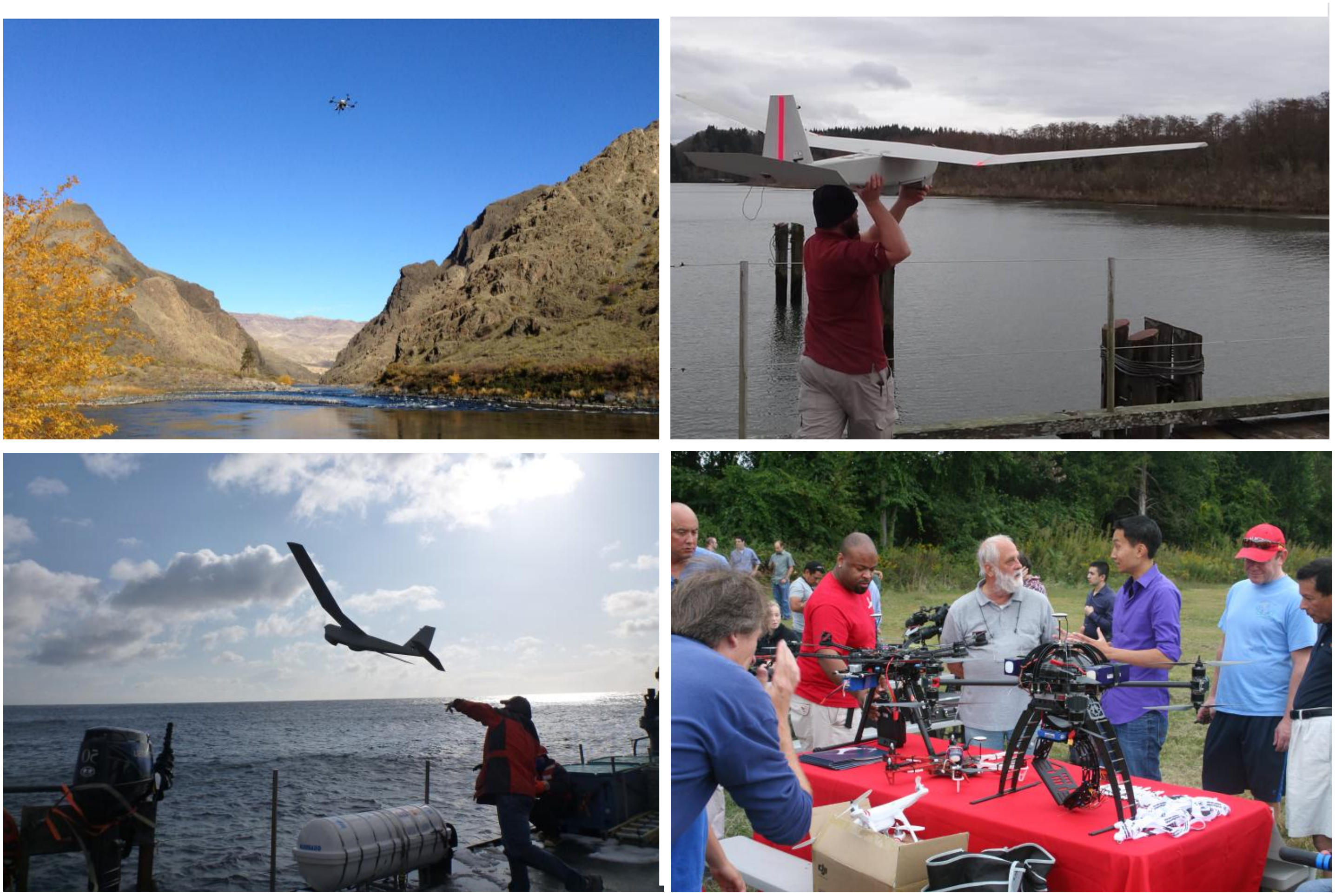
Photos courtesy of Alaska Center for Unmanned Aircraft Systems Integration at the University of Alaska Fairbanks and Academy of Model Aeronautics.

Legislative Task Force on Unmanned Aircraft Systems

Interim Report to the Legislature

As required by Legislative Resolve 17 SLA-13

January 15, 2014

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Task Force Members:

Representative Shelley Hughes, Co-Chair

Senator Donny Olson, Co-Chair

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TABLE OF CONTENTS

APPENDICES

ACRONYMS AND ABBREVIATIONS

AMA	Academy of Model Aeronautics
ASTM	American Society for Testing and Materials
AUVSI	Association for Unmanned Vehicle Systems International
CBP	U.S. Customs and Border Protection
CFR	Code of Federal Regulations
COA	Certificate of Authorization
DHS	Department of Homeland Security
DOC	Department of Commerce
DoD	Department of Defense
DOT/PF	Alaska Department of Transportation/Public Facilities
FAA	Federal Aviation Administration
FMRA	FAA Modernization and Reform Act of 2012
GAO	Government Accountability Office
IACP	International Association of Chiefs of Police
ICAO	International Civil Aviation Organization
IPC	Interagency Policy Committee
NAS	National Airspace System
NASA	National Aeronautics and Space Administration
NextGen	Next Generation Air Transportation System
PPUTRC	Pan-Pacific UAS Test Range Complex
RT&D	Research, testing, and development
RTCA SC	Radio Technical Commission for Aeronautics Special Committee
SPC	Senior Policy Committee
STEM	Science, Technology, Engineering, and Math
UAS	Unmanned Aircraft Systems

EXECUTIVE SUMMARY

The Legislative Task Force on Unmanned Aircraft Systems (UAS) was formed under House Concurrent Resolution No. 6 to review regulations and guidance regarding UAS and provide recommendations for a comprehensive state policy for unmanned aircraft that protects privacy and allows the use of UAS for public and private applications.

In response to public concern, the Legislative Task Force on UAS (LTFUAS) reviewed multiple potential UAS scenarios focusing on privacy issues, economic development, public safety, anticipated mission types, and safety. LTFUAS evaluated existing privacy laws for Alaska to avoid recommending duplicative law for UAS, considered ways to encourage the economic development and safe uses of UAS in Alaska, and supported public education to address public reservations regarding UAS use in Alaska as well as provide information on the use of UAS for life-saving and other cost-saving and beneficial applications for dull, dirty and dangerous tasks.

LTFUAS concluded that the Federal Aviation Administration (FAA) is adequately addressing the safety concerns of integrating UAS into the National Airspace System (NAS). FAA Guideline N 8900.227 clearly states the requirements for the aircraft, pilot training and responsibilities, and the expectations of the test sites for safe operations of UAS. The FAA guidelines provided LTFUAS assurance that unmanned aircraft can be operated safely in Alaska.

After understanding the role of the FAA and safety goals for integration of UAS into the NAS, the LTFUAS makes the following recommendations.

1. All state and local law enforcement entities should adopt the International Association of Chiefs of Police (IACP) guidelines to help ensure privacy protection for Alaskans.
2. All law enforcement entities must first obtain a court order to use UAS over private property for criminal investigation against any person.
3. Encourage all law enforcement entities to use high-visibility marking or navigational lighting on law enforcement UAS as appropriate.
4. Convey a clear message to industry that Alaska is open for business to harness the beneficial uses of UAS, to encourage the growth of this economic sector, and to allow Alaska to continue to lead the nation in aviation innovation.
5. Encourage private and public UAS training programs.
6. Report all UAS incidents/accidents of aircraft larger than 55 pounds to the University of Alaska and/or Alaska Aviation Coordination Council.
7. Extend LTFUAS until June 30, 2017, and expand the duties of the Task Force with the addition of one member representing the Alaska Department of Transportation/Public Facilities (DOT/PF) and one public member, for the following reasons:

- During this transitional phase of growing use of UAS in Alaska, the LTFUAS should be extended to continue to monitor the integration and any privacy matters that may arise that are not already covered by existing law. Because Alaska currently has a strong set of privacy laws, rather than recommend prohibitions be incorporated into statute that might inhibit industry, the LTFUAS recommends it continue to review UAS operations in light of current statutes and only recommend changes in statute as necessary.

- Because FAA will be updating and issuing new guidelines based on the work of the new FAA UAS test sites announced on December 30, 2013, it is necessary for the LTFUAS to continue to review FAA policies to determine their impact and whether any additional policy changes at the state level may be necessary in response.

- With Alaska's recent selection as one of the nation's six UAS test sites through the University of Alaska's application (in conjunction with Oregon and Hawaii), the LTFUAS will meet part of the test site's requirement as a public forum where concerns regarding privacy and data matters can be collected and evaluated.

As we move forward, and particularly in light of the fact that Alaska has been selected as an FAA test site for UAS integration, and with the extension and expansion of duties of the Task Force, we continue emphasis on:

1) management of the test ranges,
2) economic development opportunities,
3) public education and public relations regarding UAS, and
4) difference between model aircraft and UAS.

In addition to the above seven recommendations, the Task Force also recommends the following:

1) each department of the State of Alaska identify a point of contact for UAS to coordinate with the LTFUAS and provide information regarding department policy and procedures to ensure accountability and privacy in regard to UAS use, and

2) the Alaska Department of Administration review and update its data retention policies particularly in the area of inadvertent captured data that is not relevant to a state agency.

Representative Shelley Hughes

Senator Donny Olson

1. INTRODUCTION

House Concurrent Resolution No. 6 formed the Legislative Task Force on Unmanned Aircraft Systems (UAS) to:

- review regulations and guidance from the Federal Aviation Administration (FAA) regarding UAS;
- provide written recommendations, together with suggested legislation, for a comprehensive state policy for unmanned aircraft that protects privacy and allows the use of UAS for public and private applications; and
- submit a final report to the Legislature.

The Legislative Task Force on UAS (LTFUAS) met in 2013 on July 24 and October 2 via teleconference and twice in person October 23-24 and November 26 to respond to the concerns Alaskans have raised regarding unmanned aircraft use in Alaska. The LTFUAS:

- reviewed regulations and guidance from the FAA, International Association of Chiefs of Police (IACP), and multiple related recommendations for UAS operations;
- received hours of public testimony and written public testimony; and
- compiled recommendations and suggested legislation for the use of UAS for public and private applications in Alaska that are protective of privacy.

The LTFUAS considered two approaches to regulating the use of UAS in Alaska:

1. restrict the industry and adopt exemptions for specific kinds of approved uses, or
2. generally allow UAS operations in Alaska and adopt the necessary privacy, operations, and other guidelines that seem necessary to protect Alaskans.

The LTFUAS adopted the second approach and emphasized that educating the public will be an important part of integrating this technology safely and for the benefit of Alaskans.

The LTFUAS concluded that the FAA is adequately addressing the safety concerns of integrating UAS in the National Airspace System (NAS). FAA Guideline N 8900.227 spells out the details of operating UAS by clearly stating the requirements of the aircraft, pilot training and responsibilities, and the expectations of the FAA UAS Test Sites.[1] The rules outlined in the guidelines provided the LTFUAS assurance that unmanned aircraft can be operated safely in Alaska.

The FAA also recently released its Final Privacy Requirements in November 2013. The privacy document from the FAA clearly identified that while it governs the NAS, local governments will assume the responsibility of addressing privacy concerns.

[1] Notice N 8900.227, Subj: Unmanned Aircraft Systems (UAS) Operation Approval. Effective Date 7/30/13, Cancellation Date 7/30/14. Available at http://www.faa.gov/documentLibrary/media/Notice/N_8900.227.pdf

Alaskans are fortunate to have a state constitution and state law that provide some of the greatest privacy protections compared to other states. As the LTFUAS reviewed multiple scenarios for misuse of the UAS, it determined that existing laws would apply, are sufficiently protective of privacy, and penalties are already in place to address inappropriate behavior.

When studying the many possible scenarios for misuse, the LTFUAS returned repeatedly to the premise that an unmanned aircraft is a tool; the operator needs to be considered for breaches of privacy or harming another.

This report presents the findings of the LTFUAS resulting from LTFUAS meetings, public testimony, research, and information from industry experts in pursuit of the assigned duties listed above.

1.1 Background and Planning

The earliest UAS was A.M. Low's "Aerial Target" of 1916 during World War I. The flight lasted 12 seconds. Over the last 50 years, rapid advances in aviation technology have transformed the world's skies. In the United States, the NAS has evolved to include a variety of fixed-wing and rotary aircraft operating across the country in metropolitan areas to remote airfields. As aircraft technology expands, so do the challenges associated with managing safe skies. UAS have created a critical integration challenge for the FAA as they are flown in an environment that was originally developed for manned aircraft.

1.1.1 Federal

In 2008, the Government Accountability Office (GAO) reported that the United States must develop a clear and common understanding of what is required to safely and routinely operate UAS in the NAS. Congress enacted the FAA Modernization and Reform Act of 2012 (FMRA). Through this act, Congress set forth a number of specific requirements for achieving UAS integration—namely a UAS Comprehensive Plan[2] and a five-year Roadmap.[3]

In April 2012 under the guidance of the Next Generation Air Transportation System (NextGen) Implementation Plan Senior Policy Committee (SPC), the Joint Planning and Development Office assembled the Departments of Transportation (DOT), Defense (DoD), Commerce (DOC), and Homeland Security (DHS) as well as the National Aeronautics and Space Administration (NASA) and the FAA to develop the UAS Comprehensive Plan. The UAS Comprehensive Plan sets the overarching integration of UAS into the NAS. The plan also supports the coordination and integration of research and development necessary to achieve UAS integration goals by 2015 (Title 14 of the Code of Federal Regulations, Part 91 [14 CFR 91]; Appendix A).

[2] Unmanned Aircraft Systems (UAS) Comprehensive Plan. September 2013. Prepared by the Joint Planning and Development Office. Available at http://www.faa.gov/about/office_org/headquarters_offices/agi/reports/media/UAS_Comprehensive_Plan.pdf

[3] Integration of Civil Unmanned Aircraft Systems (UAS) in the National Airspace System (NAS) Roadmap. First Edition–2013. U.S. Department of Transportation Federal Aviation Administration. Available at http://www.faa.gov/about/initiatives/uas/media/uas_roadmap_2013.pdf

1.1.2 Federal and State Collaboration

One part of the UAS Comprehensive Plan included a priority for UAS research and development. NextGen developed the *NextGen UAS Research, Development and Demonstration Roadmap*,[4] and the FAA initiated a program for test ranges in accordance with the FMRA. In response to the FAA's solicitation for applications, the University of Alaska Fairbanks teamed with the States of Oregon and Hawaii and submitted the Pan-Pacific UAS Test Range Complex application.

On December 30, the FAA announced that Alaska was one of six states selected as a test site for safe operations and integration studies. The University of Alaska Fairbanks plans to work on state monitoring, navigation and safety standards.

1.1.3 State

Anticipating the integration of UAS in Alaska's NAS and the probable selection of Alaska as an FAA test site, HCR6 was passed to establish a task force to consider the implications of bringing this new technology to Alaska as early as spring 2014.

The FAA also recently released its Final Privacy Requirements in November 2013. The privacy document from the FAA clearly identified that while it governs the NAS, local governments will assume the responsibility of addressing privacy concerns.

Flight safety will continue to be monitored by the FAA. The State of Alaska will develop additional safety rules that pertain to specific kinds of UAS operations and will address the concern of personal privacy.

The LTFUAS approach is to responsibly embrace the positive uses of UAS without overregulating the industry and thus hindering economic opportunity. In addition to accepting the use of UAS in Alaska, the LTFUAS recognizes that public perception is greatly influenced through media reports, such as military flights in war zones. The public appears hesitant to allow UAS in Alaska due to fear of invasion of personal privacy and overreaching law enforcement.

1.2 Future of UAS in Our Skies

The FAA is expediting the planning and integration of UAS in the NAS because of the rapid advancements in this technology and the global response to the wide variety of uses by UAS. Unmanned aircraft will become part of our economy, transportation system, public safety, and much more.

Protecting the privacy of our citizens is the most important concern of the LTFUAS, and it remains at the forefront of each application of UAS missions. Alaska must respond quickly to this new technology in three ways: (1) support the integration of UAS in our airspace, (2) develop a forum to

[4] Next Generation Air Transportation System, NextGen UAS Research, Development and Demonstration Roadmap. Version 1.0, March 15, 2012. Available at http://www.jpdo.gov/library/20120315_UAS%20RDandD%20Roadmap.pdf

review concerns and recommend legislation, and (3) educate the public. All of these approaches must work in unison to be successful and maintain personal privacy.

The UAS industry is changing as quickly as your imagination can conjure a new application for use. During the first week of December 2013, some headlines included:

- HexaCopter Used to Smuggle Contraband into Prison (Georgia, USA) … similar report of misuse in Quebec, Canada, prisons.
- New Wave Energy wants to put power plants in the sky (London)… plans to build the first high altitude aerial power plant, using networks of unmanned aircraft that can harvest energy from multiple sources and transmit it wirelessly to receiving stations on the ground.
- ARA Nighthawk UAS Demonstrates Search and Rescue and Accident Reconstruction Value (Vermont State Police)… could provide benefits far outweighing (privacy) concerns.
- U.S. Navy Launches UAS from Submerged Submarine (Office of Naval Research)… rose to the ocean surface and then completed a vertical launch as part of its 12-hour mission.
- Louisville Hosts Quadcopter Battle (Louisville, KY)… you must be willing to remain in the same room as the quadcopter if the controls are given to a psychopathic 12 year old.
- United Nations UAS Deployment Debuts in Congo (Africa)… for the purposes of monitoring the volatile border with Rwanda and Uganda.

- Domino's UK tests pizza-delivering drones… the DomiCopter is undergoing further testing in the United Kingdom. (Other names previously considered included the "Pepperdroney" and the "Flyin' Hawaiian."
- Parrot Drones "Vulnerable to Flying Hack Attack" (Cambridge University, UK)… security researcher has created a flying contraption that can hijack control of other UAS … this comes with new vocabulary "hackerspace."
- World's Smallest Quadcopter for Under $40 … and it weighs only four-tenths of an ounce.

- UAS to Save and Change Lives (Philippines)… disaster relief.
- Robots of the Serengeti (Tanzania)… poaching surveillance.
- Amazon.com Delivery… spoof article, for now.
- Precision Farming Forum in Oregon to Examine UAS Technology in Agriculture … presumed one of the most significant cost savings and deployment for UAS uses.

- Arinc Incorporated announced that it has partnered with the Anne Arundel County Public School System (AACPS) to develop a class on UAS for students participating in the Science, Technology, Engineering, and Math (STEM) magnet program. The course is believed to be the first of its kind in the nation for high school students.

Nearly every country on the planet is preparing for UAS in efforts that range from military actions and border patrol to research and development of UAS technology.

2. FEDERAL AVIATION ADMINISTRATION—SAFETY AND PRIVACY

From *Integration of Civil Unmanned Aircraft Systems (UAS) in the National Airspace System (NAS) Roadmap*:

"Since the early 1990s, unmanned aircraft systems (UAS) have operated on a limited basis in the National Airspace System (NAS). Until recently, UAS mainly supported public operations, such as military and border security operations. The list of potential uses is now rapidly expanding to encompass a broad range of other activities, including aerial photography, surveying land and crops, communications and broadcast, monitoring forest fires and environmental conditions, and protecting critical infrastructures.

The FAA created the Unmanned Aircraft Systems Integration Office to facilitate integration of UAS safely and efficiently into the NAS. Toward that goal, the FAA is collaborating with a broad spectrum of stakeholders, which includes manufacturers, commercial vendors, industry trade associations, technical standards organizations, academic institutions, research and development centers, governmental agencies, and other regulators."[5]

FAA 'Roadmap'

"Ultimately, UAS must be integrated into the NAS without reducing existing capacity, decreasing safety, negatively impacting current operators, or increasing the risk to airspace users or persons and property on the ground any more than the integration of comparable new and novel technologies."

2.1 Safety Guidelines

The LTFUAS studied the FAA Guidelines for the Operations of Unmanned Aircraft Systems, participated in a presentation of the guidelines from Ro Bailey, Deputy Director of the Alaska Center for Unmanned Aircraft Systems Integration at the University of Alaska Fairbanks, and sought comments from representatives of the FAA. FAA Guideline N 8900.227 provides the most current guidelines for federal approval of operating unmanned aircraft.[6]

The LTFUAS recognizes that the FAA manages the safety of the national airspace and has adopted extensive guidelines regarding aircraft certification, pilot training and certification, and approval process for flights (or missions). The FAA Guideline N 8900.227 also provides detailed requirements for the operations of pending test sites and the current approval of flights in designated areas for specific purposes. The FAA pre-approves UAS missions and awards a Certificate of Authorization (COA) that identifies the details of the mission. This process is tightly scrutinized, and the entity flying the UAS is accountable to the FAA under the details of the COA.

