International Affairs, Space Policy Institute and Adjunct Professor of Law, The George Washington University</td>
</tr>
<tr>
<td></td>
<td>Howard Kunreuther, James G. Dinan Professor of Decision Sciences &amp; Public Policy, Co-Director Risk Management and Decision Processes Center, Wharton School, University of Pennsylvania</td>
</tr>
<tr>
<td></td>
<td>Rosanna Sattler, Partner, Posternak, Blankstein, and Lund LLP</td>
</tr>
</tbody>
</table>

Source: GAO.

<sup>a</sup>An additional insurance company and launch customer were interviewed but did not wish to be identified.

<sup>b</sup>Aerospace Industries Association convened a panel that included the launch companies Lockheed Martin, Virgin Galactic, and ATK.

We conducted this performance audit from November 2011 to July 2012 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.
## Appendix II: GAO Contacts and Staff Acknowledgments

### GAO Contacts

| Alicia Puente Cackley at (202) 512-8678 or cackleya@gao.gov and Gerald L. Dillingham, Ph.D. at (202) 512-2834 or dillinghamg@gao.gov |

### Staff Acknowledgments

In addition to the contacts named above, Teresa Spisak and Patrick Ward (Assistant Directors), Maureen Luna-Long, James Geibel, Carol Henn, David Hooper, Shelby Oakley, Susan Offutt, Amy Rosewarne, Steve Ruszczyk, Melvin Thomas, and Frank Todisco made key contributions to this report.
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Assembly Bill No. 2243

CHAPTER 416

An act to add Article 5 (commencing with Section 2210) to Chapter 5 of Title 7 of Part 4 of Division 3 of the Civil Code, relating to space flight.

[Approved by Governor September 21, 2012. Filed with Secretary of State September 21, 2012.]

LEGISLATIVE COUNSEL’S DIGEST


Existing state law governs common carriers, including contracts for the conveyance of property, persons, or messages from one place to another.

Federal law specifically governs commercial space flight activities. Among other provisions, federal law requires that space flight providers obtain both the written consent of space flight participants and liability insurance.

This bill would require a space flight entity, as defined, to collect a signed warning statement, as specified, from each participant in space flight activities, as defined. In addition to the disclosures required by federal law, the bill would require the warning statement to, at a minimum, inform the participant that there is limited civil liability for bodily injury sustained as a result of the inherent risks associated with space flight activities. The bill would limit the liability of a space flight entity that complies with these provisions, except as provided.

The people of the State of California do enact as follows:

SECTION 1. This act shall be known and may be cited as the Space Flight Liability and Immunity Act.

SEC. 2. Article 5 (commencing with Section 2210) is added to Chapter 5 of Title 7 of Part 4 of Division 3 of the Civil Code, to read:

Article 5. Space Flight Liability and Immunity

2210. For purposes of this article:
(a) “Participant” means a space flight participant as defined in Section 50902 of Title 51 of the United States Code.
(b) “Participant injury” means a bodily injury, including death, emotional injury, or property damage, sustained by the participant.
(c) “Space flight activities” means launch services or reentry services as defined in Section 50902 of Title 51 of the United States Code.
(d) “Space flight entity” means any public or private entity that holds, either directly or through a corporate subsidiary or parent, a license, permit,
or other authorization issued by the United States Federal Aviation Administration pursuant to the federal Commercial Space Launch Amendments Act of 2004 (51 U.S.C. Sec. 50905 et seq.), including, but not limited to, a safety approval and a payload determination.

2211. (a) A space flight entity providing space flight activities to a participant shall have each participant sign a warning statement that shall contain, at a minimum, and in addition to any language required by federal law, the following notice:

“WARNING AND ACKNOWLEDGMENT: I understand and acknowledge that, under California law, there is limited civil liability for bodily injury, including death, emotional injury, or property damage, sustained by a participant as a result of the inherent risks associated with space flight activities provided by a space flight entity. I have given my informed consent to participate in space flight activities after receiving a description of the inherent risks associated with space flight activities, as required by federal law pursuant to Section 50905 of Title 51 of the United States Code and Section 460.45 of Title 14 of the Code of Federal Regulations. The consent that I have given acknowledges that the inherent risks associated with space flight activities include, but are not limited to, risk of bodily injury, including death, emotional injury, and property damage. I understand and acknowledge that I am participating in space flight activities at my own risk. I have been given the opportunity to consult with an attorney before signing this statement.”