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5 Integration of Civil Unmanned Aircraft Systems (UAS) in the National Airspace System (NAS) Roadmap. First Edition–2013. U.S. Department of Transportation Federal Aviation Administration. Available at http://www.faa.gov/about/initiatives/uas/media/uas_roadmap_2013.pdf

6 Notice N 8900.227, Subj: Unmanned Aircraft Systems (UAS) Operation Approval. Effective Date 7/30/13, Cancellation Date 7/30/14. Available at http://www.faa.gov/documentLibrary/media/Notice/N_8900.227.pdf

The COA approval process gives the LTFUAS confidence that safety of the national airspace is adequately considered and that UAS missions will not invade personal privacy or operate inappropriately.

It is the opinion of the LTFUAS that no additional statutory or regulatory requirements are needed for FAA-approved missions.

2.2 Privacy Concerns

2.2.1 FAA Final Privacy Requirements

The FAA recently published its Final Privacy Requirements, November 7, 2013 (Appendix A) regarding unmanned aircraft. The FAA recognizes that there is substantial debate and difference of opinion among policy makers, industry, advocacy groups, and members of the public as to whether UAS operations at the test sites will raise novel privacy issues that are not adequately addressed by existing legal frameworks.

FAA Final Privacy Requirements

On February 22, 2013, the FAA requested public comment on the proposed privacy requirements for UAS test sites that the FAA will establish pursuant to the FAA Modernization and Reform Act of 2012.

The FAA received 99 comments through Regulations.gov and 53 comments through the public engagement session.

The public comments were grouped into 10 categories, and the FAA provided a response to each category. You can view all categories, comments and responses in the document provided in Appendix A.

From the FAA Final Privacy Requirements:

There was substantial difference of opinion among commenters as to whether the UAS operations and manned aircraft operations present different privacy issues that justify imposing special privacy restrictions on UAS operations at the test sites. In addition, there was substantial difference of opinion regarding what elements would be appropriate for a test site privacy policy.

The FAA has determined that it should not impose privacy requirements beyond those in the Final Privacy Requirements for the following reasons.

First, there are many privacy laws and applications of tort law that may address some of the privacy issues that arise from UAS operations at the test sites.

Test Site Requirements

1. *Test site operators must maintain a record of all UAS operating in the test sites;*
2. *Test site operators must require every UAS operator in the Test Site to have a written plan for the operator's use and retention of data collected by the UAS; and*
3. *Test site operators must conduct an annual review of test site operations to verify compliance with stated privacy policy and practices and share those outcomes annually in a public forum with an opportunity for public feedback.*

Second, the FAA believes that the test site operators will be responsive to local stakeholders' privacy concerns and will develop privacy policies appropriately tailored to each test site.

Third, if UAS operations at a test site raise privacy concerns that are not adequately addressed by the test site's privacy policies, elected officials can weigh the benefits and costs of additional privacy laws or regulations. Forty-three states have already enacted or are considering legislation regulating use of UAS.

Conclusion: Based on the comments submitted, the FAA intends to require each test site operator to comply with all of the privacy requirements included in the Draft Privacy Requirements as well as the following additional privacy requirements:

1. Test site operators must maintain a record of all UAS operating in the test sites;
2. Test site operators must require every UAS operator in the test site to have a written plan for the operator's use and retention of data collected by the UAS; and
3. Test site operators must conduct an annual review of test site operations to verify compliance with stated privacy policy and practices, and share those outcomes annually in a public forum with an opportunity for public feedback.

It is the opinion of the LTFUAS that privacy policy is adequate through the FAA requirements for the use of UAS in the test sites.

2.2.2 Privacy and Civil Liberties Consideration

The FAA is implementing a UAS Test Site Program to help the FAA gain better understanding of operational issues relating to UAS. Although the FAA's mission does not include developing or enforcing policies pertaining to privacy or civil liberties, experience with the UAS test sites will present an opportunity to enhance the dialogue in the Interagency Policy Committee (IPC) and other interagency forums concerning the use of UAS technologies and the areas of privacy and civil liberties.

The Fourth Amendment is central to the privacy issues with respect to government UAS operation. Although the Supreme Court has never explicitly considered the question of UAS privacy, there is a long list of relevant precedents. Among them are several cases from the 1980s that specifically considered aerial observations and the Fourth Amendment.

2.2.3 Homeland Security Privacy Impact Assessment

U.S. Customs and Border Protection (CBP) is responsible for guarding nearly 7,000 miles of land border, 2,000 miles of coastal waters, and 95,000 miles of maritime border. CBP employs several types of aircraft to achieve its mission objectives including UAS. COAs have been

Homeland Security

95,000 miles of maritime border security includes joint operations with the U.S. Coast Guard. Some of those miles include Alaska coastline.

authorized in Arizona, Texas, Florida, and North Dakota. When deploying resources for operations, the Office of Air and Marine must determine the availability of aircraft type and the integration of the requested activity into its flight operations.

Homeland Security addressed privacy in the Privacy Impact Assessment published September 9, 2013. A summary of privacy concerns addressed in their document includes:

- The collection and use of data from aerial surveillance remains within the scope of its authorities to protect the border and provide support for law enforcement activities while continuing to preserve a person's right to privacy.
- UAS present a perceived risk because they are able to fly for longer periods of time and conduct surveillance relatively undetected. While UAS can fly for longer periods of time, they are equipped with the same technology to conduct surveillance that is presently deployed on manned aircraft.
- Concern for the security of the UAS itself and the potential for hijacking of the unmanned aircraft are managed by the close monitoring of ground control and satellite communication by encrypted data. If one ground station were to lose contact, a second ground station is equipped to pick up the UAS and continue operations.

3. ALASKA STATE LAW—SAFETY AND PRIVACY

The LTFUAS is confident that the FAA will regulate safety of UAS flights in Alaska. While safety is critically important, the LTFUAS also recognizes that certain codes of conduct must be followed to ensure harmonious UAS operations in Alaska.

3.1.1 Self-Regulation by Three National Organizations

The LTFUAS considered the recommendations of the following three national organizations that have adopted rules and codes of conduct regarding UAS operations. The LTFUAS adopted the IACP rules in the legislation to be introduced this session.

- **IACP:** International Association of Chiefs of Police Recommended Guidelines (Appendix B) for the use of Unmanned Aircraft was adopted in August 2012. The Alaska Department of Public Safety has also adopted these guidelines as their doctrine with the exception of increasing the flight approval responsibility from a "supervisor" to the director's office.

- **AUVSI:** Association for Unmanned Vehicle Systems International states: "As an industry, it is incumbent upon us to hold ourselves and each other to a high professional and ethical standard. As with any revolutionary technology, there will be mishaps and abuses; however, in order to operate safely and gain public acceptance and trust, we should all act in accordance with these guiding themes and do so in an open and transparent manner. We hope the entire UAS industry will join AUVSI in adopting this industry Code of Conduct."[7]

- **AMA**: Academy of Model Aeronautics' *AMA Policies for Radio Controlled Model Aircraft Operations Utilizing First Person View, Failsafe, Stabilization and Autopilot Systems* guides model aircraft operators.[8]

In the same manner that the FAA does not regulate model aeronautics, the LTFUAS does not intend to adopt requirements of hobbyist activities using UAS.

3.1.2 Model Aircraft Rules and Definitions

The technology differences between unmanned aircraft systems and model aircraft used for sport or recreation use is narrowing each day. Technology is advancing by leaps and bounds, while at the same time becoming more affordable and integrated into off-the-shelf-systems for consumers and hobbyists. While there are many technical documents and references through the FAA Modernization and Reform Act, the general difference between UAS and model aeronautics is the operation and intent of the operator not the aircraft.

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[7] Unmanned Aircraft System Operations Industry "Code of Conduct." Accessed January 13, 2014. Available at http://www.auvsi.org/conduct

[8] AMA Policies for Radio Controlled Model Aircraft Operations Utilizing First Person View, Failsafe, Stabilization and Autopilot Systems. Revision 07/20/2013. AMA Advanced Flight Systems Committee Report 101. Available at http://www.modelaircraft.org/files/AFSCREPORT101.pdf

If the activity or intent of the activity is used for commercial operations or contributing to the creation of a product or service, it is considered commercial activity and it is subject to the FAA regulations and rule as stated in the FAA Modernization and Reform Act of 2012 and FAA UAS Road Map 2013.

If the activity is for sport and recreation use as defined by FAA SEC 336 SPECIAL RULE FOR MODEL AIRCRAFT of the Modernization Act, it is controlled by a cooperative agreement between the FAA and a Community Based Organization (CBO), such as the Academy of Model Aeronautics (AMA).

The AMA has been successful in self-regulating operations for hobbyists and aviation safety for over 77 years. During those 77 years, the AMA faced many challenges of new technologies such as analog to digital radio, coordinating operations within the airspace and the ever changing aircraft designs and capabilities not unlike the latest multi rotor and First Person View (FPV) capabilities. To address the current safety requirements and interest of model aircraft operators, the AMA has developed and updated its general safety code AMA Publication 105-Safety Code and it Advanced Aircraft rules publication 550-First Person View and 560-Autopilot effective Jan 1, 2014 to keep up with the FAA rule making and technology advances. Refer to Appendix C.

It was discussed that a notice should be provided at the time of purchase of each model aircraft to review the AMA flight operation guidelines for appropriate use of model aeronautics. The LTFUAS did not adopt a requirement for notice regarding hobbyists since so many aircraft are purchased outside of Alaska and would not be required to provide the notice.

Legal Services

Constitutional Protection of Privacy: *The Constitution of the State of Alaska explicitly protects the right of privacy against government intrusion. Art. I, sec. 22 provides: "The right of the people to privacy is recognized and shall not be infringed. The legislature shall implement this section."*

Alaska Statutory Protections:

AS 11.41.270 Stalking, nonconsensual conduct prohibits monitoring by technical means

AS 11.61.116 Sending an explicit image of a minor

AS 11.61.120(a)(6) Harassment: publishing or distributing certain images

AS 11.61.123 Indecent viewing or photography

AS 11.76.113 Misconduct involving confidential information in the first degree

AS 11.76.115 Misconduct involving confidential information in the second degree

3.1.3 Alaska State Law and Personal Privacy

The State of Alaska and its local governments cannot dictate the use of the national airspace but can consider rules that better define the FAA guidelines, can consider legal repercussion for entities found in violation of adopted laws, and can provide for specific privacy laws regarding the use of UAS in Alaska.

The State of Alaska Constitution provides privacy protection, "although not unlimited, has been held to be broader than the protection afforded by the United States Constitution. Both the Alaska Constitution and the Fourth Amendment to the United States Constitution require a warrant by a governmental agency for the search of a place where a person has a reasonable expectation of privacy."[9]

Although much attention regarding UAS privacy focuses on government use and the Fourth Amendment, it is non-governmental use that is likely to raise some of the most significant privacy challenges in coming years. For private entities, the key constitutional question is the extent of their First Amendment privilege to gather information.

Civil use of unmanned aircraft will fall under the federal and state laws including such provisions as trespassing, invasion of privacy, intrusion upon seclusion, publication of private facts, stalking and harassment, and business privacy.

The LTFUAS, with guidance from Legislative Legal Services, considered many scenarios of possible violations of state and federal law that might occur with the use of unmanned aircraft. Legislative Legal Services provided the document, *Observations from Above: Unmanned Aircraft Systems and Privacy*,[10] that presented a variety of scenarios that have been tried in court and some that should be discussed as they pertain to UAS and personal privacy. The Legal Services memo outlining the areas of statute that protect personal privacy can be found in Appendix D.

Privacy protection considerations reviewed by the LTFUAS include but are not limited to the following.

1. **If data is gathered by a government agency, it is a public record. However, AS 40.20.120 provides certain protections for private information. Use of inadvertently captured information in a criminal prosecution may depend on who captures the information and whether the person whose actions have been captured has a reasonable expectation of privacy.**

It was discussed that data captured by a government-operated UAS would be treated similarly to data captured by other technology such as cell phones, manned aircraft, satellite images, voice recorders, etc. Case law is substantial in determining if the person would be considered to have a reasonable expectation of privacy and when a warrant would be required to obtain and use any data collected.

CH 48 (HB65) SLA08 Personal Information Protection Act also addresses the collection, storage, and breach of privacy. This act would include any data captured by a UAS.

2. **As technology continues to advance beyond "normal" application of current laws, a balanced approach that recognizes the inherent difficulty in predicting the future must be adopted when drafting new laws.**

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[9] Memorandum: Alaska Laws Protecting Privacy (Work Order No. 28-LS0990). September 30, 2013. Division of Legal and Research Services, Legislative Affairs Agency, State of Alaska, Juneau.

[10] John Villasenor. 2013. Observations from Above: Unmanned Aircraft Systems and Privacy. Harvard Journal of Law & Public Policy. Available at http://www.harvard-jlpp.com/wp-content/uploads/2013/04/36_2_457_Villasenor.pdf

The LTFUAS determined that we cannot foresee the future applications of technology (of UAS or other technologies); therefore, creating restrictions in law based on assumptions is not recommended.

Observations From Above: UAS and Privacy

This document was published in the Harvard Journal of Law and Public Privacy by John Villasenor, a senior fellow in Governance Studies and the Center for Technology Innovation, the Brookings Institution.

The Task Force discussed many of the scenarios posed by the author when considering the need for Alaska law.

3. How should Alaska manage unintentionally captured images or data?

Discussion concluded that there are adequate statutes, case law, and data retention guidelines that resolved the concerns of the LTFUAS in the area of unintentionally captured images or data.

Recommendation: The LTFUAS also would request that the Department of Administration review its data retention schedules with particular emphasis on law enforcement data captured inadvertently and allowing that data to be destroyed.

4. The tie between safety and privacy is tightest with respect to rules requiring the operator of a UAS to be able to see the aircraft at all times. Public UAS operated in association with the expedited authorizations in Section 334(c)(2)(C) of the FAA Modernization and Reform Act of 2012 (FMRA) have a "line of sight" requirement.

The LTFUAS assumes that FAA regulations adopted in the next several years will continue to require visual line-of-sight operation. "Sense and avoid" technology will become more mature and some non-line-of-sight missions may be permitted by the FAA. Non-line-of-sight operations and other unknown technological advances may bring new challenges that will require the Legislature to review industry guidelines and state laws in the future.

5. Unmanned aircraft may bring efficient advances to law enforcement; however, the public seems to be highly sensitive to law enforcement using unmanned aircraft.

After reviewing many possible uses of UAS, the LTFUAS determined that existing law already affords the public with adequate protections.

- **Routine Technology**: The use of UAS is treated much the same as any other technological tool used to protect the public. The Department of Public Safety has adopted the IACP Guidelines for UAS, and the LTFUAS found those guidelines to be superior for rules of law enforcement use.

The rules of the IACP will be offered as a provision of the legislation.

- **Public Navigable Airspace:** The question of what constitutes "public navigable airspace" for UAS operated by the government is central to privacy policy. The LTFUAS found that almost every law enforcement scenario discussed was already protected by existing law.
- **Role of Imaging Technology:** Rules and case law exist that protect citizens from inappropriate use of capturing data that is "more than the human eye could ever see."
- **Extended Surveillance:** Law enforcement does not intend to use UAS for standard patrol activities at this time. Limiting flight hours was not seen as an acceptable control because long flights may be necessary in the event of search and rescue or natural disaster remediation operations.

Voluntary Approaches

The International Association of Chiefs of Police (IACP) adopted model guidelines for the use of UAS for law enforcement purposes.

The Association for Unmanned Vehicle Systems International (AUVSI) Code of Conduct calls for a commitment to "respect the privacy of individuals."

Academy of Model Aeronautics has also adopted operational policies and guidelines for advanced flight systems used in radio controlled model aircraft.

- **Obtaining a Warrant:** After much discussion, it was decided that using UAS to gather data would require a warrant in similar situations as using any other data gathering device (such as voice recording, photography, and thermal imaging with manual technology). No additional laws are required to obtain a warrant for UAS data gathering.

It is the understanding of the LTFUAS that all law enforcement entities must first obtain a court order to use UAS over private property for criminal investigation against any person. This will be offered as a provision of the recommended legislation.

- **Weaponized Aircraft:** FAA guidelines do not allow anything to be dropped from an unmanned aircraft.
- **Visibility**: Law enforcement is planning to use high-visibility marking on any UAS they will use. Application of navigational lighting and/or high-visibility paint is being considered.
- **Public Education**: It is apparent that public education is necessary for all agencies using UAS but sensitivity is heightened for law enforcement uses.

Law Enforcement

Public protection will benefit greatly from unmanned aircraft for the purposes of search and rescue, crash scene documentation time, natural disaster monitoring, wildfire management, amber and silver alerts, hostage situations, and other life safety extremes. Some efforts will require warrants to proceed and some will be allowed under a Certificate of Authorization (COA).

It is the opinion of the LTFUAS that existing privacy laws are adequate to govern the use of unmanned aircraft.

It is the opinion of the LTFUAS that since Alaska has been chosen as one of the FAA UAS Test Sites, we have the opportunity to participate in the use of UAS in a variety of ways that would put Alaska in the position to establish policy guiding the use of UAS for the rest of the United States to consider.

3.2 Technical Operations Guidelines

International Civil Aviation Organization (ICAO), a special agency of the United Nations, promotes "the safe and orderly development of international civil aviation throughout the world. It sets standards and regulations necessary for aviation safety, security, efficiency, and regularity, as well as aviation environmental protection."[11]

The goal of the ICAO in addressing unmanned aviation is to provide the fundamental international regulatory framework to support routine operation of UAS throughout the world in a safe, harmonized, and seamless manner comparable to that of manned operations.

> "A number of Civil Aviation Authorities have adopted the policy that UAS must meet the equivalent levels of safety as manned aircraft… In general, UAS should be operated in accordance with the rule governing the flight of manned aircraft and meet equipment requirements applicable to the class of airspace within which they intend to operate… To safely integrate UAS in non-segregated airspace, the UAS must act and respond as manned aircraft do. Air Traffic, Airspace and Airport standards should not be significantly changed. The UAS must be able to comply with existing provisions to the greatest extent possible."[12]

UAS Operations Guidelines

Technical rules for operating unmanned aircraft systems are clearly identified at a global and federal level. "A number of Civil Aviation Authorities have adopted the policy that UAS must meet the equivalent levels of safety as manned aircraft…"

FAA Guideline N 8900.227 specifically sets the rules for the technical operations of flying unmanned aircraft.

The FAA has established guidelines for the certification and airworthiness of the aircraft, certification of the pilot including additional instruction in operating specific UAS, flight operations with the test sites, management of the test site, and certificates of authorization (COAs) for particular missions.

The LTFUAS is confident in the FAA guidelines in protecting the safety of the national airspace.

3.3 Benefits to Alaska

The University of Alaska Fairbanks Center for Unmanned Aircraft Systems Integration, Research, Testing, and Development (RT&D) is a nationally recognized program that has shown responsible use of UAS for more than 10 years. The University has been selected by the FAA to be one of the six federal test sites. The University proposal contained a diverse set of test site range locations in

11 ICAO web page: http://www.icao.int/about-icao/Pages/default.aspx

12 *From* Circular 328 - Unmanned Aircraft Systems (UAS) (Cir 328 AN/190) as cited in Integration of Civil Unmanned Aircraft Systems (UAS) in the National Airspace System (NAS) Roadmap. First Edition–2013. U.S. Department of Transportation Federal Aviation Administration. Available at http://www.faa.gov/about/initiatives/uas/media/uas_roadmap_2013.pdf

seven climatic zones as well as geographic diversity with test site range locations in Hawaii and Oregon. The research plan includes the development of a set of standards for unmanned aircraft categories, state monitoring and navigation, as well as safety standards for UAS operations.

Numerous benefits that can be realized as Alaska takes the lead on this new technology are:

- Economic
- Policy Development
- Expedited Timeline for Test Range Use and Approved Missions
- Encourage University Pilot Training Program for UAS
- Education—Public Awareness
- Market Alaska as "Open for Business" for UAS
- Public Safety Statewide

3.3.1 Economic Benefit

Test Site Selection: As part of the University of Alaska's application to the FAA for selection as a test site, the McDowell Group was contracted to complete an economic evaluation of unmanned aircraft benefits for Alaska. *Economic Impact of a Pan-Pacific Unmanned Aircraft Systems Test Site* was completed May 2013 (Appendix E). The highlights of this report include:

> "In total, designation of PPUTRC [Pan-Pacific UAS Test Range Complex] as a UAS test site would be expected to generate 1,065 direct, indirect, and induced jobs in 2014, increasing to over 1,400 jobs by 2017. Total labor income would climb from $57 million in 2014 to about $76 million in 2017.
>
> In addition to direct jobs created from UAS firms, significant indirect and induced jobs will also be created. Indirect jobs represent jobs created throughout the supply chain to support the UAS industry and induced jobs represent jobs created due to changes in household consumption as a result of the UAS industry."[13]

In addition to Test Site Selection: The cost savings to government agencies in both man hours and safety risk is immeasurable at this time, but the LTFUAS realizes there will be many efficiencies gained with the use of this technology. Examples include but are not limited to:

- **More Accurate Biological Studies.** One specific marine mammal population count had been conducted by a single manned airplane flyover to film and later count the animals. The noise from the aircraft distressed the animals and many were on the move during the filming. With the UAS launched nearby, the animals were undisturbed and a more accurate count was completed. The more-accurate count gave biologists better data to determine such things as the health of the population and whether or not to include them on the endangered species list.

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13 Economic Impact of a Pan-Pacific Unmanned Aircraft Systems Test Site. May 2013. Prepared for Alaska Center for Unmanned Aircraft Systems Integration, University of Alaska Fairbanks. Prepared by McDowell Group.

- **Rapid Response of Air Assets for Traffic Resolution.** Several incidents along the major highways in Alaska have resulted in extended road closures up to 6 hours. For example, manual photography and mapping documentation conducted from the ground can keep a road closed for approximately 3 hours. Using a UAS to map an accident from the air can result in the road being opened in approximately 1 hour.
- **Accurate Data Collection Leading to Cost Savings.** UAS were used to determine the functioning ability of oil field smoke stacks that resulted in accurate data provided in 20 minutes, and information that showed the needed replacement of only one of three catalytic converters, saving the oil company approximately $1 million.
- **Facilitate Search & Rescue and Other Life-Saving Missions.** Many examples were discussed where human life safety was at significant risk and that UAS could be used to complete the mission.
- **Significant Cost Savings in Public Safety.** Alaska's law enforcement aircraft costs an average hourly rate of $700 and one aircraft (Super Cub) costs approximately $800,000, and the A-Star helicopter is $3.6 million. The average hourly cost of operating a UAS ranges from $30 to $50 per hour, and the aircraft costs range from a few hundred dollars to over $40,000.

3.3.2 Policy Development

Now that Alaska has been selected as one of the FAA test sites, the opportunity to develop regulations and guidelines for UAS missions nationwide can be realized.

The test site operators will provide opportunities for government agencies, industry, and researchers to access this airspace to aid in the integration of UAS regulations in the NAS. Additionally, data collection will support development and operations research, and professional development opportunities will be available for inspectors, airspace managers, air traffic controllers, and others. The specific goals described by the PPUTRC applicants are listed below.

- Develop a set of standards for select unmanned aircraft categories, for aircraft state monitoring, and navigation. [PPUTRC goals and objectives work will augment ongoing standards work with research on categories of UAS not yet addressed, and evaluations needed to refine emerging standards under consideration.]
- Validate FAA acceptable risk thresholds or safety management system standards for UAS operations.
- Identify safety factors in UAS design.
- Validate certification standards, including protocols for air traffic control interaction.
- Define and qualify underlying assumptions and a minimum set of air vehicle characteristics critical to safety, reliability, etc.
- Develop effective, compliant "sense and avoid" systems to satisfy regulatory guidance.

- Identify gaps in federal and state statutory and case law protections for privacy and recommend policies or legislation to remedy.
- Directly support the federal mandate for "Expanding Use of UAS in the Arctic" (in Sec 332(d) of Public Law 112-95).
- Design experiments and provide data to support American Society for Testing and Materials (ASTM) F38 and Radio Technical Commission for Aeronautics Special Committee (RTCA SC) 203 to evaluate minimum training and operator qualification standards for crew licensing.[14]

UAF Center for Unmanned Aircraft Systems Integration, RT&D

UAF has been involved in UAS missions for more than 10 years. It has participated in research and data gathering operations from Prudhoe Bay to South Africa.

The Alaska Legislature indicated its support in the University's efforts by passage of HCR6 in the 2013 session. The resolution identified many of the good uses of UAS in Alaska and established this task force to recommend statutory changes.

3.3.3 Expedited Timeline for Test Range Use and Approved Missions

Currently, approved UAS missions (flights) require approval by the FAA through the COA process. This process requires the entity interested in operating UAS to complete a detailed flight plan and aircraft approval. This process takes approximately 6 months from application to flight.

Now that Alaska has been selected as a test site, specific areas of the state are expected to be pre-approved for flight testing, thus eliminating the extensive application process through the FAA. The University Center for Unmanned Aircraft Systems Integration RT&D will authorize and schedule UAS flights in the test ranges and other areas with expedited approval.

3.3.4 Encourage Pilot Training Program for UAS

One hurdle that aircraft manufacturers and pilots are experiencing is that while specific training is a requirement to fly a UAS, there is no UAS flight training program approved by the FAA. Alaska would like to lead the nation and become a training center for interested UAS pilots and crew.

The LTFUAS recognizes this as an opportunity for our state University in pilot training and as an economic benefit in the state. In addition, it will keep the University in league with other U.S. universities that are developing pilot training programs.

3.3.5 Education—Public Awareness

The LTFUAS discussed that each entity that would be using a UAS would also be responsible to educate the public on the purpose of the mission as well as provide contact information of a person who would be able to respond to inquiries.

14 Ibid.

The LTFUAS also felt that some of the public awareness would be provided through the extended duties of the LTFUAS as they deliberate the issues surrounding UAS flights in Alaska.

3.3.6 Market Alaska "Open for Business" for UAS

The Department of Commerce, Community, and Economic Development is partnering with the Fairbanks Economic Development Council to prepare an education booth for Alaska at the next AUVSI convention in Florida in May 2014.

Now that Alaska has been selected as a test site, many manufacturers and associated businesses will seek out the University to begin using test ranges and conduct business in and around the state. If fact, at least one UAS services business has already indicated an intent to open an office here in Alaska.

3.3.7 Benefits to the Public Safety Statewide

- UAS do not require a pilot on board to operate the aircraft or attached equipment. UAS operators and system operators remain safely on the ground, reducing their exposure to threats.
- UAS are able to enter environments that may be hazardous to pilots of manned aircraft.
- UAS provide superior situational awareness while minimizing the danger to which operators are exposed.
- UAS and trained operators minimize response time to most emergency situations.
- Community safety is enhanced by the rapid response of air assets to an emergency. In most cases, manned aircraft must take off and land at airports where UAS can launch from nearly anywhere within minutes.

3.4 Audits of Missions

FAA Privacy Policy requires the test site to report a variety of data on the flights occurring in the test ranges.

At this time, the LTFUAS does not believe there should be an additional requirement for reporting other than what is required by the FAA.

3.5 Test Site Operations Manager Position

The FAA Privacy Policy requirement also requires a Chief Privacy Officer at the test site. The University is refining the duties of the Director of the Test Site to encompass all the responsibilities of managing the test ranges. This officer will be developing privacy policies to govern all activities conducted by the test site, make privacy policies publicly available, and establish a mechanism to receive and consider comments from the public. Annually, the privacy officer will review test site operations to verify compliance with the policies and practices and share those outcomes in a public forum.

3.6 Incentive Grants

Many businesses have asked the LTFUAS if Alaska will offer any incentives to conduct business in the state. Given the reduced General Fund income to Alaska, the LTFUAS did not consider any financial incentives for potential business startups in Alaska.

The LTFUAS did discuss the advantages of being selected as a test site and the expedited administrative support for conducting UAS business in Alaska. It was agreed that the opportunity will offer many benefits to our state (see Section 3.3).

3.7 Research Appropriation to University of Alaska Fairbanks

While the LTFUAS would like to support the University financially, it was determined that funding may not be available at this time. The FAA states that no additional funding will be provided in conjunction with test site selection, but we are confident that federal funding may follow as integration into the NAS will require additional management.

4. FINAL RECOMMENDATIONS

The LTFUAS supports its recommendations to the Legislature by considering and adopting general guidelines from the following reports from the FAA:

- Guidelines for Operations of UAS (N 8900.227)
- Comprehensive Plan to Integrate UAS in National Airspace
- Final Privacy Requirements

The LTFUAS also adopted the IACP UAS Guidelines as appropriate for law enforcement in Alaska (Appendix B).

In addition to the FAA documents, the LTFUAS considered a report from Legislative Legal Services that identified Alaska's privacy laws and Constitutional protections of privacy to determine if there might be a scenario created through the use of UAS that would not be protected by existing privacy laws. The LTFUAS also recognized that because Alaska has been chosen as an FAA UAS Test Site for UAS Integration, an emphasis on management of the test ranges, economic development, and public education need immediate attention.

The LTFUAS made the following conclusions:

- It is the opinion of the LTFUAS that no additional statutory or regulatory requirements are needed for FAA-approved missions.
- It is the opinion of the LTFUAS that privacy policy is adequate through the FAA requirements for the use of UAS in the test sites.
- The LTFUAS does not intend to adopt requirements of hobbyist activities using UAS in the same manner that the FAA does not regulate model aeronautics.
- It is the opinion of the LTFUAS that the Department of Administration should review its data retention schedules with particular emphasis on law enforcement data captured inadvertently and allowing that data to be destroyed.
- It is the opinion of the LTFUAS that existing privacy laws are adequate to govern the use of unmanned aircraft
- The LTFUAS is confident in the FAA guidelines in protecting the safety of the national airspace.

Based on these findings, the final recommendations of the LTFUAS are the following:

1. Require all state and local law enforcement entities to adopt the IACP guidelines to help ensure privacy protection for Alaskans.

2. Require all law enforcement entities to first obtain a court order to use UAS over private property for criminal investigation against any person.

3. Encourage use of high-visibility marking or navigational lighting on law enforcement UAS as appropriate.

4. Convey a clear message to industry that Alaska is open for business to harness the beneficial uses of UAS, to encourage the growth of this economic sector, and to allow Alaska to continue to lead the nation in aviation innovation.

5. Encourage private and public UAS training programs.

6. Report all UAS incidents/accidents of aircraft larger than 55 pounds to the University of Alaska and/or Alaska Aviation Coordination Council.

7. Extend LTFUAS until June 30, 2017, and expand the duties of the Task Force with the addition of one member representing the Alaska Department of Transportation/Public Facilities (DOT/PF) and one public member, for the following reasons:

    - During this transitional phase of growing use of UAS in Alaska, the LTFUAS should be extended to continue to monitor it and any privacy matters that may arise that are not already covered by existing law. Because Alaska currently has a strong set of privacy laws, rather than recommend prohibitions be incorporated into statute that might inhibit industry, the LTFUAS recommends it continue to review UAS operations in light of current statutes and only recommend changes in statute as necessary.

    - Because FAA will be updating and issuing new guidelines based on the work of the new FAA UAS Test Sites announced on December 30, 2013, it is necessary for the LTFUAS to continue to review FAA policies to determine their impact and whether any additional policy changes at the state level may be necessary in response.

    - With Alaska's recent selection as one of the nation's six FAA UAS Test Sites through the University of Alaska's application (in conjunction with Oregon and Hawaii), the LTFUAS will meet part of the test site's requirement as a public forum where concerns regarding privacy and data matters can be collected and evaluated.

As we move forward, and particularly in light of the fact that Alaska has been selected as an FAA test site for UAS integration, and with the extension and expansion of duties of the Task Force, the LTFUAS further recommends immediate emphasis on the following:

1. management of the test ranges,

2. economic development opportunities,

3. public education and public relations regarding UAS, and

4. difference of model aircraft from UAS.

In addition to the above seven recommendations, the Task Force also recommends the following:

1. each department of the State of Alaska identify a point of contact for UAS to coordinate with the LTFUAS and provide information regarding department policy and procedures to ensure accountability and privacy in regard to UAS use, and

1) the Alaska Department of Administration review and update its data retention policies particularly in the area of inadvertent captured data that is not relevant to a state agency.

5. DEFINITIONS

TERMINOLOGY	DEFINITION	SOURCE
Autonomous Operations	It is generally understood that most UAS have some level of autonomy associated with its operation. Although it is possible to have a completely manual UAS, which requires a pilot-in-the-loop, the majority of UAS are autonomous to a certain degree. Only those UAS that have the capability of pilot intervention, or pilot-on-the-loop, shall be allowed in the NAS outside of Restricted, Prohibited, or Warning areas. UAS that are designed to be completely autonomous, with no capability of pilot intervention, are not authorized in the national airspace system. Although the pilot may be technically considered out-of-the-loop in a lost link scenario, this restriction does not apply to UAS operating under lost link.	1
Certificate of Waiver or Authorization (COA)	An FAA grant of approval for a specific flight operation. The authorization to operate a UAS in the National Airspace System as a public aircraft outside of Restricted, Warning, or Prohibited areas approved for aviation activities.	2
Civil Aircraft	Aircraft other than public aircraft.	2
Crewmember [UAS]	In addition to the crewmembers identified in 14 CFR Part 1, a UAS flightcrew member includes pilots, sensor/payload operators, and visual observers, but may include other persons as appropriate or required to ensure safe operation of the aircraft.	2
Detect and Avoid	Term used instead of Sense and Avoid in the Terms of Reference for RTCA Special Committee 228. This new term has not been defined by RTCA and may be considered to have the same definition as Sense and Avoid when used in this document.	2
International Civil Aviation Organization (ICAO)	A specialized agency of the United Nations whose objective is to develop the principles and techniques of international air navigation and to foster planning and development of international civil air transport.	2
Manned Aircraft	Aircraft piloted by a human onboard.	2
Model Aircraft	An unmanned aircraft that is capable of sustained flight in the atmosphere; flown within visual line-of-sight of the person operating the aircraft and flown for hobby or recreational purposes.	2
National Airspace System	The common network of U.S. airspace; air navigation facilities, equipment and services, airports or landing areas; aeronautical charts, information and services; rules, regulations and procedures, technical information, and manpower and material. Included are system components shared jointly with the military.	2
Personal Information Privacy Act (PIPA)	An Act relating to breaches of security involving personal information, credit report and credit score security freezes, protection of social security numbers, care of records, disposal of records, identity theft, credit cards, and debit cards, disclosure of the names and addresses of permanent fund dividend applicants, and to the jurisdiction of the office of administrative hearings; amending Rules 60 and 82, Alaska Rules of Civil Procedure; and providing for an effective date.	3

TERMINOLOGY	DEFINITION	SOURCE
Pilot-in-Command	Pilot-in-command means the person who: 1) has final authority and responsibility for the operation and safety of the flight; 2) has been designated as pilot-in-command before or during the flight; and 3) holds the appropriate category, class, and type rating, if appropriate, for the conduct of the flight.	2
Public Aircraft	An aircraft operated by a governmental entity (including federal, state, or local governments, and the U.S. Department of Defense and its military branches) for certain purposes as described in 49 U.S.C. §§ 40102(a)(41) and 40125. Public aircraft status is determined on an operation by operation basis. See 14 CFR Part 1, § 1.1 for a complete definition of a public aircraft.	2
Sense and Avoid	The capability of a UAS to remain well clear from and avoid collisions with other airborne traffic. Sense and Avoid provides the functions of self-separation and collision avoidance to establish an analogous capability to "see and avoid" required by manned aircraft.	2
Test Range	A defined geographic area where research and development are conducted in accordance with Sections 332 and 334 of the FMRA. Test ranges are also known as test sites in related documents such as the FAA's Screening Information Request.	2
Unmanned Aircraft	1) A device used or intended to be used for flight in the air that has no onboard pilot. This devise excludes missiles, weapons, or exploding warheads, but includes all classes of airplanes, helicopters, airships, and powered-lift aircraft without an onboard pilot. UA do not include traditional balloons (see 14 CFR Part 101), rockets, tethered aircraft and unpowered gliders. 2) An aircraft that is operated without the possibility of direct human intervention from within or on the aircraft.	2
Unmanned Aircraft System	An unmanned aircraft and its associated elements related to safe operations, which may include control stations (ground, ship, or air-based), control links, support equipment, payloads, flight termination systems, and launch/recovery equipment. An unmanned aircraft and associated elements (including communications links and the components that control the unmanned aircraft) that are required for the pilot-in-command to operate safely and efficiently in the national airspace system.	2
Visual Line-of-Sight	Unaided (corrective lenses and/or sunglasses exempted) visual contact between a pilot-in-command or a visual observer and a UAS sufficient to maintain safe operational control of the aircraft, know its location, and be able to scan the airspace in which it is operating to see and avoid other air traffic or objects aloft or on the ground.	2

Sources:

1. Interim Operational Approval Guidance 08-01. Aviation Safety Unmanned Aircraft Program Office Air-160. Unmanned Aircraft Systems Operations in the U. S. National Airspace System, March 13, 2008. Federal Aviation Administration.
2. Integration of Civil Unmanned Aircraft Systems (UAS) in the National Airspace System (NAS) Roadmap. First Edition–2013. U.S. Department of Transportation Federal Aviation Administration.
3. Chapter 92 SLA 08 (HB65) .

APPENDIX A

FAA FINAL PRIVACY REQUIREMENTS
NOVEMBER 7, 2013

[4910-13]

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 91

[Docket No.: FAA-2013-0061]

Unmanned Aircraft System Test Site Program

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of availability of final privacy requirements for the unmanned aircraft system ("UAS") test site program; response to comments

SUMMARY: On February 22, 2013 the FAA published and requested public comment on the proposed privacy requirements (the "Draft Privacy Requirements") for UAS test sites (the "Test Sites") that the FAA will establish pursuant to the FAA Modernization and Reform Act of 2012 ("FMRA"). This notice responds to the public comments received and publishes the FAA's final privacy requirements for the Test Sites (the "Final Privacy Requirements").

ADDRESSES: You may review the public docket for this rulemaking (Docket No. FAA-2013-0061) on the Internet at http://www.regulations.gov. You may also review the public docket at the Docket Management Facility in Room W12-140 of the West Building Ground Floor at 1200 New Jersey Avenue, SE., Washington, DC, 20590-0001 between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

FOR FURTHER INFORMATION CONTACT: For technical questions concerning the test site program, contact Elizabeth Soltys, Unmanned Aircraft Systems Integration Office, Federal Aviation Administration, 800 Independence Avenue SW., Washington, DC 20591; email: 9-ACT-UASTSS@faa.gov.

For legal questions concerning the FAA's privacy requirements for the Test Sites contact Carlos Siso, Office of the Chief Counsel, Federal Aviation Administration, 800 Independence Ave. SW., Washington, DC 20591; email: 9-AGC-UASPrivacy@faa.gov.

SUPPLEMENTARY INFORMATION

This notice summarizes and responds to the public comments received in response to the following Federal Register notices seeking public comment on the Draft Privacy Requirements for the Test Sites:

(i) Notice of availability and request for comments published in the Federal Register on February 22, 2013 (78 FR 12259), Docket No. FAA-2013-0061-0001; and

(ii) Notice of public engagement session published in the Federal Register on March 28, 2013 (78 FR 18932), Docket No. FAA-2013-0061-0050.

In addition, this notice publishes the FAA's Final Privacy Requirements for the Test Sites which are set forth under the "Conclusion" section below.

Discussion of Comments

The FAA received 99 comments through Regulations.gov and 53 comments through the public engagement session. A transcript of the public engagement session is available at: http://www.faa.gov/about/initiatives/uas/media/UAStranscription.pdf. Public comments ranged from recommending that the FAA not impose any privacy requirements on the Test Sites to recommending that the FAA impose extensive privacy requirements on the Test Sites. The FAA also received comments that were not responsive to the notice or that were unclear.

The FAA analyzed the responsive comments and grouped them into ten categories. The following sections address the comments by category.

1) The FAA should focus on its safety mission; it should not engage in regulating privacy.

The FAA received a number of comments advocating that the FAA should focus on its safety mission and should not engage in regulating privacy. The following comments were received:

- The FAA should focus on safety;
- Regulating privacy is outside the FAA's mission;
- The FAA does not have statutory authority to regulate privacy;
- The FAA does not have the authority to impose privacy requirements on the Test Sites;
- The FAA should allow privacy to be addressed by other more appropriate government bodies including: Federal agencies that have expertise and authority to deal with privacy concerns; Congress; state or local legislative bodies; and the judicial system;
- The Federal Government should not regulate privacy impacts of UAS; these issues should be left to states, cities, and counties to address;
- The FAA should only require compliance with privacy laws that are already in place and focus on developing safe operation of UAS;
- The FAA should not deny access to the national airspace for reasons other than safety;
- Existing privacy laws are sufficient to cover the responsible use of UAS. There already exist Federal, state and other laws that protect privacy. In addition, tort law may also provide avenues of recourse for plaintiffs to protect their privacy rights;
- The FAA should not implement privacy regulations that make entry into the market prohibitive for small businesses;
- The FAA should not allow privacy issues to hinder commercialization of UAS;
- There is no evidence that the operations at the Test Sites will harm privacy interests. Restricting activities at the test sites at this early stage will likely overprotect privacy at the expense of innovation;

- The FAA should afford adequate time for non-governmental solutions such as industry norms and practices to develop before intervening administratively to protect privacy. These less restrictive solutions will reduce the need for administrative intervention and will allow for increased innovation in the national airspace;
- Requiring Test Site operators to develop privacy policies that are informed by Fair Information Practice Principles is onerous for commercial operators of UAS and its cost will likely outweigh any hypothetical benefits;
- Requiring Test Site operators to issue privacy policies informed by Fair Information Practice Principles will limit the diversity of data that will inform integration of UAS into the national airspace. The FAA's approach would exclude an important possible alternative from the discussion: some operators might choose not to issue a privacy policy or adopt a non-FIPPs-compliant policy; and
- The FAA should treat data gathered by UAS no differently than data gathered by a manned aircraft or by other electronic means. There is no significant difference in terms of surveillance between a UAS and a manned aircraft, and manned aircraft are permitted to operate in the national airspace with cameras.