(b) Failure to comply with the requirements provided in this section shall prevent a space flight entity from invoking the privileges of immunity provided by Section 2212.

2212. (a) Except as provided in subdivision (c), a space flight entity shall not be liable for participant injury arising out of space flight activities if both of the following apply:

1. The participant has been informed of the risks associated with space flight activities as required by federal law and Section 2211.

2. The participant has given his or her informed consent that he or she is voluntarily participating in space flight activities after having been informed of the risks associated with those activities, as required by federal law and Section 2211.

(b) If informed consent is given pursuant to subdivision (a), a participant, his or her representative, including the heirs, administrators, executors, assignees, next of kin, and estate of the participant, or any person who attempts to bring a claim on behalf of the participant for a participant injury, shall not be authorized to maintain an action against, or recover from, a space flight entity for a participant injury that resulted from the risks associated with space flight activities, except as provided in subdivision (c).

(c) Nothing in this section shall prevent or limit the liability of a space flight entity that does any of the following:
(1) Commits an act or omission that constitutes gross negligence or willful or wanton disregard for the safety of the participant, and that act or omission proximately causes a participant injury.

(2) Intentionally causes a participant injury.

(3) Has actual knowledge or reasonably should have known of a dangerous condition on the land or in the facilities or equipment used in space flight activities and the dangerous condition proximately causes injury, damage, or death to the participant.

(d) Any limitation on legal liability afforded by this section to a space flight entity is in addition to any other limitations of legal liability otherwise provided by law.

(e) Nothing in this section shall be construed to limit the liability of a manufacturer of a part or component used in space flight activities if a defective part or component proximately causes an injury to the participant.
SENATE BILL 12-035

BY SENATOR(S) Hodge, Aguilar, Boyd, Cadman, Giron, Guzman, Heath, Hudak, Jahn, Johnston, King K., King S., Lambert, Lundberg, Morse, Neville, Newell, Roberts, Scheffel, Schwartz, Spence, Tochtrop, White, Williams S., Shaffer B.; also REPRESENTATIVE(S) Gardner B., Barker, Baumgardner, Brown, Gerou, Kerr J., Peniston, Priola, Ryden, Summers, Waller.

CONCERNING LIMITED LIABILITY FOR SPACEFLIGHT ACTIVITIES.

Be it enacted by the General Assembly of the State of Colorado:

SECTION 1. Legislative declaration. (1) The general assembly hereby finds and declares that:

(a) Colorado has the second-largest aerospace workforce in the United States and is uniquely positioned to become a national and international leader in horizontal take-off commercial spaceflight;

(b) Colorado's mile-high altitude affords significant advantages for spaceport activities;

(c) Eight of the nation's top aerospace contractors have significant operations in Colorado, and metro Denver has the highest concentration of...
private sector aerospace employment in the country;

(d) Colorado's academic institutions have an outstanding record of success in training and research in space-related activities, and Colorado's universities are among the world's best for aerospace engineering;

(e) Denver International Airport and Front Range Airport are geographically ideal for commercial space-related activities and cargo transport;

(f) The governor of Colorado has endorsed the recent application of Front Range Airport to be designated a spaceport by the United States government;

(g) The economic activity generated by the designation and operation of Front Range Airport as a spaceport would be a significant factor in the creation of numerous primary employment opportunities for the people of Colorado;

(h) Commercial spaceflight activities in Colorado would lead to the creation and retention of numerous small- to medium-sized businesses that would help further stimulate Colorado's economy and would help to reduce the unemployment levels in the state; and

(i) The potential of horizontal take-off commercial spaceflight facilities in Colorado would soon position Colorado as the hub of civilian spaceflight activities in the country, similar to the status held by Cape Kennedy and Houston.