Response: The FAA's mission is to provide the safest, most efficient aerospace system in the world and does not include regulating privacy. At the same time, the FAA recognizes that there is substantial debate and difference of opinion among policy makers, industry, advocacy groups, and members of the public as to whether UAS operations at the Test Sites will raise novel privacy issues that are not adequately addressed by existing legal frameworks.

The FAA will require the Test Site operators to comply with the Final Privacy Requirements. Congress mandated that the FAA establish the Test Sites to further UAS integration into the national airspace system. The Final Privacy Requirements advance this purpose by helping inform the dialogue among policymakers, privacy advocates, and industry regarding the impact of UAS technologies on privacy.

The FAA's authority for including the Final Privacy Requirements in the Test Site OTAs is set forth in 49 U.S.C. 106(l)(6). That statute authorizes the FAA Administrator to enter into an OTA "on such terms and conditions as the Administrator may consider appropriate." The FAA believes that it is appropriate to require Test Site operators to comply with the Final Privacy Requirements.

2) The FAA should require warrants before law enforcement can use UAS in the Test Sites to conduct surveillance or gather evidence.

The FAA received a variety of comments advocating that:

- The FAA should include provisions in the OTA that require warrants to be obtained when UAS are used to conduct surveillance or gather evidence within the Test Site; and
- The OTA include appropriate safeguards to protect Fourth Amendment rights at and around our national borders.

Response: The FAA's mission is to provide the safest, most efficient aerospace system in the world. The FAA is establishing the UAS Test Sites consistent with its mission and the direction in the FMRA. The FAA appreciates the commenters' concerns. Accordingly, the final privacy requirements provide that the Site Operator and its team members must comply with all applicable privacy laws.

3) The FAA should mandate specific privacy requirements for the Test Sites.

The FAA received a variety of comments advocating that the FAA mandate specific privacy requirements for the Test Sites. The recommendations included the following:

- The FAA should specify minimum privacy requirements and require each Test Site to comply with them;
- The FAA should mandate compliance with Fair Information Practice Principles for all Test Site operators;

- The FAA should establish prohibitions on where UAS can operate within a Test Site and the kinds of surveillance activities that UAS conduct at the Test Sites;
- The FAA should require all UAS flown at the Test Sites to have unencrypted down links so that all their data collection can be viewed by the public, including records contained onboard and recovered after landing;
- The FAA should require each Test Site operator to conduct a full Privacy Impact Assessment;
- The FAA should require each Test Site operator to establish a Chief Privacy Officer and centralize privacy responsibilities in that person;
- The FAA should require each Test Site operator to establish a privacy advisory committee to review proposed UAS research at the Test Sites for privacy concerns;
- The FAA should require each Test Site operator to provide a detailed response to public input it receives regarding the Test Site's privacy policy;
- The FAA should prohibit the sharing of recorded surveillance footage beyond the scope of its original purpose;
- The FAA should prohibit UAS in the Test Sites from flying below a minimum altitude;
- The FAA should prohibit UAS in the Test Sites from carrying any equipment that could be used to conduct surveillance;
- The FAA should limit the use of the data collected at the Test Sites;
- The FAA should prohibit (i) the use of Test Sites for government surveillance, and (ii) sharing data collected with law enforcement for the purpose of investigating or prosecuting a crime;

- The FAA should limit the type of data that can be collected by UAS at the Test Sites including limiting the resolution of visual imagery that UAS can collect, prohibiting recording of audio data, and restricting the ability to collect WiFi and cellular signals;
- The FAA should require Test Site operators to provide data on the payload of each UAS flown at the Test Site including specific information on the data the payload is capable of collecting;
- The FAA should mandate privacy policies that require deletion of collected data within a certain time period;
- The FAA should prohibit the Test Site operator and UAS operators at the Test Sites from retaining any data collected longer than is necessary to fulfill the purpose of the Test Site;
- The FAA should require UAS operators to file data collection statements with the FAA for UAS operations that involve remote sensing and signals surveillance from the UAS platform; and
- The FAA should require UAS operating at altitudes over 400 feet to carry an automatic dependent surveillance-broadcast transponder (ADS-B Out) so that UAS operations can be tracked.

Response: The FAA's mission is to provide the safest, most efficient aerospace system in the world. Although there is a long history of placing cameras and other sensors on aircraft for a variety of purposes—news helicopters, aerial surveys, film/television production, law enforcement, etc.—the FAA is not, through awarding and supervising these Test Sites, taking specific views on whether or how the Federal Government should regulate privacy or the scope of data that can be collected by manned or unmanned aircraft.

There was substantial difference of opinion among commenters as to whether UAS operations and manned aircraft operations present different privacy issues that justify imposing special privacy restrictions on UAS operations at the Test Sites. In addition, there was substantial difference of opinion among commenters regarding what elements would be appropriate for a Test Site privacy policy. Based on the comments received, the FAA will require Test Sites to comply with the following requirements in addition to those described in the Draft Privacy Requirements:

(1) Test site operators must maintain a record of all UAS operating in the test sites;

(2) Test site operators must require every UAS operator in the Test Site to have a written plan for the operator's use and retention of data collected by the UAS; and

(3) Test site operators must conduct an annual review of test site operations to verify compliance with stated privacy policy and practices and share those outcomes annually in a public forum with an opportunity for public feedback.

The above are reflected in the Final Privacy Requirements.

The FAA has determined that it should not impose privacy requirements beyond those in the Final Privacy Requirements for the following reasons. *First,* there are many privacy laws and applications of tort law that may address some of the privacy issues that arise from UAS operations at the Test Sites.

Second, the FAA believes that Test Sites operators will be responsive to local stakeholders' privacy concerns and will develop privacy policies appropriately tailored to each Test Site. The selection criteria for the Test Sites specify that only a "public entity" can serve as a Test Site operator. The term "public entity" is defined in the selection criteria to mean "(A) any State or local government; (B) any department, agency, special purpose district, or other instrumentality of a State or States or local government; and (C) the National Railroad Passenger Corporation, and any commuter authority." The FAA expects that public entities will be responsive to stakeholder concerns.

Third, if UAS operations at a Test Site raise privacy concerns that are not adequately addressed by the Test Site's privacy policies, elected officials can weigh the benefits and costs of additional privacy laws or regulations. Forty-three states have already enacted or are considering legislation regulating use of UAS. *See* Drone Legislation All the Rage; Varies Widely Across 43 States, According to WestlawNext, June 17, 2013, *available at*: http://thomsonreuters.com/ press-releases/062013/drone_legislation_varies_across_ states_according_to_Westlaw.

4) The FAA should conduct audits of the Test Sites to ensure compliance with privacy policies.

Various commenters recommended that the FAA should audit each Test Site to ensure compliance with the privacy policies in the OTA.

Response: Each Test Site will be operated by a public entity (see response to Category 3 above). The FAA expects that the public entity operating each test site will already be subject to oversight and audit requirements. The FAA does not believe that it is appropriate for the FAA to impose additional audit requirements on the Test Site operators.

5) The FAA should require Test Site operators to keep records that will allow for effective citizen participation and reporting of privacy violations.

One commenter recommended that the FAA require Test Site operators to keep accurate, detailed, frequent, and accessible records to allow for effective citizen participation and reporting of privacy violations.

Response: Each Test Site operator will be a public entity (see response to Category 3 above). Public entities are generally subject to laws that establish record keeping requirements and provide the public access to records. The FAA does not believe that it is appropriate for the FAA to impose additional record keeping requirements on the Test Site operators other than those specified in the Final Privacy Requirements.

6) The FAA should establish a searchable database or registry of UAS operators and operations at the Test Sites.

The FAA received a variety of comments advocating that:

- The FAA should create a public, searchable database or registry of all UAS operators. Some commenters recommended that the database include information about surveillance equipment used and the operator's data collection practices;
- The FAA should require UAS operators at the Test Sites to provide public statements describing the surveillance equipment that will be carried by a UAS, the geographical area where the UAS will be operated, and the purposes for which the UAS will be deployed; and
- The FAA should establish a means for the public to access the data on UAS flights collected by the FAA.

Response: The FAA believes that it is not appropriate for the FAA to create a public registry or database of UAS operations at the Test Sites. However, the FAA has included a contractual provision in the Final Privacy Requirements that will require each Test Site operator to maintain a record of all UAS operating at the Test Site.

7) The FAA should modify its Test Site selection criteria to take into account privacy concerns.

Various commenters recommended that the FAA revise its selection criteria. Suggestions included the following:

- The FAA should choose an applicant that has an established UAS research program with active engagement with UAS privacy issues;
- The FAA should choose at least one Test Site in a state with strong privacy protective UAS laws and regulations;
- The FAA should select one or more Test Sites in or near a densely populated urban area in order to avoid a bias towards privacy issues relevant for rural UAS operations; and

- The FAA should consider the privacy track record of applicants as part of the selection process.

Response: The FAA believes that it is not appropriate to modify the Test Site selection criteria to include the recommended privacy considerations. Applicants have already submitted complete applications based on the announced selection criteria and the application period has closed.

The FAA published the Test Site selection criteria and application instructions on February 14, 2013 on https://faaco.faa.gov under Solicitation number DTFACT-13-R-00002. The selection criteria incorporate the factors that Congress directed the FAA to consider in the FMRA, including, geographic and climatic diversity; location of ground infrastructure; and research needs. The FAA required applicants to submit seven volumes of extensive and detailed information that address a broad set of considerations including safety, airspace use, experience, research objectives, and risk considerations. This information will allow the FAA to make a selection based on the direction provided by Congress in the FMRA and on the FAA's mission.

The FAA developed the Test Site selection criteria after seeking public input and consulting with other agencies regarding what selection criteria would be appropriate. In March 2012, the FAA published a request for comment in the Federal Register and in April 2012, the FAA hosted two public webinars to obtain public input on the FAA's proposed selection criteria. Although there was significant public participation, the FAA did not receive comments advocating that privacy issues be used as a factor in choosing the Test Sites.

8) The FAA should require Test Site operators to conduct specific tests related to privacy and surveillance.

Commenters recommended that the FAA should:

- Require UAS operators at Test Sites to conduct specific tests related to surveillance and privacy;

- Require Test Site operators to design the sites— including the creation of "fake" houses or businesses—to allow UAS operators to test how accurate their surveillance systems are and test how much data those systems collect; and
- Develop and require Test Sites to implement a standard battery of privacy tests that each UAS operating within a Test Site should have to perform in order to collect data that the FAA can use to make decisions about privacy issues.

Response: The FAA is not planning to have the Test Site operators conduct specific research.

9) The FAA should not take punitive actions against a Test Site operator for privacy violations without due process.

One commenter noted that if charges are filed by law enforcement against a Test Site operator due to potential violations of privacy laws, the OTA allows the FAA to suspend or modify the relevant operational authority for a Test Site (e.g. Certificate of Operation, or OTA). That commenter recommended that a Test Site operator be entitled to due process before the operational authority be suspended or modified.

Response: A Test Site operator's rights to operate a Test Site are set forth in the OTA and are subject to the terms and conditions in the OTA. The FAA believes that it is appropriate to include contractual provisions in the Final Privacy Requirements that allow the FAA to protect the public interest by suspending or modifying the relevant operational authority for a Test Site if charges are filed by law enforcement against a Test Site operator due to potential violations of privacy laws.

10) The FAA should establish sanctions for violations of privacy policies or rights.

One commenter recommended that the FAA rescind the OTA for a Test Site where serious privacy violations have occurred and levy fines against operators that fail to comply with privacy policies.

Response: The Final Privacy Requirements provide that violations of privacy laws can result in suspension or termination of the OTA.

The FAA will not monitor a Test Site's compliance with its own privacy policies. The FAA expects the public entities operating the Tests Sites and their respective state/local oversight bodies to monitor and enforce a Test Site's compliance with its own policies.

Conclusion

Based on the comments submitted, the FAA intends to require each test site operator to comply with all of the privacy requirements included in the Draft Privacy Requirements as well as the following additional privacy requirements:

(1) Test site operators must maintain a record of all UAS operating in the test sites;

(2) Test site operators must require every UAS operator in the Test Site to have a written plan for the operator's use and retention of data collected by the UAS; and

(3) Test site operators must conduct an annual review of test site operations to verify compliance with stated privacy policy and practices and share those outcomes annually in a public forum with an opportunity for public feedback.

Accordingly, the FAA intends to include the following terms and conditions into Article 3 of the OTA:

"ARTICLE 3 PRIVACY; APPLICABLE LAW

a. Privacy Policies

The Site Operator must:

(i) Have privacy policies governing all activities conducted under the OTA, including the operation and relevant activities of the UAS authorized by the Site Operator.

(ii) Make its privacy policies publicly available;

(iii) Have a mechanism to receive and consider comments from the public on its privacy policies;

(iv) Conduct an annual review of test site operations to verify compliance with stated privacy policy and practices and share those outcomes annually in a public forum with an opportunity for public feedback;

(v) Update its privacy policies as necessary to remain operationally current and effective; and

(vi) Ensure the requirements of its privacy policies are applied to all operations conducted under the OTA.

The Site Operator's privacy policies should be informed by Fair Information Practice Principles.

b. Compliance With Applicable Privacy Laws

For purposes of this agreement, the term "Applicable Law" shall mean (i) a law, order, regulation, or rule of an administrative or legislative government body with jurisdiction over the matter in question, or (ii) a ruling, order, decision or judgment of a court with jurisdiction over the matter in question. The Site Operator and its team members must operate in accordance with all Applicable Law regarding the protection of an individual's right to privacy (hereinafter referred to as "Privacy Laws").

If the U.S. Department of Justice or a state's law enforcement authority files criminal or civil charges over a potential violation of a Privacy Law, the FAA may take appropriate action including suspending or modifying the relevant operational authority (e.g., Certificate of Operation, or OTA) until the proceedings are completed. If the proceedings demonstrate the operation was in violation of the Privacy Law, the FAA may terminate the relevant operational authority.

c. Change in Law

If during the term of this Agreement an Applicable Law comes into effect which may have an impact on UAS, including impacts on the privacy interests of individuals or entities affected by any operation of any UAS operating at the Test Site, such Applicable Law will be applicable to the OTA and the FAA may update or amend the OTA to reflect these changes.

d. Transmission of Data to the FAA

The Site Operator should not provide or transmit to the FAA or its designees any data other than the data the data requested by the FAA pursuant to Article 5 of this OTA.

e. **Other Requirements**

The Site Operator must:

(i) Maintain a record of all UAS operating at the test sites; and

(ii) Require each UAS operator in the Test Site to have a written plan for the operator's use and retention of data collected by the UAS."

Issued in Washington, DC on November 7, 2013.

Marc L. Warren

Acting Chief Counsel, Federal Aviation Administration.

APPENDIX B

INTERNATIONAL ASSOCIATION OF CHIEFS OF POLICE RECOMMENDED GUIDELINES

INTERNATIONAL ASSOCIATION OF CHIEFS OF POLICE

AVIATION COMMITTEE

Recommended Guidelines for the use of Unmanned Aircraft

August 2012

BACKGROUND:

Rapid advances in technology have led to the development and increased use of unmanned aircraft. That technology is now making its way into the hands of law enforcement officers nationwide.

We also live in a culture that is extremely sensitive to the idea of preventing unnecessary government intrusion into any facet of our lives. Personal rights are cherished and legally protected by the Constitution. Despite their proven effectiveness, concerns about privacy threaten to overshadow the benefits this technology promises to bring to public safety. From enhanced officer safety by exposing unseen dangers, to finding those most vulnerable who may have wandered away from their caregivers, the potential benefits are irrefutable. However, privacy concerns are an issue that must be dealt with effectively if a law enforcement agency expects the public to support the use of UA by their police.

The Aviation Committee has been involved in the development of unmanned aircraft policy and regulations for several years. The Committee recommends the following guidelines for use by any law enforcement agency contemplating the use of unmanned aircraft.

DEFINITIONS:

1. **Model Aircraft -** A remote controlled aircraft used by hobbyists, which is manufactured and operated for the purposes of sport, recreation and/or competition.
2. **Unmanned Aircraft (UA)** – An aircraft that is intended to navigate in the air without an on-board pilot. Also called Remote Piloted Aircraft and "drones."
3. **UA Flight Crewmember -** A pilot, visual observer, payload operator or other person assigned duties for a UA for the purpose of flight.
4. **Unmanned Aircraft Pilot -** A person exercising control over an unmanned aircraft during flight.

COMMUNITY ENGAGEMENT:

1. Law enforcement agencies desiring to use UA should first determine how they will use this technology, including the costs and benefits to be gained.
2. The agency should then engage their community early in the planning process, including their governing body and civil liberties advocates.
3. The agency should assure the community that it values the protections provided citizens by the U.S. Constitution. Further, the agency will operate the aircraft in full compliance with the mandates of the Constitution, federal, state and local law governing search and seizure.
4. The community should be provided an opportunity to review and comment on agency procedures as they are being drafted. Where appropriate, recommendations should be considered for adoption in the policy.
5. As with the community, the news media should be brought into the process early in its development.

SYSTEM REQUIREMENTS:

1. The UA should have the ability to capture flight time by individual flight and cumulative over a period of time. The ability to reset the flight time counter should be restricted to a supervisor or administrator.
2. The aircraft itself should be painted in a high visibility paint scheme. This will facilitate line of sight control by the aircraft pilot and allow persons on the ground to monitor the location of the aircraft. This recommendation recognizes that in some cases where officer safety is a concern, such as high risk warrant service, high visibility may not be optimal. However, most situations of this type are conducted covertly and at night. Further, given the ability to observe a large area from an aerial vantage point, it may not be necessary to fly the aircraft directly over the target location.
3. Equipping the aircraft with weapons of any type is strongly discouraged. Given the current state of the technology, the ability to effectively deploy weapons from a small UA is doubtful. Further, public acceptance of airborne use of force is likewise doubtful and could result in unnecessary community resistance to the program.
4. The use of model aircraft, modified with cameras, or other sensors, is discouraged due to concerns over reliability and safety.

OPERATIONAL PROCEDURES:

1. UA operations require a Certificate of Authorization (COA) from the Federal Aviation Administration (FAA). A law enforcement agency contemplating the use of UA should contact the FAA early in the planning process to determine the requirements for obtaining a COA.
2. UA will only be operated by personnel, both pilots and crew members, who have been trained and certified in the operation of the system. All agency personnel with UA responsibilities, including command officers, will be provided training in the policies and procedures governing their use.
3. All flights will be approved by a supervisor and must be for a legitimate public safety mission, training, or demonstration purposes.
4. All flights will be documented on a form designed for that purpose and all flight time shall be accounted for on the form. The reason for the flight and name of the supervisor approving will also be documented.
5. An authorized supervisor/administrator will audit flight documentation at regular intervals. The results of the audit will be documented. Any changes to the flight time counter will be documented.
6. Unauthorized use of a UA will result in strict accountability.
7. Except for those instances where officer safety could be jeopardized, the agency should consider using a “Reverse 911” telephone system to alert those living and working in the vicinity of aircraft operations (if such a system is available). If such a system is not available, the use of patrol car public address systems should be considered. This will not only provide a level of safety should the aircraft make an uncontrolled landing, but citizens may also be able to assist with the incident.
8. Where there are specific and articulable grounds to believe that the UA will collect evidence of criminal wrongdoing and if the UA will intrude upon reasonable expectations of privacy, the agency will secure a search warrant prior to conducting the flight.

IMAGE RETENTION:

1. Unless required as evidence of a crime, as part of an on-going investigation, for training, or required by law, images captured by a UA should not be retained by the agency.
2. Unless exempt by law, retained images should be open for public inspection.

APPENDIX C

ACADEMY OF MODEL AERONAUTICS SAFETY CODES

Academy of Model Aeronautics National Model Aircraft Safety Code

Effective January 1, 2014

A. **GENERAL**: A model aircraft is a non-human-carrying aircraft capable of sustained flight in the atmosphere. It may not exceed limitations of this code and is intended exclusively for sport, recreation, education and/or competition. All model flights must be conducted in accordance with this safety code and any additional rules specific to the flying site.