(2) The general assembly hereby expresses its support of horizontal spaceflight activities in Colorado by recognizing that companies and individuals engaged in creating and retaining these space-related employment opportunities should reasonably expect some degree of protection in the event of an accident that might occur as a result of the inherent dangers of spaceflight.

SECTION 2. In Colorado Revised Statutes, add article 6 to title 41 as follows:
ARTICLE 6
Aerospace

41-6-101. Limited liability for spaceflight activities - definitions - agreement and warning. (1) AS USED IN THIS ARTICLE, UNLESS THE CONTEXT OTHERWISE REQUIRES:

(a) "SPACEFLIGHT ACTIVITY" MEANS LAUNCH SERVICES OR REENTRY SERVICES AS THOSE TERMS ARE DEFINED IN 51 U.S.C. SEC. 50902.

(b) "SPACEFLIGHT ENTITY" MEANS ANY PUBLIC OR PRIVATE ENTITY HOLDING A UNITED STATES FEDERAL AVIATION ADMINISTRATION LAUNCH, REENTRY, OPERATOR, OR LAUNCH SITE LICENSE FOR SPACEFLIGHT ACTIVITIES. THE TERM ALSO INCLUDES ANY MANUFACTURER OR SUPPLIER OF COMPONENTS, SERVICES, OR VEHICLES, WHICH MANUFACTURER OR SUPPLIER HAS BEEN REVIEWED BY THE UNITED STATES FEDERAL AVIATION ADMINISTRATION AS PART OF ISSUING SUCH A LICENSE, PERMIT, OR AUTHORIZATION.

(c) "SPACEFLIGHT PARTICIPANT" MEANS ANY SPACEFLIGHT PARTICIPANT AS THAT TERM IS DEFINED IN 51 U.S.C. SEC. 50902.

(2) (a) EXCEPT AS OTHERWISE PROVIDED IN PARAGRAPH (b) OF THIS SUBSECTION (2), A SPACEFLIGHT ENTITY IS NOT LIABLE FOR INJURY TO OR DEATH OF A SPACEFLIGHT PARTICIPANT RESULTING FROM THE INHERENT RISKS OF SPACEFLIGHT ACTIVITIES SO LONG AS THE AGREEMENT AND WARNING CONTAINED IN PARAGRAPH (b) OF SUBSECTION (3) OF THIS SECTION IS DISTRIBUTED AND SIGNED AS REQUIRED. EXCEPT AS PROVIDED FOR IN PARAGRAPH (b) OF THIS SUBSECTION (2), A SPACEFLIGHT PARTICIPANT OR HIS OR HER REPRESENTATIVE MAY NOT MAINTAIN AN ACTION AGAINST OR RECOVER FROM A SPACEFLIGHT ENTITY FOR ANY LOSS, DAMAGE, INJURY, OR DEATH OF THE SPACEFLIGHT PARTICIPANT RESULTING EXCLUSIVELY FROM ANY OF THE INHERENT RISKS OF SPACEFLIGHT ACTIVITIES.

(b) NOTWITHSTANDING THE PROVISIONS OF PARAGRAPH (a) OF THIS SUBSECTION (2) TO THE CONTRARY, THIS SUBSECTION (2) DOES NOT LIMIT LIABILITY IF THE SPACEFLIGHT ENTITY DOES ONE OR MORE OF THE FOLLOWING:
(I) Commits an act or omission that constitutes gross negligence or willful or wanton disregard for the safety of the spaceflight participant and that act or omission proximately causes loss, damage, injury, or death to the spaceflight participant;

(II) Has actual knowledge or reasonably should have known of a dangerous condition on the land or in the facilities or equipment used in the spaceflight activities and the danger proximately causes injury, damage, or death to the spaceflight participant; or

(III) Intentionally injures the spaceflight participant.

(3) (a) Every spaceflight entity providing spaceflight activities to a spaceflight participant, whether such activities occur on or off the site of a facility capable of launching a suborbital flight, shall have each spaceflight participant sign the agreement and warning statement specified in paragraph (b) of this subsection (3).

(b) The agreement shall include the following language and any other language required by federal law:

AGREEMENT AND WARNING

Under Colorado law, there is no liability for any loss, damage, injury to, or death of a spaceflight participant in a spaceflight activity provided by a spaceflight entity if such loss, damage, injury, or death results from the inherent risks of the spaceflight activity to the spaceflight participant. Injuries caused by the inherent risks of spaceflight activities may include, among others, death or injury to person or property. I, the undersigned spaceflight participant, assume the inherent risk of participating in this spaceflight activity.

__________
(Signed)

__________
(Witnessed)

PAGE 4-SENATE BILL 12-035
(c) FAILURE TO COMPLY WITH THE WARNING STATEMENT REQUIREMENTS IN THIS SECTION PREVENTS A SPACEFLIGHT ENTITY FROM INVOKING THE PRIVILEGES OF IMMUNITY PROVIDED BY THIS SECTION.

SECTION 3. Act subject to petition - effective date. This act takes effect at 12:01 a.m. on the day following the expiration of the ninety-day period after final adjournment of the general assembly (August 8, 2012, if adjournment sine die is on May 9, 2012); except that, if a referendum petition is filed pursuant to section 1 (3) of article V of the state constitution against this act or an item, section, or part of this act within such period, then the act, item, section, or part will not take effect unless
approved by the people at the general election to be held in November 2012 and, in such case, will take effect on the date of the official declaration of the vote thereon by the governor.

Brandon C. Shaffer
PRESIDENT OF THE SENATE

Frank McNulty
SPEAKER OF THE HOUSE OF REPRESENTATIVES

Cindi L. Markwell
SECRETARY OF THE SENATE

Marilyn Eddins
CHIEF CLERK OF THE HOUSE OF REPRESENTATIVES

APPROVED________________________________________

John W. Hickenlooper
GOVERNOR OF THE STATE OF COLORADO

PAGE 6-SENATE BILL 12-035
CHAPTER 2012-1

Senate Bill No. 634

An act relating to spaceport facilities; amending s. 331.303, F.S.; defining the term “launch support facilities”; deleting the term “spaceport launch facilities”; providing an effective date.

Be It Enacted by the Legislature of the State of Florida:

Section 1. Present subsection (17) of section 331.303, Florida Statutes, is repealed; present subsections (11) through (16) are renumbered as subsections (12) through (17), respectively, and a new subsection (11) is added to that section, to read:

331.303 Definitions.—

(11) “Launch support facilities” means facilities that are located at launch sites or launch ranges that are required to support launch activities, including launch vehicle assembly, launch vehicle operations and control, communications, and flight safety functions, as well as payload operations, control, and processing.

(17) “Spaceport launch facilities” means industrial facilities as described in s. 380.0651(3)(e), Florida Statutes 2010, and include any launch pad, launch control center, and fixed launch support equipment.

Section 2. This act shall take effect July 1, 2012.

Approved by the Governor February 16, 2012.

Filed in Office Secretary of State February 16, 2012.
An act relating to spaceport territory; amending s. 331.304, F.S.; revising spaceport territory to include certain properties; providing an effective date.

Be It Enacted by the Legislature of the State of Florida:

Section 1. Subsections (3) and (4) are added to section 331.304, Florida Statutes, to read:

331.304 Spaceport territory.—The following property shall constitute spaceport territory:

(3) Certain real property located in Duval County which is included within the boundaries of Cecil Airport and Cecil Commerce Center.

(4) Real property within the state which is a spaceport licensed by the Federal Aviation Administration, as designated by the board of directors of Space Florida.

Section 2. This act shall take effect July 1, 2012.

Approved by the Governor April 13, 2012.

Filed in Office Secretary of State April 13, 2012.
A BILL FOR AN ACT

RELATING TO TOURISM.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF HAWAII:

SECTION 1. The legislature finds that tourism is the chief generator of employment and revenue in the State and influences all sectors of the State's economy. New developments in technology, increased visitor sophistication, and greater competition from other world tourism markets require Hawaii's tourism industry to direct their marketing efforts at visitors with specific interests.