1. Model aircraft will not be flown:
   (a) In a careless or reckless manner.
   (b) At a location where model aircraft activities are prohibited.
2. Model aircraft pilots will:
   (a) Yield the right of way to all human-carrying aircraft.
   (b) See and avoid all aircraft and a spotter must be used when appropriate. (AMA Document #540-D.)
   (c) Not fly higher than approximately 400 feet above ground level within three (3) miles of an airport without notifying the airport operator.
   (d) Not interfere with operations and traffic patterns at any airport, heliport or seaplane base except where there is a mixed use agreement.
   (e) Not exceed a takeoff weight, including fuel, of 55 pounds unless in compliance with the AMA Large Model Airplane program. (AMA Document 520-A.)
   (f) Ensure the aircraft is identified with the name and address or AMA number of the owner on the inside or affixed to the outside of the model aircraft. (This does not apply to model aircraft flown indoors.)
   (g) Not operate aircraft with metal-blade propellers or with gaseous boosts except for helicopters operated under the provisions of AMA Document #555.
   (h) Not operate model aircraft while under the influence of alcohol or while using any drug that could adversely affect the pilot's ability to safely control the model.
   (i) Not operate model aircraft carrying pyrotechnic devices that explode or burn, or any device which propels a projectile or drops any object that creates a hazard to persons or property.
   Exceptions:
   - Free Flight fuses or devices that burn producing smoke and are securely attached to the model aircraft during flight.
   - Rocket motors (using solid propellant) up to a G-series size may be used provided they remain attached to the model during flight. Model rockets may be flown in accordance with the National Model Rocketry Safety Code but may not be launched from model aircraft.
   - Officially designated AMA Air Show Teams (AST) are authorized to use devices and practices as defined within the Team AMA Program Document. (AMA Document #718.)

   (j) Not operate a turbine-powered aircraft, unless in compliance with the AMA turbine regulations. (AMA Document #510-A.)
3. Model aircraft will not be flown in AMA sanctioned events, air shows or model demonstrations unless:
   (a) The aircraft, control system and pilot skills have successfully demonstrated all maneuvers intended or anticipated prior to the specific event.
   (b) An inexperienced pilot is assisted by an experienced pilot.
4. When and where required by rule, helmets must be properly worn and fastened. They must be OSHA, DOT, ANSI, SNELL or NOCSAE approved or comply with comparable standards.

B. **RADIO CONTROL (RC)**

1. All pilots shall avoid flying directly over unprotected people, vessels, vehicles or structures and shall avoid endangerment of life and property of others.
2. A successful radio equipment ground-range check in accordance with manufacturer's recommendations will be completed before the first flight of a new or repaired model aircraft.
3. At all flying sites a safety line(s) must be established in front of which all flying takes place. (AMA Document #706.)
   (a) Only personnel associated with flying the model aircraft are allowed at or in front of the safety line.
   (b) At air shows or demonstrations, a straight safety line must be established.
   (c) An area away from the safety line must be maintained for spectators.
   (d) Intentional flying behind the safety line is prohibited.
4. RC model aircraft must use the radio-control frequencies currently allowed by the Federal Communications Commission (FCC). Only individuals properly licensed by the FCC are authorized to operate equipment on Amateur Band frequencies.
5. RC model aircraft will not knowingly operate within three (3) miles of any pre-existing flying site without a frequency-management agreement. (AMA Documents #922 and #923.)
6. With the exception of events flown under official AMA Competition Regulations, excluding takeoff and landing, no powered model may be flown outdoors closer than 25 feet to any individual, except for the pilot and the pilot's helper(s) located at the flightline.
7. Under no circumstances may a pilot or other person touch an outdoor model aircraft in flight while it is still under power, except to divert it from striking an individual.
8. RC night flying requires a lighting system providing the pilot with a clear view of the model's attitude and orientation at all times. Hand-held illumination systems are inadequate for night flying operations.
9. The pilot of an RC model aircraft shall:
   (a) Maintain control during the entire flight, maintaining visual contact without enhancement other than by corrective lenses prescribed for the pilot.
   (b) Fly using the assistance of a camera or First-Person View (FPV) only in accordance with the procedures outlined in AMA Document #550.
   (c) Fly using the assistance of autopilot or stabilization system only in accordance with the procedures outlined in AMA Document #560.

C. **FREE FLIGHT**

1. Must be at least 100 feet downwind of spectators and automobile parking when the model aircraft is launched.
2. Launch area must be clear of all individuals except mechanics, officials, and other fliers.
3. An effective device will be used to extinguish any fuse on the model aircraft after the fuse has completed its function.

D. **CONTROL LINE**

1. The complete control system (including the safety thong where applicable) must have an inspection and pull test prior to flying.
2. The pull test will be in accordance with the current Competition Regulations for the applicable model aircraft category.
3. Model aircraft not fitting a specific category shall use those pull-test requirements as indicated for Control Line Precision Aerobatics.
4. The flying area must be clear of all utility wires or poles and a model aircraft will not be flown closer than 50 feet to any above-ground electric utility lines.
5. The flying area must be clear of all nonessential participants and spectators before the engine is started.

"AMA Advanced Flight Systems Committee"
amaflightsystems@gmail.com

Radio Controlled Model Aircraft Operation
Utilizing "First Person View" Systems

1. DEFINITION OF TERMS:

Please refer to Page 3, section 7 which contains an alphabetical listing of the definitions of the terms in italics that are used in this document.

2. GENERAL:

FPV flying of radio control model aircraft by AMA members is allowed only for noncommercial purposes as a hobby/recreational and/or competition activity and must be conducted in accordance with AMA's current National Model Aircraft Safety Code and any additional rules specific to a flying site/location.

3. OPERATIONS – REQUIREMENTS – LIMITATIONS:

a) AMA *FPV novice pilots* must use a buddy-box system with an *FPV spotter* while learning to fly *FPV*.

b) All *FPV* flights require an AMA *FPV pilot* to have an AMA *FPV spotter* next to him/her maintaining *VLOS* with the *FPV aircraft* throughout its flight.

c) The *FPV pilot* must brief the *FPV spotter* on the *FPV spotter's* duties, communications and hand-over control procedures before *FPV flight*.

d) The AMA *FPV spotter* must communicate with the *FPV pilot* to ensure the *FPV aircraft* remains within *VLOS*, warning the *FPV pilot* of approaching aircraft, and when avoidance techniques are necessary.

e) During an FPV flight, the FPV spotter must be prepared to acquire the transmitter/control from the FPV pilot and assume VLOS control of the model aircraft any time safe operation of the flight is in question.

f) If the *FPV pilot* experiences a problem due to a loss of video link, orientation, or is unable to safely fly, he/she must abandon *FPV* mode and fly *VLOS* or pass the RC transmitter to the *FPV spotter* to assume *VLOS* control of the model aircraft.

g) Before the initial *FPV* flight of an *FPV model aircraft* and/or after any changes or repairs *to essential flight systems*, the *FPV model aircraft* must have an *R/C test flight* by conventional *VLOS*.

h) *FPV model aircraft* must use frequencies approved by the FCC for both the RC system and the wireless video system. Pilots must meet applicable FCC licensing requirements if they choose to operate the RC flight control system or the wireless video system on Amateur Band frequencies.

4. RANGE – ALTITUDE – WEIGHT – SPEED:

a) One of the requirements in Federal Law (Public Law 112-95 Sec 336 (c) (2) February 14, 2012) for model aircraft to be excluded from FAA regulations is that model aircraft must be flown within *VLOS* of the operator.

b) Model aircraft flown using *FPV* must remain at or below 400 feet AGL when within 3 miles of an airport as specified in the AMA Safety Code.

c) Model aircraft flown *FPV* are limited to a weight (including fuel, batteries, and onboard *FPV* equipment) of 15lbs. and a speed of 70mph.

5. RECOMMENDATIONS & INFORMATION:

a) AMA *FPV novice pilots* should consider using a cockpit view flight simulator to become accustomed to *FPV* flight.

b) AMA *FPV pilots* should consider using a programmable *autopilot* (AMA Document #560) with a failsafe "return to launch" (RTL) feature that will maintain control of the aircraft in the event of signal loss.

c) An onboard camera equipped with a pan and tilt mount that is positioned by head tracking goggles, will improve the *FPV pilot's* situational awareness of airspace surrounding the *FPV aircraft* during flight, but does not replace the requirement for an AMA *FPV spotter*.

d) When purchasing *FPV* operational systems, always try to select quality equipment, verify its compatibility, install components for interference rejection, and determine that signal range is adequate for maximum VLOS range.

6. PRIVACY PROTECTION SAFEGUARDS:

The use of imaging technology for aerial surveillance with radio control model aircraft having the capability of obtaining high-resolution photographs and/or video, or using any types of sensors, for the collection, retention, or dissemination of surveillance data information on individuals, homes, businesses, or property at locations where there is a reasonable expectation of privacy is strictly prohibited by the AMA unless written expressed permission is obtained from the individual property owners or managers.

7. DEFINITIONS OF TERMS:

AMA FPV Pilot is an AMA member who is capable of maintaining stable flight of a model aircraft within its intended flight envelope when flown FPV without losing control or having a collision.

Buddy-Box System is a system that has one transmitter operating as the master controller, while a second transmitter is linked/slaved to it allowing dual control of an aircraft. The operator of the master transmitter allows one or the other transmitter to control the aircraft through the use of a spring-loaded switch. The switch provides instantaneous transfer of control from one transmitter to the other. The buddy-box system is an efficient and effective means of achieving a position transfer of control from one pilot to another. Although this system is commonly used for training novice fliers, it is also useful in situations where an experienced pilot may have an increased likelihood of needing a second pilot's assistance in maintaining control of the aircraft. The use of the buddy-box may be helpful in assisting pilots with physical limitations, flying in congested environments, during times of reduced visibility, or anytime during FPV when a timely transfer of control may be beneficial.

Essential Flight Systems are any systems or components necessary to maintain stable flight within a model aircraft's flight envelope. (This includes primary radio control systems and any stabilization or gyros required to maintain stability and heading in certain types of model aircraft that would be uncontrollable/unstable without their use).

First Person View (FPV) refers to the operation of a radio controlled (R/C) model aircraft using an onboard camera's cockpit view to orient and control the aircraft.

Flight Envelope is defined as the range of airspeeds, attitudes, and flight maneuvers which a model aircraft can safely perform/operate for its intended use.

FPV Aircraft is an RC model aircraft equipped with a video transmitter to send real-time video images from an onboard camera to a ground based receiver for display on a pilot's video monitor/goggles. (*FPV model aircraft* types include: Fixed Wing, Rotary Wing, and Multi-Rotor Platforms).

FPV Novice Pilot is an AMA member learning to fly *FPV* utilizing a buddy-box system with an experienced AMA *RC pilot* operating the master transmitter and serving as the *FPV spotter*.

FPV Spotter is an experienced AMA *RC pilot* who has been briefed by the *FPV pilot* on the tasks, responsibilities and procedures involved in being a spotter; is capable and mature enough to perform the duties and is able to assume conventional *VLOS* control of the aircraft.

Non-Essential Flight Systems are any systems or components that are not necessary to maintain stable flight within the model aircraft's *flight envelope*. (This includes *autopilot* or *stabilization systems* that can be activated and deactivated in flight by the pilot without affecting stable flight).

R/C Test Flight requires an *AMA Pilot* to manually operate an R/C transmitter to control a model aircraft's flight path and determine if the aircraft is capable of maintaining stable flight within its *flight envelope*.

Visual Line Of Sight (VLOS) is the distance at which the pilot is able to maintain visual contact with the aircraft and determine its orientation without enhancements other than corrective lenses.

Academy of Model Aeronautics
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Radio Controlled Model Aircraft Operation
Utilizing Failsafe, Stabilization and Autopilot Systems

1. DEFINITION OF TERMS:

Please refer to Page 3, section 7 which contains an alphabetical listing of the definitions of the terms in italics that are used in this document.

2. GENERAL:

All model aircraft flights utilizing *stabilization* and *autopilot* control systems must be conducted in accordance with AMA's current National Model Aircraft Safety Code and any additional rules specific to a flying site/location.

3. OPERATIONS – REQUIREMENTS – LIMITATIONS:

a) AMA members flying radio controlled model aircraft equipped with flight *stabilization* and *autopilot* systems must maintain *VLOS* with the aircraft at all times including programmed autopilot waypoint flight.

b) *AMA Pilots* must be able to instantaneously deactivate programmed flight of *autopilot systems* at any time during flight and resume manual control of the model aircraft.

c) *AMA Pilots* must perform an *R/C Test Flight* of a model aircraft before activating a newly installed *autopilot* or *stabilization system* and/or after any repairs or replacement of model aircraft *essential flight systems*.

d) Model aircraft exceeding 15lbs and/or 70mph may only use an *autopilot* for a programmed "return to launch" (RTL) flight and not for programmed waypoint flying of a predetermined course.

e) STABILIZATION & AUTOPILOT SYSTEMS MAY BE USED FOR/TO:

- Stabilization/automatically stabilize aircraft to level flight when control sticks are centered.
- Recovery/activate TRX switch to recover an out of control aircraft to level flight.
- Heading/activate TRX switch to hold a model aircraft's heading for precision flight path.
- Altitude/activate TRX switch to maintain fixed aircraft altitude while allowing directional control.
- Return GPS/activate TRX switch to return aircraft via GPS to launch point.
- Return FSS/failsafe activated from radio signal loss to return aircraft via GPS to launch point.
- Fixed circle/activate TRX switch to circle aircraft at point of activation at fixed altitude.
- Waypoint/activate TRX switch to initiate an autopilot programmed flight path via waypoints.
- Fencing/autopilot programed to display site unique boundaries on video monitor/goggles.

 (Revision 01/14/2013)

4. RANGE – ALTITUDE – WEIGHT – SPEED:

a) One of the requirements in Federal Law (Public Law 112-95 Sec 336 (c) (2) February 14, 2012) for model aircraft to be excluded from FAA regulations is that model aircraft be flown within *VLOS* of the operator.

b) Model aircraft must be flown at or below 400 feet AGL when within 3 miles of an airport as stated in the AMA Safety Code.

c) Model aircraft utilizing an *autopilot* for waypoint flying are limited to a maximum weight (including fuel, batteries, and onboard *autopilot systems*) of 15lbs and a speed of 70mph.

5. RECOMMENDATIONS & INFORMATION:

a) If your radio system lacks *failsafe* capability, consider using programmable digital servos or auxiliary *failsafe* modules. In the event of a radio signal failure these components will activate desired safe servo settings or an *autopilot* for return to base/launch (RTL).

b) When using an *autopilot system* the "return to launch" (RTL) feature should be programmed to return the aircraft to a safe location and safely terminate the flight should manual control of the aircraft be lost. When using RTL, pay particular attention to the manufacturer's throttle recommendations to prevent stalling.

c) The use of *stabilization systems* is recommended when flying FPV to improve flight stability and video quality.

d) Pilots usually choose to incorporate *stabilization* and *autopilot systems* for model aircraft flying to enhance flight performance, correct bad tendencies of the model aircraft, maintain stability in windy weather, establish precision heading holds for takeoffs/landings, flight training for novice pilots, create a steady flight platform for cameras, and generally just to make an airplane easier and safer to fly.

e) When purchasing *stabilization* and *autopilot systems*, always try to select quality equipment from reputable dealers, ensure for compatibility with other onboard systems, and install components according to manufacturers' instructions.

6. PRIVACY PROTECTION SAFEGUARDS:

The use of imaging technology for aerial surveillance with radio control model aircraft having the capability of obtaining high-resolution photographs and/or video, or using any types of sensors, for the collection, retention, or dissemination of surveillance data or information on individuals, homes, businesses, or property at locations where there is a reasonable expectation of privacy is strictly prohibited by the AMA unless written expressed permission is obtained from the individual property owners or managers.

7. DEFINITIONS OF TERMS:

AMA Pilot is an AMA member who is capable of manually operating an R/C transmitter to control a model aircraft's flight path within its safe intended *flight envelope* without losing control or having a collision.

Autopilot Systems incorporate programmable flight *stabilization* with an altitude sensor and a GPS receiver for accurate positioning and to navigate/control a radio controlled model aircraft's flight path. Advanced systems offer software for entering navigable waypoints. The flight data waypoints may be saved to autopilot's/GPS memory for programmed flight.

Essential Flight Systems are any systems or components necessary to maintain stable flight within a model aircraft's *flight envelope*. (This includes primary R/C systems and any *stabilization* or gyros required to maintain stability and heading in certain types of model aircraft that would be uncontrollable/unstable without their use).

Failsafe Systems are designed to minimize or prevent damage and safely terminate a flight when a radio controlled model aircraft loses radio signal. Modern radio systems can be programmed to position servos to a desired control setting in the event of radio signal failure.

First Person View (FPV) refers to the operation of a radio controlled (R/C) model aircraft using an onboard camera's cockpit view to orient and control the aircraft. (AMA Document #550).

Flight Envelope is defined as the range of airspeeds, attitudes and flight maneuvers which a model aircraft can safely perform/operate for its intended use.

Non-Essential Flight Systems are any systems or components that are not necessary to maintain stable flight within the model aircraft's intended flight envelope. (This includes *autopilot* or *stabilization systems* that can be activated and deactivated in flight by the pilot without affecting manually controlled stable flight).

R/C Test Flight requires an AMA Pilot to manually operate an R/C transmitter to control a model aircraft's flight path and determine if the aircraft is capable of maintaining stable flight within its safe intended *flight envelope*.

Stabilization Systems are designed to maintain intended model aircraft flight attitudes. The pilot can install, program and/or activate a system to stabilize yaw, pitch, or roll or any one attitude or combination of attitudes. Systems are often based on rate/heading hold gyros or inertial motion sensors utilizing multi-axis gyros and accelerometers for attitude stabilization.

Visual Line of Sight (VLOS) is the distance at which the pilot is able to maintain visual contact with the aircraft and determine its orientation and attitude without enhancements other than corrective lenses.

APPENDIX D

LEGISLATIVE LEGAL SERVICES MEMO
ALASKA LAWS PROTECTING PRIVACY

LEGAL SERVICES

DIVISION OF LEGAL AND RESEARCH SERVICES
LEGISLATIVE AFFAIRS AGENCY
STATE OF ALASKA

(907) 465-3867 or 465-2450
FAX (907) 465-2029
Mail Stop 3101

State Capitol
Juneau, Alaska 99801-1182
Deliveries to: 129 6th St., Rm. 329

MEMORANDUM September 30, 2013

SUBJECT: Alaska Laws Protecting Privacy
(Work Order No. 28-LS0990)

TO: Representative Shelley Hughes
Attn: Ginger Blaisdell

FROM: Kathleen Strasbaugh
Legislative Counsel

You have asked for a review of Alaska's laws protecting individual privacy in preparation for a meeting of the Task Force on Unmanned Aircraft Systems. Among the Task Force's duties is providing written recommendations concerning, among other things, a state policy that protects privacy. 2013 Legislative Resolve No. 17 at 3. To that end, as I understand from Ms. Blaisdell, you would like to know what protections might already exist, with a view toward avoiding duplication of existing law. The Task Force has apparently expressed concern about how information gathered by unmanned aircraft could be used by private or public parties, and what use might be made of such information captured inadvertently.

This memo will outline constitutionally based protections of privacy and identify state statutes that might apply to conduct considered invasion of privacy. As you requested, this memo focuses on the protections afforded under Alaska law. A brief discussion of emerging federal law is included, but I haven't explored other states' case law, nor lower federal court cases that consider these issues. However, I have attached an excerpt of an *Alaska Law Review* which summarizes Alaska's privacy law as it has developed independently of federal constitutional law. I have also attached a recent *Harvard Law Review* article that specifically addresses this topic in great detail. The memo also briefly addresses scenarios set out in your request. Please note that it is very difficult to predict the outcome of litigation in this very new intersection of technology and privacy law.

1. Constitutional Protection of Privacy

The Constitution of the State of Alaska explicitly protects the right of privacy against government (but not private) intrusion. Art. I, sec. 22, provides:

> The right of the people to privacy is recognized and shall not be infringed. The legislature shall implement this section.

This protection, although not unlimited, has been held to be broader than the protection afforded by the United States Constitution. *Woods & Rohde, Inc. v. State, Department of Labor*, 565 P.2d 138, 149 (Alaska 1977).[1] Both the Alaska Constitution and the Fourth Amendment to the United States Constitution require a warrant by a governmental agency for the search of a place where a person has a reasonable expectation of privacy. *Beltz v. State*, 221 P.3d 328, 333, 337 (Alaska 2009) (search of garbage placed out on the street for collection did not require warrant; expectation of privacy found not reasonable.)

Neither the Alaska Supreme Court nor the United States Supreme Court has ruled on whether surveillance by a government operated unmanned aerial vehicle is a search under the Fourth Amendment. Based on available precedent, it is possible that the courts will decide that the use of an unmanned aerial vehicle constitutes a search requiring either a warrant, or the application of a recognized exception to the warrant requirement.

The United States Supreme Court has considered law enforcement or other government agency use of aerial surveillance and the use of technological devices for surveillance purposes. The Court found that surveillance by manned aircraft is not an intrusion into a private area that renders an overflight a search under the Fourth Amendment to the United States Constitution; however the placement of a global positioning device on a person's vehicle is an intrusion that constitutes a search. Here is a brief summary of some of these cases: *United States v. Jones*, 565 U.S. ___, 132 S.Ct. 945 (2012): Attachment of global positioning device to automobile parked in public place is a search under the Fourth Amendment.

Dow Chemical Co. v. United States, 476 U.S. 227 (1986) EPA aerial surveillance and photography of chemical plant is not a search where the aircraft was manned and operating at a lawful altitude.

California v. Ciraolo, 476 U.S. 207 (1986) Manned aerial surveillance of a backyard marijuana grow at lawful altitude did not violate the Fourth Amendment.