The legislature recognizes that expanding the State's tourism product by developing new niche products, such as space tourism, can enhance Hawaii's appeal as a tourist destination.

In 2007, Virgin Galactic confirmed the viability of space tourism by earning approximately $31,000,000 in ticket revenue from over one hundred passengers. On December 15, 2008, the Federal Aviation Administration awarded a launch license for vertical and horizontal launches to the New Mexico Spaceport Authority to establish a commercial spaceport. On January 11, 2010, Cecil Field airport in Jacksonville, Florida was awarded a similar Federal Aviation Administration license.
Space tourism is a potential billion dollar global industry that could significantly increase state revenues, provide new aerospace jobs, and rejuvenate economic development in the Kalaeloa area. The Federal Aviation Administration is expected to issue a limited number of spaceport licenses and the legislature finds that it is crucial to position Hawaii for that economic opportunity.

The purpose of this Act is to appropriate funds for the application for a spaceport license from the Federal Aviation Administration.

SECTION 2. There is appropriated out of the general revenues of the State of Hawaii the sum of $250,000 or so much thereof as may be necessary for fiscal year year 2012-2013 for the application for a spaceport license from the Federal Aviation Administration; provided that no funds shall be made available under this Act unless the federal government provides a dollar-for-dollar match of funds for the purpose for which this sum is appropriated.

The sum appropriated shall be expended by the department of business, economic development, and tourism for the purposes of this Act.
SECTION 3. The department of business, economic
development, and tourism shall submit a report on the status of
the application for the spaceport license to the legislature no
later than twenty days prior to the convening of the regular
session of 2013.

SECTION 4. This Act shall take effect on July 1, 2012.
Report Title:
Tourism; Space Industry; Federal Aviation Administration; Spaceport License; Appropriation

Description:
Appropriates funds for the application of a spaceport license from the Federal Aviation Administration to establish space tourism in Hawaii, subject to matching federal funds on a dollar-for-dollar basis. (CD1)

*The summary description of legislation appearing on this page is for informational purposes only and is not legislation or evidence of legislative intent.*
A BILL FOR AN ACT

RELATING TO THE PACIFIC INTERNATIONAL SPACE CENTER FOR EXPLORATION SYSTEMS.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF HAWAII:

SECTION 1. The legislature finds that the Pacific international space center for exploration systems, including its proposed aerospace technology research and development park project, is an economic driver for the island of Hawaii that promotes the establishment and growth of new sustainable and green industries along with associated jobs, workforce development, internships, and science, technology, engineering, and math education programs. The legislature also finds that the Pacific international space center for exploration systems aerospace technology research and development park project will attract investment that will help to leverage costs of expanding the island of Hawaii's broadband capacity.

The legislature further finds there is a continued need for the Pacific international space center for exploration systems to work closely with the University of Hawaii, but also recognizes the center's need for the flexibility to make swift and independent decisions and take actions in the rapidly
evolving aerospace sector to keep Hawaii competitive and
attractive to industry partners. Therefore, a transfer of
positions from the University of Hawaii to the department of
business, economic development, and tourism is needed. This is
especially critical with the recent emergence of private
commercial space access and a resurgence of global space
initiatives. Supporting these initiatives will involve
significant private sector investment in the development,
testing, and evaluation of robotics, broadband, energy
production, energy storage, recycling, and other innovative
technologies that can have immediate application for the Hawaii
economy and the general well-being of the State.

The purpose of this Act is to transfer the Pacific
international space center for exploration systems from the
University of Hawaii to the department of business, economic
development, and tourism.

SECTION 2. Chapter 201, Hawaii Revised Statutes, is
amended by adding to part V a new subpart to be appropriately
designated and to read as follows:

" . Pacific International Space Center for
Exploration Systems
§201- Pacific international space center for exploration systems. (a) There is established the Pacific international space center for exploration systems, to be administratively attached to the office of aerospace development in the department of business, economic development, and tourism.

(b) The space center may employ, subject to chapter 76, technical experts and officers, agents, and employees, permanent and temporary, as required. The space center may also employ officers, agents, and employees, prescribe their duties and qualifications, and fix their salaries, without regard to chapter 76, when in the determination of the board, the services to be performed by those employed are unique and essential to the execution of the functions of the space center.

§201- Pacific international space center for exploration systems; board of directors; establishment; duties. (a) There is established the board of directors of the Pacific international space center for exploration systems, consisting of ten members, to include:

(1) The executive director of the space center as an ex officio voting member;
The director of business, economic development, and
tourism, or the director's designated representative;

The president of the University of Hawaii, or the
president's designated representative;

Six members from government, industry, and academia,
both national and international, with appropriate
professional interests and backgrounds; and

An invited representative from the National
Aeronautics and Space Administration as an ex officio
non-voting member,
to be appointed by the governor, pursuant to section 26-34;
provided that of the members appointed under paragraph (4), two
members shall be appointed from a list of nominees submitted by
the president of the senate, two members shall be appointed from
a list of nominees submitted by the speaker of the house of
representatives, and two members shall be appointed by the
governor.

The board shall select a chairperson from among its
members.

Five members shall constitute a quorum, whose
affirmative vote shall be necessary for all actions by the space
center. The members of the board shall serve without
compensation, but shall be entitled to reimbursement for necessary expenses, including travel expenses, incurred in the performance of their duties.

(c) The director of business, economic development, and tourism shall appoint an executive director to the space center, subject to confirmation by the board, who shall be exempt from chapter 76. The board shall set the salary and duties of the executive director.

§201- General powers. (a) The board may:

(1) Sue and be sued;

(2) Adopt a seal and alter the seal at pleasure;

(3) Make and execute contracts and other instruments necessary or convenient to the exercise of its powers; and

(4) Adopt bylaws and rules, which shall be exempt from chapter 91, for its organization and internal management, and to carry into effect its purposes, powers, and programs.

(b) In addition to other powers conferred upon it, the board may do all things necessary and convenient to carry out the powers expressly provided in this subpart.
§201- Powers and duties of the Pacific international space center for exploration systems executive director. In addition to any other powers and duties provided in this subpart, the executive director shall:

(1) Oversee, supervise, and direct the planning, evaluation, and coordination of space-related activities, and identify and promote opportunities for expanding and diversifying aerospace-related industries in the State pertaining to the space center;

(2) Establish partnerships with corporate, government, and University of Hawaii entities that can promote and enhance the State's aerospace industry; and where possible, help to generate additional revenue for the University of Hawaii and create classes and other educational opportunities for students;

(3) Work with local universities and community colleges to facilitate internships for students with the space center and associated companies;

(4) Continue to work with the University of Hawaii on course development, teaching, workforce development, and outreach;
(5) Promote innovative educational and workforce development programs that will enhance public awareness of the space center and enable residents to pursue employment in Hawaii's aerospace industry;

(6) Act as the public representative of the space center;

(7) Monitor national and global trends in the aerospace industry and promote global awareness of the space center;

(8) Pursue projects in the aerospace sector that can be leveraged for improvements to the State's broadband and alternative energy capabilities;

(9) Serve as a clearinghouse for information on the space center and associated activities;

(10) Target existing businesses that can provide products or services of importance to the space center and its projects to support the expansion of these businesses in Hawaii;

(11) Increase contact and maintain liaison with the National Aeronautics and Space Administration, related aerospace organizations, and other federal agencies and facilities;
(12) Maintain and expand liaisons with local business and
citizen groups;
(13) Work with private landowners in the vicinity to expand
opportunities and physical space and appurtenances for
the participants in the space center's aerospace
technology research and development park;
(14) Adopt, amend, and repeal rules pursuant to chapter 91
necessary to carry out this subpart;
(15) Contract for services as may be necessary for the
purposes of this subpart; and
(16) Do all other things necessary or proper to carry out
the purposes of this subpart."