The Court might find the use of a technology that exceeds human observational capacity the sort of intrusion that constitutes a search requiring a warrant or an accepted exception:

> Where, as here, the Government uses a device that is not in general public use, to explore details of the home that would previously have been unknowable without physical intrusion, the surveillance is a "search" and is presumptively unreasonable without a warrant.

Kyllo v. United States, 533 U.S. 27, 40 (2001) (internal citations omitted) (thermal

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[1] In Alaska, the right to privacy extends to protection of such activities as possession and use of marijuana in the home by an adult, which, while not a fundamental right, is protected because such possession and use does not implicate the public welfare in the manner that more harmful substances, or public ingestion, or use by minors might. *Ravin v. State*, 537 P.2d 494, 508-09 (Alaska 1975).

imaging of home from outside a search under the Fourth Amendment).

2. Alaska Statutory protections

There are a handful of criminal statutes that may apply to improper use of images obtained from unmanned aerial vehicle surveillance. These statutes would seem to apply for the most part to private actors. These are offenses that punish conduct that invades the privacy of a victim, and would require proof that images gathered by the unmanned aerial vehicle were disseminated. These offenses would probably not punish capturing the images inadvertently, although collecting and storing them might be a concern.

Alaska Statute	Charge	Penalty
11.41.270	Stalking in the second degree: nonconsensual conduct prohibited by statute prohibits monitoring by technical means.	Class A misdemeanor[2]
11.61.116	Sending an explicit image of a minor.	(1) class B misdemeanor if the person distributes the image to another person;[3] (2) a class A misdemeanor if the person distributes the image to an Internet website that is accessible to the public.
11.61.120(a)(6)	Harassment in the second degree: publishing or distributing images that show certain body parts or a sexual act.	Class B misdemeanor

[2] A class A misdemeanor is punishable by a fine of up to $10,000, and a sentence of imprisonment up to one year.

[3] A class B misdemeanor is punishable by a fine of up to $2,000, and a sentence of imprisonment up to 90 days.

11.61.123	Indecent viewing or photography (with certain law enforcement and security surveillance exceptions).	(1) class C felony if the person viewed or shown in a picture was, at the time of the viewing or production of the picture, a minor;[4] (2) class A misdemeanor if the person viewed or shown in the picture was, at the time of viewing or production of the picture, an adult.
11.76.113	Misconduct involving confidential information in the first degree: use of confidential information to commit a crime or obtain a benefit to which the person is not entitled to injure another, or deprive another of a benefit.	Class A misdemeanor
11.76.115	Misconduct involving confidential information in the second degree: knowingly and without legal authority obtaining confidential information about another.	Class B misdemeanor

In addition to the above criminal offenses, there are other provisions of law that might bear on the information obtained from data gathered by an unmanned aerial vehicles.

If the data is gathered by a government agency, it is a public record. However, AS 40.25.120 provides certain protections for private information. AS 40.25.120(a)(4) excepts records required by law to be kept confidential. *See Falcon v. APOC*, 570 P.2d 469 (Alaska 1977) (physician not required to disclose identity of certain patients to Alaska Public Offices Commission where the disclosure of the patients' identities might disclose the fact that they were being treated for conditions that patients would normally keep private); *Alaska Wildlife Alliance v. Rue*, 948 P.2d 976 (Alaska 1997) (payroll information may be kept private where disclosure might endanger employees or contractors, where those employees and contractors were threatened with harm). AS 40.25.120(a)(6)(C) protects information gathered by law enforcement the disclosure of which "could reasonably be expected to constitute an unwarranted invasion of the personal privacy of a suspect, defendant, victim, or witness."

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4 A Class C felony is punishable by a fine of up to $50,000, and a sentence of imprisonment up to five years. Presumptive sentences based on whether the offense is a first or subsequent offense are set out at AS 12.55.155(e).

There may be civil liability for obtaining (and subsequently misappropriating) information on trade secrets or patented processes. *See, generally.* AS 45.50.

In addition, a person who is subject to surveillance that is unreasonable or unlawful could sue for the tort of invasion of privacy. *Compare Wal-Mart v. Stewart*, 990 P.2d 626, 634 (Alaska 1999) (daily search of employee's bags held an unreasonable invasion of privacy where not part of a random, nondiscriminatory policy, and where the employee feared that refusing the search might result in others suspecting him of theft, or result in a police call or firing).

3. Particular scenarios

Inadvertent capture of evidence of illegal activity. Use of inadvertently captured information in a criminal prosecution may depend on who captures the information, and whether the person whose actions have been captured has a reasonable expectation of privacy. One of the scenarios mentioned in your request is the capture of evidence of poaching. Assuming that the poacher is a person taking game on property that is not the poacher's own, the poacher cannot reasonably expect privacy when present on another's land without authority.

If a law enforcement agency sends out an unmanned aerial vehicle for patrolling or surveillance, perhaps to look for illegal cultivation of marijuana or manufacture of methamphetamine on public land, and in the course of doing so, captures evidence of an industrial sized marijuana grow operation on private land, it might provide grounds to obtain a warrant to explore further.[5] Under Alaska law, if the observation of the event is lawful or in "plain view," the discovery inadvertent, and the incriminating nature of the evidence immediately apparent, a warrant might not be required. *Ahvakana v. State*, 283 P.3d 1284, 1288 (Alaska Ct. App. 2012) (entry into property where evidence found was authorized under the emergency aid exception to the warrant requirement). However, since the vehicle is not manned, the federal authorities discussed above suggest that the information might not be considered to be lawfully obtained unless some other exception to the requirement of a warrant is present. It is not clear to me whether and under what circumstances a court might grant a search warrant to follow up on information inadvertently obtained, but not in "plain view."

It is possible that the inadvertent capture of information that might otherwise be inadmissible under the exclusionary rule that bars admission of evidence obtained in violation of the United States Constitution will be treated as a good faith exception under *United States v. Leon*, 468 U.S. 897(1984). In *Leon*, the United States Supreme Court held that the Fourth Amendment exclusionary rule should not be applied so as to bar the use of evidence obtained by officers acting in reasonable reliance on a search warrant

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[5] *But see State v. Crocker*, 97 P.3d 93 (Alaska Ct. App. 2004) holding that because the application for the warrant did not affirmatively disclose information that the marijuana cultivation was beyond what was permitted under *Ravin*, there was no probable cause for a warrant.

issued by a detached and neutral magistrate but ultimately found to be invalid. A court could determine that information inadvertently captured in otherwise lawful surveillance is likewise a good faith exception. However, Alaska's appellate courts have not decided whether to adopt this exception. *Deemer v. State*, 244 P.3d 69, 72 (Alaska Ct. App. 2010). Thus it is impossible to predict the outcome of litigation on this subject under Alaska law, and it is not at all clear, given the federal case law developments discussed elsewhere in this memorandum, that the United States Supreme Court would apply the exception in a situation where there was no warrant.

<u>Person intentionally gathers private information for personal use or distribution.</u> A number of the criminal charges listed above might be available. In addition, if the images obtained are used in child pornography, a number of federal and state criminal statutes might apply.

Please advise if you require further assistance in this matter.

KJS:ray
13-008.ray

Enclosures

APPENDIX E

ECONOMIC IMPACT OF A PAN-PACIFIC UNMANNED AIRCRAFT SYSTEMS TEST SITE

Economic Impact of a

Pan-Pacific Unmanned Aircraft Systems Test Site

May 2013

PREPARED FOR

Alaska Center for Unmanned
Aircraft Systems Integration
University of Alaska Fairbanks

PREPARED BY

McDowell GROUP

Table of Contents

Executive Summary

Purpose and Scope

In March 2013, the University of Alaska Fairbanks Center for Unmanned Aircraft Systems contracted with McDowell Group to analyze the economic conditions for unmanned aircraft systems (UASs) in Alaska and measure the projected economic impact of developing a Federal Aviation Administration (FAA) test site for UAS in Alaska. The economic impact assessment (EIA) in this report provides annual projections of the direct, indirect, and induced impacts to employment and wages as well as projections of output and value added related to the test site, called the Pan-Pacific UAS Test Range Complex (PPUTRC) – with test ranges located in Alaska, Hawaii, and Oregon. The EIA focuses on the additional economic activity that is expected in response to the PPUTRC test site selection. Additional information is provided in this report on the economic impact of the commercialization of UAS specifically in Alaska once UAS flights are allowed in the National Airspace System (NAS).

Summary

- UAS represent a new industry that is set to quickly grow once new government regulations increase access to designated test sites and then to the National Airspace System (NAS), the system of air traffic control that enables safe and efficient flight activity in the U.S.

- UAS applications are far reaching for civilian and military purposes; ranging from environmental monitoring to search and rescue to pipeline or powerline inspections.

- The FAA has limited the authorized use of UASs in the U.S. to efforts focused on the public interest. There are currently two ways to operate a UAS with the approval of the FAA (both of these options require that the flight takes place outside of densely-populated areas):

    - Certificate of Waiver or Authorization (COA) for public UAS

    - Special airworthiness certificate for private sector (civil) UAS

- However, the FAA is scheduled to designate six UAS test sites in the U.S., as required under the FAA Modernization and Reform Act of 2012. The sites will operate from January of 2014 to February 13, 2017 to provide opportunities for government agencies, industry, and researchers to access this airspace to aid in the integration of UASs in the NAS.

- According to the Association of Unmanned Vehicle Systems International (AUVSI), integration of UASs into the NAS will generate some $82 billion in activity in the U.S. between 2015 and 2025; employment impacts are estimated at just over 100,000 jobs by 2025.

- In an effort to bring additional UAS activity and related economic benefits to Alaska, UAF is leading the PPUTRC Test Site application process for 13 ranges in Alaska, Hawaii, and Oregon.

- Existing UAS activity in Alaska, Hawaii, and Oregon benefits from unique assets and opportunities, including government facilities (e.g. numerous military bases, universities, and maritime assets), wide-open airspace in largely unpopulated areas, and geographic diversity (e.g. tropical to arctic climates, oceanic or mountainous landscapes, and up/down weather fronts).

- In total, designation of PPUTRC as a UAS test site would be expected to generate 1,065 direct, indirect and induced jobs in 2014, increasing to over 1,400 jobs by 2017. Total labor income would climb from $57 million in 2014 to about $76 million in 2017.

- Output in the PPUTRC states attributable to test site designation would climb from $265 million in 2014 to $333 million in 2017.

- Value added would climb from $109 million to $134 million over the same period.

- Designation of the PPUTRC will provide a four-year total of $20 million of income tax revenue to Hawaii and Oregon.

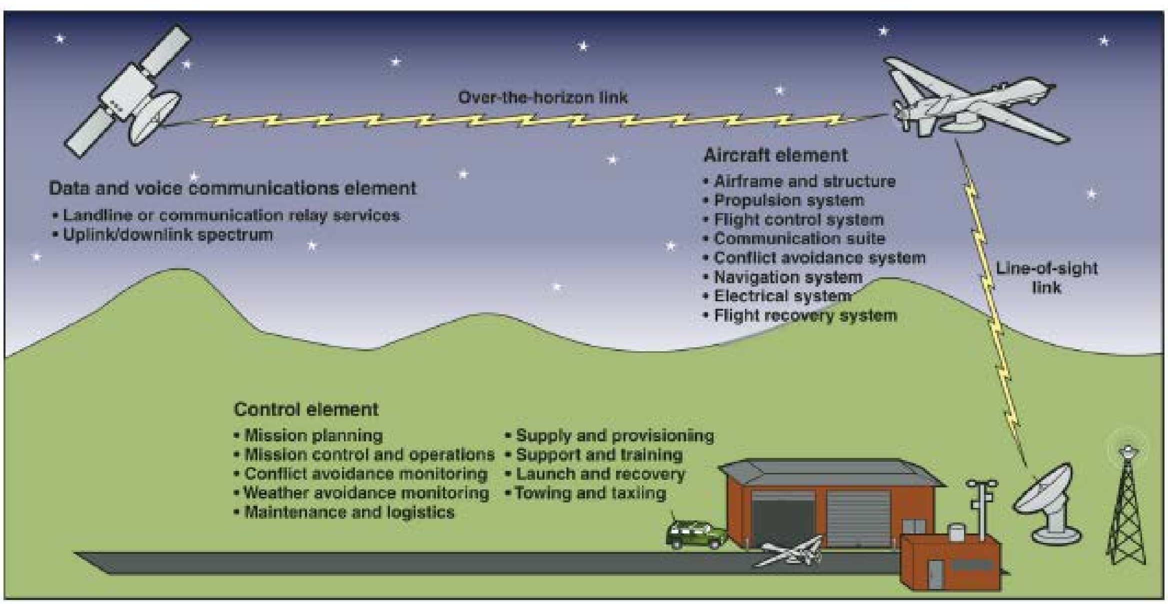
Chapter 1. Unmanned Aircraft Systems in the United States and the NAS

Background

Unmanned aerial vehicles (UAVs) were first described in the late-19th century. Early attempts to develop these UAVs, mostly for combat purposes, soon followed. These remotely piloted vehicles first entered U.S. combat in the mid-20th century to support missions focused on reconnaissance and surveillance, and sometimes they were also used as decoys. Throughout most of the 20th century UAVs lacked real-time data capability and instead focused on collecting images and video for surveillances purposes. Widespread adoption of the technology for U.S. military purposes did not begin until the 1990s and, to a much greater extent, the 2000s during the Afghanistan and Iraq conflicts. It was at this point that technological innovations related to onboard sensors, communication links, and data collection began drastically increasing the potential domestic uses of unmanned aircraft systems.

The increase in complexity for the UAVs required a systems approach to appropriately understand the interactions - and design each component from the start as an integratedsystem - among the on-the-ground control elements, the aircraft, and the communication links. This broader operational perspective is termed "unmanned aircraft system" (UAS). The image below provides a conceptual rendering of the interactions among key elements of a UAS flight.

Figure 1: Conceptual Rendering of an Unmanned Aircraft System



Source: GAO, 2013

UAS Applications

Unmanned aircraft often provide advantages in comparison to manned aircraft. For instance, flights that are dangerous or covert represent potential opportunities where an unmanned vehicle might be preferred over a manned vehicle. Similarly, dull tasks such as extended surveillance missions may be better suited for ground-based operators that can be relieved at the end of their shift. UAVs are often more fuel efficient, quieter, and less disruptive to their surroundings (in comparison to manned aircrafts) and, thus, can allow for fewer environmental disturbances as well as more accurate research results. Finally, initial costs, operating costs (e.g. maintenance costs, fuel costs, storage costs, etc.), and labor costs (e.g. wages, insurances, etc.) are all generally lower for UAVs (Source: Austin, 2010). UASs have already been shown to lead to arrests as well as saving lives during search and rescue missions (Source: The Verge, 2013).

The existing and potential applications for UASs are wide ranging for both civilian uses as well as for military purposes. The lists below provide an abbreviated look at how important this relatively new field may become to sectors throughout Alaska's economy (Source: Austin, 2010):

Civilian

- Aerial Photography - Film, video, stills, etc.
- Agriculture - Crop monitoring and spraying; herd monitoring and driving
- Coastguard – Search and rescue, coastline, and sea-lane monitoring
- Conservation – Pollution and land monitoring
- Customs and Excise – Surveillance for illegal imports
- Electricity Companies – Powerline inspection
- Fire Services and Forestry – Fire detection, incident control
- Fisheries – Fisheries protection
- Gas and Oil Supply Companies – Land survey and pipeline security
- Information Services – News information and pictures, feature pictures (e.g. wildlife)
- Lifeboat Institutions – Incident investigation, guidance, and control
- Local Authorities – Survey, disaster control
- Meteorological Services – Sampling and analysis of atmosphere for forecasting, etc.
- Oil Companies – Pipeline security
- Ordinance Survey – Aerial photography for mapping
- Police Authorities – Search for missing persons, security and incident surveillance
- Rivers Authorities –Water course and level monitoring, flood and pollution control
- Survey Organizations – Geographical, geological, and archaeological survey
- Traffic Agencies – Monitoring and control of road traffic
- Water Boards – Reservoir and pipeline monitoring

Military

- Navy
    - Shadowing enemy fleets

    - Decoying missiles by the emission of artificial signatures
    - Electron intelligence
    - Relaying radio signals
    - Protection of ports from offshore attack
    - Placement and monitoring of sonar buoys and possibly other forms of anti-submarine warfare
- Army
    - Reconnaissance
    - Surveillance of enemy activity
    - Monitoring of nuclear, biological, or chemical (NBC) contamination
    - Electronic intelligence
    - Target designation and monitoring
    - Location and destruction of land mines
- Air Force
    - Long-range, high-altitude surveillance
    - Radar system jamming and destruction
    - Electronic intelligence
    - Airfield base security
    - Airfield damage assessment
    - Elimination of unexploded bombs

UAS Categories

UASs are typically categorized based on the size or capability of the UAV. The five categories below provide a common categorization of UAS that helps simplify requirement assessments and costing estimates (Source: Teal Group, 2008):

- Micro or Mini – A small UAV that ranges in size from something that can be held in the palm of the hand to a UAV that can be carried on your back and launched by hand.

- Naval – A tactical UAV is generally operated with simpler systems over a radius between 100 and 300 km.

- Tactical – A reconnaissance UAV used by the Army for endurance missions ranging several hours over an operating radius up to 200 km.

- MALE – Medium Altitude Long Endurance reconnaissance UAVs fly between 5,000 and 15,000 meters in altitude for approximately 24 hours.

- HALE – High Altitude Long Endurance reconnaissance and surveillance UAVs are usually operated by Air Forces at altitudes over 15,000 meters for periods longer than 24 hours.

National Airspace System

The NAS was developed to allow for safe and efficient commercial aviation. However, commercial UAS flights are currently not allowed in the NAS due to concerns over (1) "the inability to detect, sense, and avoid other aircraft and airborne objects in a manner similar to 'see and avoid' by a pilot in a manned aircraft, (2) vulnerabilities in the command and control of UAS operations, (3) the lack of technological and operational standards needed to guide the safe and consistent performance of UAS, and (4) the lack of final regulations to accelerate the safe integration of UAS into the national airspace" (Source: U.S. GAO, 2012 and Waggoner, 2013).

The first authorized use of UASs in the NAS in the U.S. was permitted by FAA in 1990. Over the past 23 years, the FAA has limited the authorized use of UAS in the U.S. to efforts focused on the public interest. These missions have included border patrol, military training, disaster relief, firefighting, search and rescue, law enforcement, and testing and evaluation. According to the FAA, the Department of Homeland Security currently utilize UASs for border and port surveillance; NASA and NOAA utilize UAS to help with scientific research and environmental monitoring; law enforcement agencies utilize UASs to support public safety; and state universities use UASs to conduct research (Source: FAA Fact Sheet 2013). These efforts are limited to areas outside of major urban areas at elevations less than 50,000 feet. The aircraft range in size from a hummingbird to a wingspan as large as a Boeing 737; although many are the size of a remote-control plane or helicopter. Recreational use of airspace is allowed away from airports and air traffic and below 400 feet above ground level – informal flights for business purposes are specifically excluded (Source: FAA Advisory Circular 91-57).

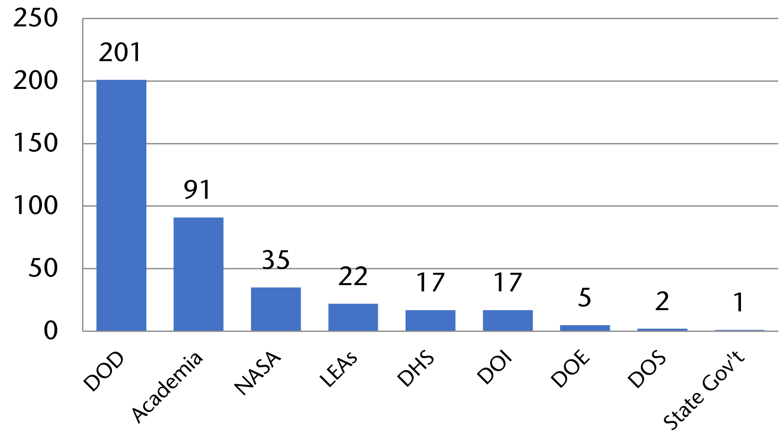
As of 2013, there are currently two ways to operate a UAS with the approval of the FAA: (1) Certificate of Waiver or Authorization (COA) for public UAS's and (2) special airworthiness certificate for private sector (civil) UAS's – both of these options require that the flight takes place outside of densely-populated areas.

Certificate of Waiver or Authorization (COA)

COAs allow public entities to fly UASs in a defined block of civil airspace. The FAA issued the first COAs in January 2007. With COAs, the UAV must remain in view, either of the ground crew or via a chase plane, since UAS technology cannot currently comply with 'See and Avoid' rules. COAs usually require between six and 24 months for approval and cost $40,000 to $60,000 (Source: Economic Development of Central Oregon, 2011). Most of the cost is for specialists in the testing protocols, documentation, and in managing the process through the FAA. Common applications by COA holders include firefighting, border patrol, disaster relief, search and rescue, military training, and other government operational missions (Source: FAA 2013b). The number of COAs issued has increased since 2009, with 146 in 2009, 298 in 2010, and 313 in 2011 (Source: FAA 2013b). In 2012, the FAA issued 391 COAs to 121 federal, state, and local government entities in the U.S. A total of 1,428 COAs have been issued since January of 2007 (Source: GAO 2013). As of February 15, 2013, there were 327 active COAs (Source: FAA 2013b).