SECTION 3. Chapter 201, part V, Hawaii Revised Statutes,
is amended by designating sections 201-71 to 201-75 as subpart A
and inserting a title before section 201-71 to read as follows:

"A. General Provisions"

SECTION 4. Section 201-71, Hawaii Revised Statutes, is
amended by adding two new definitions to be appropriately
inserted and to read as follows:

""Board" means the board of directors of the Pacific
international space center for exploration systems.
"Space center" means the Pacific international space center for exploration systems."

SECTION 5. Notwithstanding any law to the contrary, all responsibilities of the University of Hawaii heretofore held with regard to the Pacific international space center for exploration systems are transferred to the office of aerospace development of the department of business, economic development, and tourism.

SECTION 6. All appropriations, records, equipment, machines, files, supplies, contracts, books, papers, documents, maps, and other personal property heretofore made, used, acquired, or held by the University of Hawaii relating to the functions transferred to the office of aerospace development of the department of business, economic development, and tourism shall be transferred with the functions to which they relate.

SECTION 7. All rules, policies, procedures, guidelines, and other material adopted or developed by the agencies, divisions, or officers transferred to or placed for administrative purposes under this Act, shall remain in full force and effect until amended or repealed by the department of business, economic development, and tourism pursuant to chapter 91, Hawaii Revised Statutes.
SECTION 8. All deeds, leases, contracts, loans, agreements, permits, or other documents executed or entered into by or on behalf of the agencies, division, or offices transferred to or placed for administrative purposes with the department of business, economic development, and tourism by this Act, shall remain in full force and effect.

SECTION 9. All rights, powers, functions, and duties of the University of Hawaii as they relate to the Pacific international space center for exploration systems are transferred to the department of business, economic development, and tourism.

All officers and employees whose functions are transferred by this Act shall be transferred with their functions and shall continue to perform their regular duties upon their transfer, subject to the state personnel laws and this Act.

No officer or employee of the State having tenure shall suffer any loss of salary, seniority, prior service credit, vacation, sick leave, or other employee benefit or privilege as a consequence of this Act, and such officer or employee may be transferred or appointed to a civil service position without the necessity of examination; provided that the officer or employee possesses the minimum qualifications for the position to which
transferred or appointed; and provided that subsequent changes
in status may be made pursuant to applicable civil service and
compensation laws.

An officer or employee of the State who does not have
tenure and who may be transferred or appointed to a civil
service position as a consequence of this Act shall become a
civil service employee without the loss of salary, seniority,
prior service credit, vacation, sick leave, or other employee
benefits or privileges and without the necessity of examination;
provided that such officer or employee possesses the minimum
qualifications for the position to which transferred or
appointed.

If an office or position held by an officer or employee
having tenure is abolished, the officer or employee shall not
thereby be separated from public employment, but shall remain in
the employment of the State with the same pay and classification
and shall be transferred to some other office or position for
which the officer or employee is eligible under the personnel
laws of the State as determined by the head of the department or
the governor.

SECTION 10. It is the intent of this Act not to jeopardize
the receipt of any federal aid nor to impair the obligation of
the State or any agency thereof to the holders of any bond
issued by the State or by any such agency, and to the extent,
and only to the extent, necessary to effectuate this intent, the
governor may modify the strict provisions of this Act, but shall
promptly report any such modification with reasons therefor to
the legislature at its next session thereafter for review by the
legislature.

SECTION 11. There is appropriated out of the general
revenues of the State of Hawaii the sum of $500,000 or so much
thereof as may be necessary for fiscal year 2012-2013 for the
purpose of operating the Pacific international space center for
exploration systems aerospace technology research and
development park project.

SECTION 12. The sum appropriated under section 11 shall be
expended by the department of business, economic development,
and tourism for the purposes of this Act.

SECTION 13. New statutory material is underscored.

SECTION 14. This Act shall take effect on July 1, 2012.
Report Title:
Pacific International Space Center for Exploration Systems; Appropriation

Description:
Transfers the Pacific international space center for exploration systems (PISCES) from the University of Hawaii to the department of business, economic development, and tourism's office of aerospace development. Establishes a PISCES board of directors. Appropriates funds. (CD1)

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