The graph below aggregates the 391 COAs issued in 2012 to nine types of entities: U.S. Department of Defense, academia, NASA, local law enforcement agencies, U.S. Department of Homeland Security, U.S. Department of the Interior, U.S. Department of Energy, U.S. Department of State, and state government.

Figure 2: Number of Approved COAs, 2012



Source: GAO, 2013

Special Airworthiness Certificate

Special airworthiness certificates are the only way for civil operators to fly UASs in the NAS at present. However, these certificates cannot be utilized to carry people or property for compensation or hire – they can only be issued for research and development, crew training, or market surveys (Source: FAA 2011).

Allowing UAS in the NAS

In recent years the FAA has made a concerted effort to integrate UAS regulations into the NAS. In 2009, the FAA, NASA, DoD, and the Department of Homeland Security began addressing pathways to integrating UAS regulations into the NAS through their UAS Executive Committee. Additionally, the FAA chartered a UAS Aviation Rulemaking Committee in 2011 to create operational procedures, regulatory standards, and policies related to UAS flights in the NAS. In 2012, the FAA Modernization and Reform Act of 2012 (FMRA of 2012) was passed by Congress to approve six test sites where UAS integration could be tested prior to a 2015 integration of UAS regulations in the NAS (Source: FAA 2012). Delays within the FAA due to technical, logistical, and public outreach concerns may contribute to a UAS integration date later than 2015. However, six test sites are still scheduled to run from January 1, 2014 to February 13, 2017.

Six UAS Test Sites

There is considerable competition over where test sites will be designated, since designation will provide immediate employment in the selected region and support a strong foundation for UAS activity prior to integration of UAS regulation in the NAS. As of March 5, 2013, 50 applicants from 37 states were granted access to the FAA test site application web portal (Source: FAA 2013b). The FAA will consider five key items when deciding the location of the six test sites: (1) geographic and climatic diversity, (2) location of ground infrastructure and research needs, (3) consultation with NASA and DOD, (4) population density and air traffic density of the surrounding area of any proposed location as well as the potential impact areas in the event of incidents, such as "Fly away" given potential safety mitigations; and (5) identification of specific goals and objectives to be accomplished. Additionally, the test sites are expected to provide an environment and opportunity to test conventional takeoff and landing capability, high speed flight (greater than 250 knots indicated air speed), maritime (launch/maneuver/recovery) capability, operations at extremely high altitudes (Class A airspace and above), and evaluation of dissimilar aircraft (including a mix of manned and unmanned aircraft) in multiple altitude structures (Source: FAA 2013a).

The six test sites that are selected will support the following operations and programs:

- Safe designation of airspace for integrated manned and unmanned flight operations in the national airspace system;
- Development of certification standards and air traffic requirements for unmanned flight operations;
- Coordinating with and leveraging the resources of NASA and the Department of Defense;
- Addressing both civil and public unmanned aircraft systems;
- Ensuring that the program is coordinated with the Next Generation Air Transportation System; and
- Ensuring the safety of unmanned aircraft systems and related navigation procedures before they are integrated into the national airspace system (Source: FAA, 2013b).

The test site operators will provide opportunities for government agencies, industry, and researchers to access this airspace to aid in the integration of UAS regulations in the NAS. Additionally, data collection will support development and operations research and professional development opportunities will be available for inspectors, airspace managers, air traffic controllers, and others. The specific goals described by the PPUTRC applicants include (Source: PPUTRC, 2013):

- Develop a set of standards for select unmanned aircraft categories, for aircraft state monitoring, and navigation. PPUTRC goals and objectives work will augment ongoing standards work with research on categories of UAS not yet addressed, and evaluations needed to refine emerging standards under consideration;
- Validate FAA acceptable risk thresholds or safety management system standards for UAS operations;

- Identify safety factors in UAS design; validate certification standards, including protocols for air traffic control interaction. Define and qualify underlying assumptions and a minimum set of air vehicle characteristics critical to safety, reliability, etc.;
- Develop effective, compliant 'sense and avoid' systems to satisfy regulatory guidance;
- Identify gaps in federal and state statutory and case law protections for privacy and recommend policies or legislation to remedy;
- Directly support the federal mandate for "Expanding Use of UAS in the Arctic" (in Sec 332(d) of Public Law 112-95);
- Design experiments and provide data to support American Society for Testing and Materials (ASTM) F38 and Radio Technical Commission for Aeronautics Special Committee (RTCA SC) 203 to evaluate minimum training and operator qualification standards for crew licensing.

Economic Impact of UAS in the U.S.

The economic implications of integrating UAS regulations into the NAS are substantial. According to a study conducted for the Association for Unmanned Vehicle Systems International (AUVSI), integration will generate $82 billion in activity between 2015 and 2025. Employment impacts are estimated at just over 100,000 jobs by 2025.

The direct economic impact of UAS development in the U.S. is expected to climb from $1.1 billion in 2015 to over $5 billion annually by 2025, measured in terms of output. Including indirect and induced effects, the annual economic impact is expected to rise from $2.3 billion in 2015 to $10 billion in 2025 (Source: AUVSI, 2013).

Areas selected as UAS test sites will have an advantage in capturing these economic benefits; thus the fierce competition among the 50 applicants.

Chapter 2. Pan-Pacific Test Range Complex

In 2012, the Alaska Center for UAS Integration (ACUASI) at the University of Alaska Fairbanks Geophysical Institute began collaborating with Oregon State University and the University of Hawaii to propose a Pan-Pacific Test Range Complex (PPUTRC) as one of the six FAA test sites. This proposed PPUTRC contains 13 test ranges located in Alaska, Hawaii, and Oregon. Of the 13 ranges, six ranges are in Alaska (Denali, Kodiak, North Slope, Oliktok, Poker Flat, and Wainwright), three ranges are in Hawaii (Humuula-R-3103, Makua-R-3109, and Maku-R-3110), and four ranges are in Oregon (Juniper MOA, Pendleton, Tillamook Coastal, and Warm Spring).

Existing UAS activity in Alaska, Hawaii, and Oregon benefits from unique assets and opportunities, including government facilities (e.g. numerous military bases, universities, and maritime assets), wide open airspace in largely unpopulated areas, and geographic diversity (e.g. tropical to arctic climates, oceanic or mountainous landscapes, and up/down weather fronts). The diverse testing environments for the PPUTRC are included in the Table 1 below:

Table 1: Diversity of Potential Testing Environments for the PPUTRC

360 degree oceanic airspace access	Arctic landscape	Extreme low temperatures
Oceanic and sea-ice access	High arctic winds	High sea-salt corrosion effect
Able to fully matrix UAS into NextGen and air traffic operating both VFR and IFR; high and low altitude	Operations in all classes and categories of military SUA	Operations in Classes A through F international airspace in the oceanic environment
Class C, D, & E airspace within 5-nautical miles of airports	High and low-land vegetation tundra	Numerous inland waterways and lakes
High density airports integration studies and testing	Class C, D, & E airspace airport approaches/departures	High-humidity high and low-altitude
Hot and cold high-desert testing	Littoral coastal region mountainous area	Class E (high) airspace
Jungle conditions	Class A airspace	Mountainous terrain
Volcanic	Glacier	Ship traffic including open ocean and ports

UAS Activity in Alaska, Hawaii, and Oregon

There are currently 15 active COAs in the PPUTRC area as well as eight in-process COAs and 20 expired COAs.

Alaska

ACUASI at the University of Alaska Fairbanks (UAF) is the lead organization for the proposed PPUTRC. The formal PPUTRC team includes over 80 businesses, universities, tribes, and economic development organizations in Alaska. UAF has actively managed UAS operations since 2004.

ACUASI was formed in 2012 to enhance UAS research in Alaska. ACUASI and the UAF Geophysical Institute have developed and flown a variety of in-situ and remote sensing instruments on various UASs in Alaska and throughout the world. Scientific and research campaigns undertaken in Alaska over the past decade include using UASs to support observation and monitoring of sea lions in the Aleutian Islands, weather forecasting, volcanic plume monitoring, atmospheric sampling during wildfires, monitoring of sea ice build ups, and oil spill mapping. Commercial applications trialed in Alaska include whale monitoring, cadastral mapping, maritime navigation support, industrial plant monitoring, and environmental clean-up. This experience, coupled with the FAA's UAS test site status, would leverage a variety of new economic activities in Alaska.

The following table, which summarizes ACUASI activity in 2012, illustrates the variety of UAS activity supported by the organization. The table also provides revenue and staffing data for each UAS campaign.

Table 2: UAS Campaigns Supported by the University of Alaska Fairbanks in 2012

Client	Flight Locations	Type of UAS	Purpose of Flights	Revenue for Site Operator	Site Operator Staff	Flight Operator Staff
Aleutians	Aleutian Islands, AK	Aeryon Scout and Puma	Seal observation	$314,200	2 pilots	1 observer
Idaho	Lewiston, ID	Aeryon Scout	Salmon nest observation	$115,000	1 pilot	1 observer
Eglin Air Force Base	Fort Walton Beach, FL	ScanEagle and Aeryon Scout	Controlled burn experiment	$413,000	4 pilots	3 observers
Prudhoe Bay	Prudhoe Bay, AK	Aeryon Scout	British Petroleum flare stack monitoring	$190,000	1 pilot	1 observer
Nome	Nome, AK	Aeryon Scout	Harbor Ice monitoring for USCG	$30,000	1 pilot	1 observer
Ugak Island	Ugak Island, AK	Aeryon Scout	Seal population monitor	$6,500	1 Pilot	1 observer
Fort Greely	Fort Greely, AK	ScanEagle and Aeryon Scout	Flight test	$25,000	2 pilots	2 observers
Chile	Santiago, Chile	Aeryon Scout	Glacier Ice monitor	$9,000	1 pilot	1 observer
Belgium	Belgium	Gatewing	Flight training	$16,000	2 pilots	1 observer
Anchorage	Fort Richardson, AK	Aeryon Scout	Flight test and demonstration	$1,000	2 pilots	1 observer
Fairbanks	Poker Flat Research Range	ScanEagle	Payload test	$347,000	2 pilots	1 observer
Fairbanks	Poker Flat Research Range	Aeryon Scout	Payload test and demonstration	$30,000	2 pilots	1 observer
Fairbanks	Poker Flat Research Range	Raven	Flight test for avionics	$5,000	2 pilots	2 observers
Hawaii	Offshore Hawaiian Islands	Puma	Tsunami debris tracking	$95,000	1 pilot	1 observer

Sources: ACUASI, 2013

Figure 3: Types of UAS Flown in Alaska in 2012

Aeryon Scout

Boeing Insitu ScanEagle

AeroVironment Raven

Gatewing

AeroVironment Puma

Hawaii

Hawaii offers many unique qualities that make UAS operations appealing. These include: (1) expansive over-water areas unencumbered by other aviation uses, (2) proximity to U.S. Pacific Command – a significant user of future UAS systems, (3) opportunities for joint operations with the Pacific Missile Range Facility – a major test range on Kauai, and (4) opportunities for long-range point-to-point tests with partner ranges in Alaska and Oregon. The Hawaii ranges have proven an important focus for the development of scientific applications of UAS, with significant milestones including test flights of the Aerovironment Pathfinder; Pathfinder Plus; and Helios solar-hybrid propulsion high altitude, long endurance UAS, between 1997 and 2001. Scientific applications led by U.S. federal agencies have recently seen Hawaii emerge as a focal point for NOAA's exploration of UAS as a tool for marine park surveillance. NOAA has utilized UAS to monitor Papahanaumokuakea Marine National Monument since 2007 and performed initial trials using small hand launched systems in mid-2012.

Oregon

The Oregon-based PPUTRC team members include 16 businesses, universities, tribes, and economic development organizations. Additionally, six committed team partners will convert to formal team members upon FAA test site designation award to PPUTRC. Engagements are also planned with a wide ranging network in Oregon – including the 111 AUVSI members and numerous startup companies, primarily in sensor, robotics, and other supporting technologies. In comparison to Alaska and Hawaii, Oregon has historically been more engaged in design, development, and manufacture of UAV systems and subsystems.

The two largest Oregon UAS firms are Insitu (design, development, and manufacture of UAS systems) and FLIR Systems (remote sensors). The main Oregon firm involved in UAS applications has been Near Space Corporation (NSC). NSC uses very high altitude unmanned balloons and gliders to perform scientific and commercial test activities, ranging from data gathering on behalf of government agencies to near-space testing of hardware and sensors for commercial firms. NSC is opening a new $6 million flight test and operations facility at the Tillamook Airport on the Oregon coast. Existing UAS activity also includes the Oregon Army National Guard operations in Pendleton. Oregon's UAS efforts are synergistic with a separately funded ground vehicle innovation initiative, Drive Oregon, which requires systems that can be spun out of UAS: quiet, efficient motors, lightweight composite designs, and navigation systems. The potential economic benefits of the test sites, as well as NAS integration, are particularly strong for Oregon's already significant aircraft manufacturing sector.

Recent UAS Funding in Alaska, Hawaii, and Oregon

Since 2004, nine Alaska contractors have received direct U.S. federal agency contracts for UAS goods and services. The largest federal contract in Alaska is a 5-year standing services award, worth $47 million, from the U.S. Navy to the University of Alaska in 2010 for UAS payload integration and flight test services. The second major award made since 2004 to an Alaska firm consists of a series of pacts totaling $17 million from the U.S. State Department to Anchorage-headquartered Kuk Construction (subsidiary of Olgoonik Development, an Alaskan Native Corporation) for the provision of UAS-based security surveillance services in Iraq in partnership with KBR, Inc. UAF has collaborated with commercial entities, such as Idaho Power Company, and manufacturers including AeroVironment to conduct surveys and observe environmental impacts. Additionally, UAF has collaborated with BP for oil spill response and flare stack monitoring, as well as projects focused on detecting and locating gas and oil pipeline leaks and developing new sensors and processes to identify leaks.

Hawaii's large military presence has resulted in defense spending as the primary source of federal funding to UAS vendors in the state. Direct defense contracts accounted for 94 percent of all awards in terms of obligated amounts from 2004-2012, rising to 97 percent when including awards placed by the General Services Administration on behalf of the U.S. Air Force. The remaining awards were placed with Honolulu-based Referentia Systems by NOAA as part of the Papahanaumokuakea Marine National Monument monitoring project. Hawaii supports a dedicated UAS development and manufacturing company, Williams Aerospace, a small firm currently developing new platforms in the fixed-wing, hand launched micro and medium altitude endurance classes. The state is also working to create two commercial UAS services arms, addressing the defense, homeland security, and precision agriculture markets.

In Oregon, a consortium of industry, academia, and public entities has created a 7-year strategic plan to double the size of the UAS industry in the state, with the help of a $2.5 million State of Oregon grant scheduled for the 2013-14 biennium and additional investments of at least $1.15 million from other sources for a total of $3.65 million. The plan specifically creates UAS solutions for commercial applications, and safely integrating those UAS solutions into the NAS. Projects include emergency response; weather; firefighting; search and rescue; wildlife and habitat management; law enforcement; physical and resource surveys (land and water); management of agriculture, livestock, and public lands; and management of public and private infrastructure. Oregon State University (OSU) has already begun UAS flights based on these research objectives.

Leveraging Current Research Institutes, Community Colleges, and Training Centers

ACUASI is collaborating with the UAF College of Engineering and Mines (CEM) and the Community and Technical College (CTC) to integrate UAS engineering, science, and technology into UAF's teaching, research, and service activities. Additionally, ACUASI is working with the CEM to fill a full-time tenure track engineering faculty position with a professor focused on UAS engineering, science, and technology. ACUASI and CTC also intend to include UAS technology courses in CTC's aviation curricula to train UAS developers, technicians, and pilots as well as to improve outreach to remote Alaskan villages that could benefit from UAS technologies. Cooperation with the CTC at UAA will add air traffic controller participation, offer training for UAS operators, and ultimately build a maintenance program similar to the Aircraft and Powerplant program currently offered.

The University of Hawaii is testing UASs in several of its research programs, evaluating the utility and impact of UAS through analysis of coastal resource management, terrestrial and aquatic environmental monitoring, natural source management and inventory, and human impact studies. University of Hawaii is also developing programs to train students and research professionals on UASs, and plans to integrate this capacity into accredited degree programs.

The new OSU industry-university UAS consortium will depend on test site facilities for collaborative research and development in all phases of operations and applications. Through the Colleges of Engineering, Science, Agriculture, Forestry and Earth, Ocean and Atmospheric Sciences, OSU has expertise and supports ongoing research on control theory and robotics, flexible airframes and flight, sensors, and signal processing, and numerous applications in natural and environmental sciences and environmental monitoring, measuring, and management. OSU-Cascades, located in Central Oregon near the Warm Springs and Juniper test ranges, offers programs in energy engineering, computer science, natural resources, and business, and plans to add programs designed in conjunction with the UAS industry. OSU-Cascades can also provide on-site facilities for OSU-Corvallis researchers leading projects in the region. Central Oregon Community College (COCC) has one of the largest aviation flight training programs on the West Coast – both fixed wing and rotary. COCC offers certifications for UAS flight training and plans to develop a program for data analysis of sensors, building on the school's strong geographic information systems program. Additionally, Blue Mountain Community College (BMCC) in Pendleton, Oregon is developing a UAS curriculum for instructional delivery and course certification. Oregon Institute of Technology (OIT) offers a variety of degrees in engineering and engineering technology, composite engineering, computer and software systems engineering, and electrical engineering, including a master's degree in manufacturing engineering. It offers degrees in professional land surveying and geographic information systems. OIT is collaborating with Rockwell Collins, the aviation electronics company, on real-world projects at a joint campus outside Portland and offers similar hands-on collaborations with other aerospace firms in the northwestern U.S.

Expansion of Existing Businesses and Attracting New Business Investment

The University of Alaska has spun off at least two companies who intend to test their products on the Pan-Pacific test range. These companies were created by University graduate students who were expanding their research in sensors for testing in UASs. UA recently received $5 million from the State of Alaska to support the development of a sustainable high-tech industry in Alaska. Already two companies have established satellite offices in Alaska to improve collaboration with the ACUASI.

Placement of a UAS test site in Hawaii will promote growth within Hawaii and reduce development cycles for manufacturers and researchers. Additionally, it would reduce or eliminate costs to ship sensors, and send knowledgeable staff, to mainland test sites to operate and demonstrate systems. Close proximity to a test site in Hawaii will greatly benefit firms such as BAE Systems, Williams Aerospace, and others – including many military and government contractors working with the Honolulu Fire Department, Honolulu Police Department, U.S. Civil Air Patrol, U.S. Coast Guard, U.S. Department of Defense, U.S. Department of Homeland Security, U.S. National Guard, and others.

In Oregon, more than a dozen companies have said that they will begin testing their sensor packages, propulsion systems, and airframes in Oregon if the Pan-Pacific UAS Test Area is designated as a national test site. Additionally, two companies have informally pledged to open satellite offices at a state test range. The PPUTRC will benefit UAS businesses in the Columbia River Gorge. Over the past seven years, the Gorge's UAS industry grew from a small core of 30 people to an employment base of more than 1,400 employees. Many of these new jobs were created by the UAS companies' suppliers. The two largest Oregon UAS manufacturers are Insitu, manufacturer of UAS platforms and subsystems, and FLIR Surveillance Systems, a manufacturer of electro-optic and infrared imaging systems. Insitu is a major global supplier of high endurance, runway-independent UAS. FLIR Surveillance provides more ER and IR imaging systems for unmanned aircraft, unmanned ground, and unmanned maritime platforms than any other company. Activity in the Gorge from firms such as Insitu, FLIR Surveillance Systems, Cloud Cap Technology, and UTC Aerospace has spun off more than 20 local companies. Central Oregon's general aviation aircraft manufacturing industry had a similar growth pattern over a 15-year period, expanding from a core company of about 30 employees (Lancair) to a cluster of 25 companies that now employs nearly 1,200 people. It is anticipated the PPUTRC will help expand these existing businesses in the Gorge and Central Oregon.

Infrastructure

Alaska expects to invest $1.5 million to construct a test site center at its Poker Flat Research Range, as well as develop and acquire mobile test infrastructure such as fixtures, data collection devices, and monitoring systems similar to its internet-Portable Aerial Surveillance System (iPASS), a web-based application that merges track information from radar, GPS, and a transponder interrogator/receiver. Additionally, large data collection requirements are expected to drive development of a data center for processing and storage.

Hawaii's test ranges link to military/restricted areas used for current UAS operations. These sites include the Pohakuloa training area on the Island of Hawaii, Bradshaw and Wheeler Army Airfields on Oahu, and the Pacific Missile Range Facility on Kauai. Other areas under consideration include Upolu and Dillingham Airfields (on the Big Island and Oahu, respectively). Test points within the ranges would be utilized to support both shore and ship-based development, testing and certification of new UASs, training and crew certification of operational UASs, and development of expanded and joint capabilities involving existing communications systems and operations tactics using UAS.

The budget for the $2.5 million Oregon innovation grant envisions spending at least $1.2 million at test ranges for new equipment and/or infrastructure, with the grant providing $300,000, private enterprise providing $750,000, and public entities providing $150,000. Possible infrastructure development proposed with this funding includes: portable ground radar units; an automatic dependent surveillance-broadcast ground station or a similar 'sense and avoid' technology system; one or more operations management buildings housing computers, calibration components, baseline sensors with a range of capabilities, data analysis equipment, supporting software, maintenance facilities and machine shops; and ground control stations, an observation tower, and ITAR facilities as needed. Additionally, as noted earlier, Near Space Corporation is preparing to open a new $6 million flight test and operations facility at the Tillamook airport.

Chapter 3. Potential Economic Impacts of the PPUTRC

Designation as one of the nation's six UAS test sites promises to have significant economic impacts in the areas where flight activity occurs and support services are provided. Private and public sector UAS activity that has been constrained by restricted access and a restrictive federal authorizing process will have much greater opportunity to conduct UAV flight operations. In this chapter the potential economic impacts in Alaska, Hawaii, and Oregon related to serving as a test site are quantified.

The following economic impact projections were developed by McDowell Group, Inc. utilizing flight activity, flight cost, and flight-related staffing data provided by PPUTRC team members. Direct economic activity was measured by approximating preflight administrative costs, site fees per day, operating costs per day, and total flight days from historical data provided by the applicant. Sector-level information was obtained from the applicant concerning the number of UAS-related firms and jobs per firm. Direct employment estimates were then coupled with multipliers obtained from the IMPLAN economic impact model to estimate total direct, indirect, and induced economic effects. Annual projections from 2014 to 2017 were calculated for each of the 13 ranges utilizing growth rates based on funding forecasts from the Teal Group UAS market profile and forecast report, historical flight activity, and projected growth in flight activity, research, and UAS-related manufacturing as provided by the applicant.

In total, designation of PPUTRC as a UAS test site would be expected to generate 1,065 direct, indirect, and induced jobs in 2014, increasing to over 1,400 jobs by 2017. Total labor income would climb from$57 million in 2014 to about $76 million in 2017.

Table 3: Summary Impacts of PPUTRC Test Site Designation, 2012-2017
Combined Impacts in Alaska, Hawaii and Oregon

Impact of Test Site Designation				
	2014	2015	2016	2017
Total Employment	**1,065**	**1,260**	**1,335**	**1,429**
Direct Employment	490	571	602	642
Indirect Employment	198	243	259	279
Induced Employment	377	447	474	508
Total Labor Income ($ million)	**$56.9**	**$66.9**	**$70.8**	**$75.6**
Direct Labor Income ($ million)	$26.4	$30.5	$32.2	$34.2
Indirect Labor Income ($ million)	$10.4	$12.5	$13.3	$14.4
Induced Labor Income ($ million)	$20.1	$23.8	$25.3	$27.1
Output ($ million)	**$265.0**	**$301.8**	**$315.9**	**$333.5**
Total Value Added ($ million)	**$109.3**	**$121.9**	**$127.1**	**$133.5**
State Income Taxes ($ million)	$4.3	$5.0	$5.3	$5.6

Employment Resulting from UAS and Test Site Operations

In 2014, with designation of PPURTC as a test site, UAS activity in Alaska, Hawaii, and Oregon is expected to account for 581 direct jobs and a total of 1,254 jobs - including direct, indirect, and induced jobs. Approximately 85 percent of that total employment (1,065 jobs) is attributable to test site designation. The remaining 15 percent (189 jobs) is expected to occur in the absence of PPUTRC test site designation. By 2017, employment will rise to an estimated 904 direct jobs and 1,991 total jobs - with 72 percent of that total employment (1,429) attributable to test site designation. A significant number of these direct jobs are expected in smaller communities that tend to have higher unemployment – thus test site designation for the PPUTRC will help improve opportunities where they will provide the most benefits.

Table 4: Direct Employment, 2012-2017

Direct Employment						
	2012	2013	2014	2015	2016	2017
Total Direct Employment						
PPUTRC	**74**	**82**	**581**	**712**	**801**	**904**
Alaska Ranges	43	47	129	142	157	173
Hawaii Ranges	-	-	-	72	95	126
Oregon Ranges	31	35	452	498	549	605
Impact of Test Site Designation						
PPUTRC	**-**	**-**	**490**	**571**	**602**	**642**
Alaska Ranges	-	-	77	82	86	91
Hawaii Ranges	-	-	-	72	95	126
Oregon Ranges	-	-	414	417	421	424

Oregon's relatively high direct employment numbers are due to the existing, well-developed aircraft manufacturing sector in Oregon. Oregon is well placed to supply the growing demand for UAS aircraft that will be triggered by UAS integration. Most of the new jobs created in Oregon due to PPUTRC designation include manufacturing jobs (many of which may be created due to designation of test sites anywhere in the U.S.). These numbers for Oregon are based on an analysis provided to McDowell Group by Economic Development for Central Oregon (EDCO).

In addition to direct jobs created from UAS firms, significant indirect and induced jobs will also be created. Indirect jobs represent jobs created throughout the supply chain to support the UAS industry and induced jobs represent jobs created due to changes in household consumption as a result of the UAS industry.

Table 5: Indirect Employment, 2012-2017

Indirect Employment						
	2012	2013	2014	2015	2016	2017
Total Indirect Employment						
PPUTRC	**21**	**24**	**224**	**290**	**328**	**374**
Alaska Ranges	7	8	22	24	27	30
Hawaii Ranges	-	-	-	42	56	74
Oregon Ranges	14	16	202	223	246	271
Impact of Test Site Designation						
PPUTRC	-	-	**198**	**243**	**259**	**279**
Alaska Ranges	-	-	-	42	56	74
Hawaii Ranges	-	-	185	187	188	190
Oregon Ranges	-	-	13	14	15	16

Table 6: Induced Employment, 2012-2017

Induced Employment						
	2012	2013	2014	2015	2016	2017
Total Induced Employment						
PPUTRC	**59**	**65**	**448**	**558**	**629**	**712**
Alaska Ranges	35	39	106	117	129	142
Hawaii Ranges	-	-	-	64	84	111
Oregon Ranges	24	26	342	377	416	459
Impact of Test Site Designation						
PPUTRC	-	-	**377**	**447**	**474**	**508**
Alaska Ranges	-	-	63	67	71	75
Hawaii Ranges	-	-	-	64	84	111
Oregon Ranges	-	-	313	316	319	321

Note: Summation of columns may not match the total due to rounding

Labor Income Resulting from UAS and Test Site Operations

In 2014, UAS activity in Alaska, Hawaii, and Oregon is expected to account for $31 million in direct labor income and $67 million in total labor income - including direct, indirect, and induced - assuming the PPUTRC is awarded test site designation. Approximately 84 percent of that total labor income ($57 million) is attributable to test site designation, while the remaining 16 percent ($10 million) is expected to occur even if the proposed PPUTRC does not become a test site. By 2017, labor income is expected to include $106 million in total direct, indirect, and induced labor income - with 71 percent of that total labor income ($76 million) attributable to test site designation.

Table 7: Direct Income, 2012-2017 ($ million)

Direct Income						
	2012	2013	2014	2015	2016	2017
Total Direct Income						
PPUTRC	**$4.0**	**$4.4**	**$31.3**	**$38.2**	**$42.9**	**$48.3**
Alaska Ranges	$2.3	$2.6	$7.0	$7.7	$8.5	$9.4
Hawaii Ranges	-	-	-	$3.7	$4.9	$6.4
Oregon Ranges	$1.7	$1.9	$24.2	$26.7	$29.5	$32.5
Impact of Test Site Designation						
PPUTRC	-	-	**$26.4**	**$30.5**	**$32.2**	**$34.2**
Alaska Ranges	-	-	$4.2	$4.4	$4.7	$5.0
Hawaii Ranges	-	-	-	$3.7	$4.9	$6.4
Oregon Ranges	-	-	$22.2	$22.4	$22.6	$22.8

Table 8: Indirect Income, 2012-2017 ($ million)

Indirect Income						
	2012	2013	2014	2015	2016	2017
Total Direct Income						
PPUTRC	**$1.1**	**$1.3**	**$11.7**	**$15.0**	**$17.0**	**$19.3**
Alaska Ranges	$0.4	$0.4	$1.2	$1.3	$1.5	$1.6
Hawaii Ranges	-	-	-	$2.1	$2.7	$3.6
Oregon Ranges	$0.7	$0.8	$10.5	$11.6	$12.8	$14.1
Impact of Test Site Designation						
PPUTRC			**$10.4**	**$12.5**	**$13.3**	**$14.4**
Alaska Ranges	-	-	$0.7	$0.8	$0.8	$0.9
Hawaii Ranges	-	-	-	$2.1	$2.7	$3.6
Oregon Ranges	-	-	$9.6	$9.7	$9.8	$9.9

Table 9: Induced Income, 2012-2017 ($ million)

Induced Income						
	2012	2013	2014	2015	2016	2017
Total Induced Income						
PPUTRC	**$3.5**	**$3.8**	**$24.4**	**$30.1**	**$34.0**	**$38.4**
Alaska Ranges	$2.2	$2.5	$6.7	$7.4	$8.2	$9.0
Hawaii Ranges	-	-	-	$3.3	$4.3	$5.7
Oregon Ranges	$1.2	$1.4	$17.6	$19.4	$21.4	$23.6
Impact of Test Site Designation						
PPUTRC	-	-	**$20.1**	**$23.8**	**$25.3**	**$27.1**
Alaska Ranges	-	-	$4.0	$4.3	$4.5	$4.8
Hawaii Ranges	-	-	-	$3.3	$4.3	$5.7
Oregon Ranges	-	-	$16.1	$16.3	$16.4	$16.6

Output, Value Added, & State Income Taxes Resulting from UAS and Test Site Operations

'Output' represents the value of industry production, and 'total value added' is the difference between an industry's total output and the cost of their intermediate inputs. Economic modeling conducted for the purposes of this study indicates output in the PPUTRC states attributable to test site designation would climb from $265 million in 2014 to $333 million in 2017. Value added would climb from $109 million to $134 million over the same period.

Table 10: Output, 2012-2017 ($ million)

Output						
	2012	2013	2014	2015	2016	2017
Total Output						
PPUTRC	**$18.3**	**$20.2**	**$302.4**	**$366.8**	**$411.7**	**$463.6**
Alaska Ranges	$8.6	$9.5	$34.3	$37.8	$41.7	$46.0
Hawaii Ranges	-	-	-	$33.3	$44.1	$58.3
Oregon Ranges	$9.7	$10.7	$268.1	$295.6	$325.9	$359.3
Impact of Test Site Designation						
PPUTRC	-	-	**$280.1**	**$315.5**	**$328.4**	**$344.7**
Alaska Ranges	-	-	$23.8	$24.8	$25.8	$26.8
Hawaii Ranges	-	-	-	$33.3	$44.1	$58.3
Oregon Ranges	-	-	$256.3	$257.4	$258.5	$259.6

Table 11: Total Value Added, 2012-2017 ($ million)

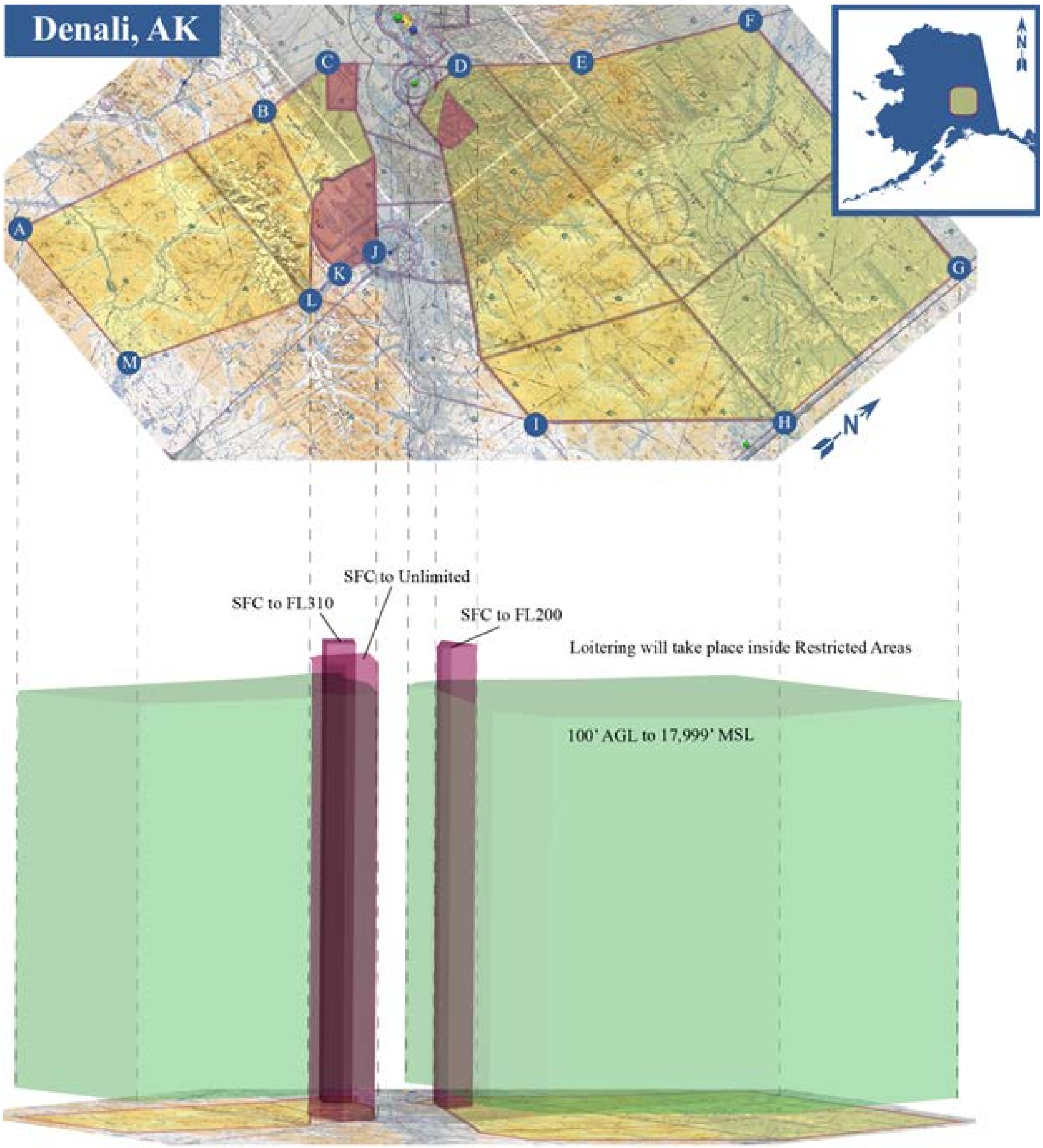
Value Added						
	2012	2013	2014	2015	2016	2017
Total Value Added						
PPUTRC	**$9.5**	**$10.5**	**$127.7**	**$151.8**	**$169.7**	**$190.3**
Alaska Ranges	$5.7	$6.3	$22.7	$25.0	$27.6	$30.4
Hawaii Ranges	-	-	-	$10.9	$14.5	$19.1
Oregon Ranges	$3.8	$4.2	$105.1	$115.8	$127.7	$140.8
Impact of Test Site Designation						
PPUTRC	-	-	**$116.2**	**$128.2**	**$132.8**	**$138.5**
Alaska Ranges	-	-	$15.8	$16.4	$17.1	$17.7
Hawaii Ranges	-	-	-	$10.9	$14.5	$19.1
Oregon Ranges	-	-	$100.4	$100.9	$101.3	$101.7

Designation of the PPUTRC will provide a combined four-year total of $20 million in income tax revenue to Hawaii and Oregon. The effective income tax rate for these calculations was approximated as 7.5 percent for Hawaii, and 9 percent for Oregon (Alaska has no income tax).

Table 12: State Income Taxes, 2012-2017 ($ million)

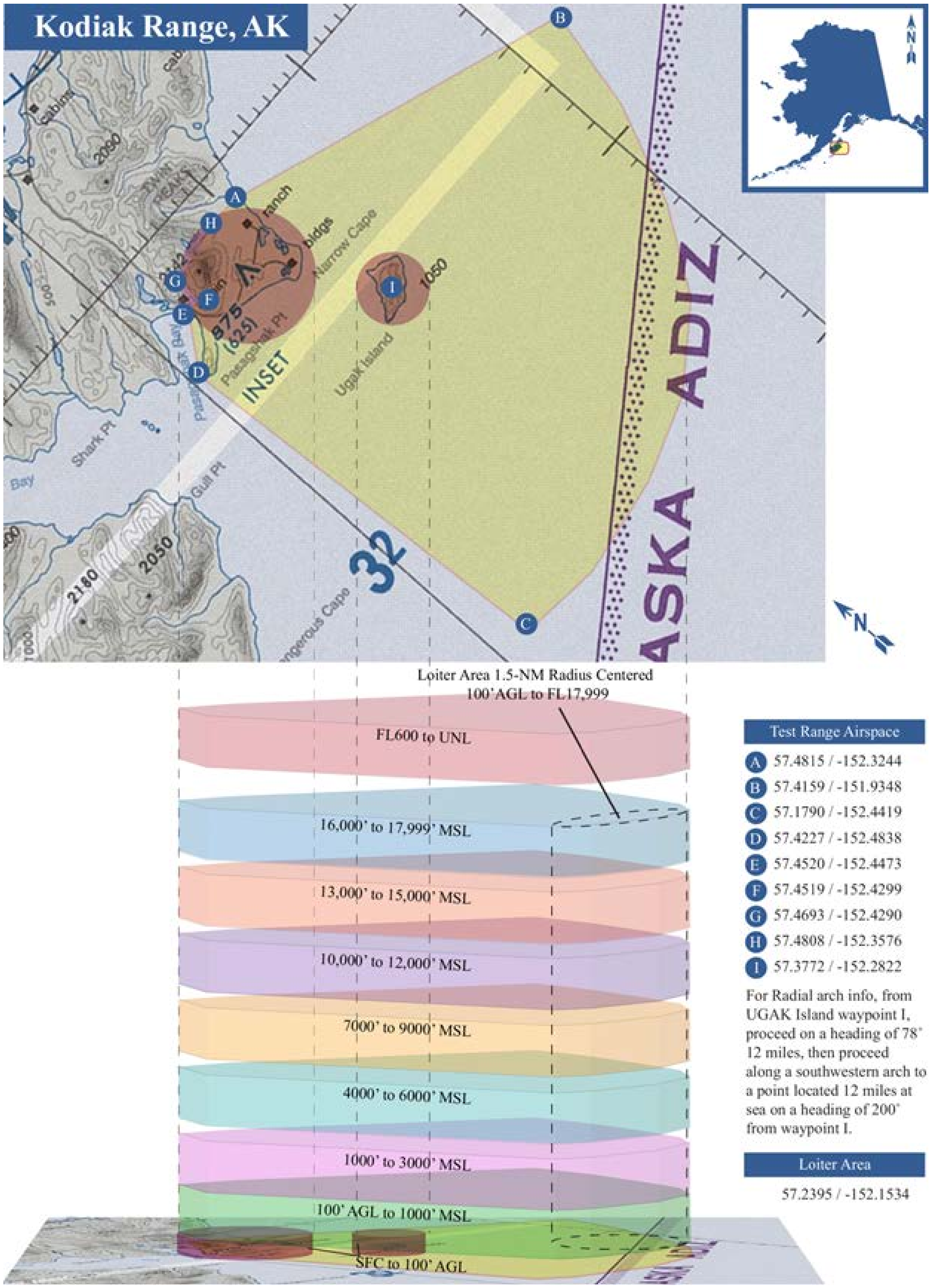
State Income Taxes						
	2012	2013	2014	2015	2016	2017
Total State Income Taxes						
PPUTRC	**$0.2**	**$0.2**	**$4.7**	**$5.9**	**$6.6**	**$7.5**
Alaska Ranges	-	-	-	-	-	-
Hawaii Ranges	-	-	-	$0.7	$0.9	$1.2
Oregon Ranges	$0.2	$0.2	$4.7	$5.2	$5.7	$6.3
Impact of Test Site Designation						
PPUTRC	-	-	**$4.5**	**$5.2**	**$5.5**	**$5.8**
Alaska Ranges	-	-	-	-	-	-
Hawaii Ranges	-	-	-	$0.7	$0.9	$1.2
Oregon Ranges	-	-	$4.5	$4.5	$4.6	$4.6

Appendix. Proposed Pan-Pacific Test Ranges

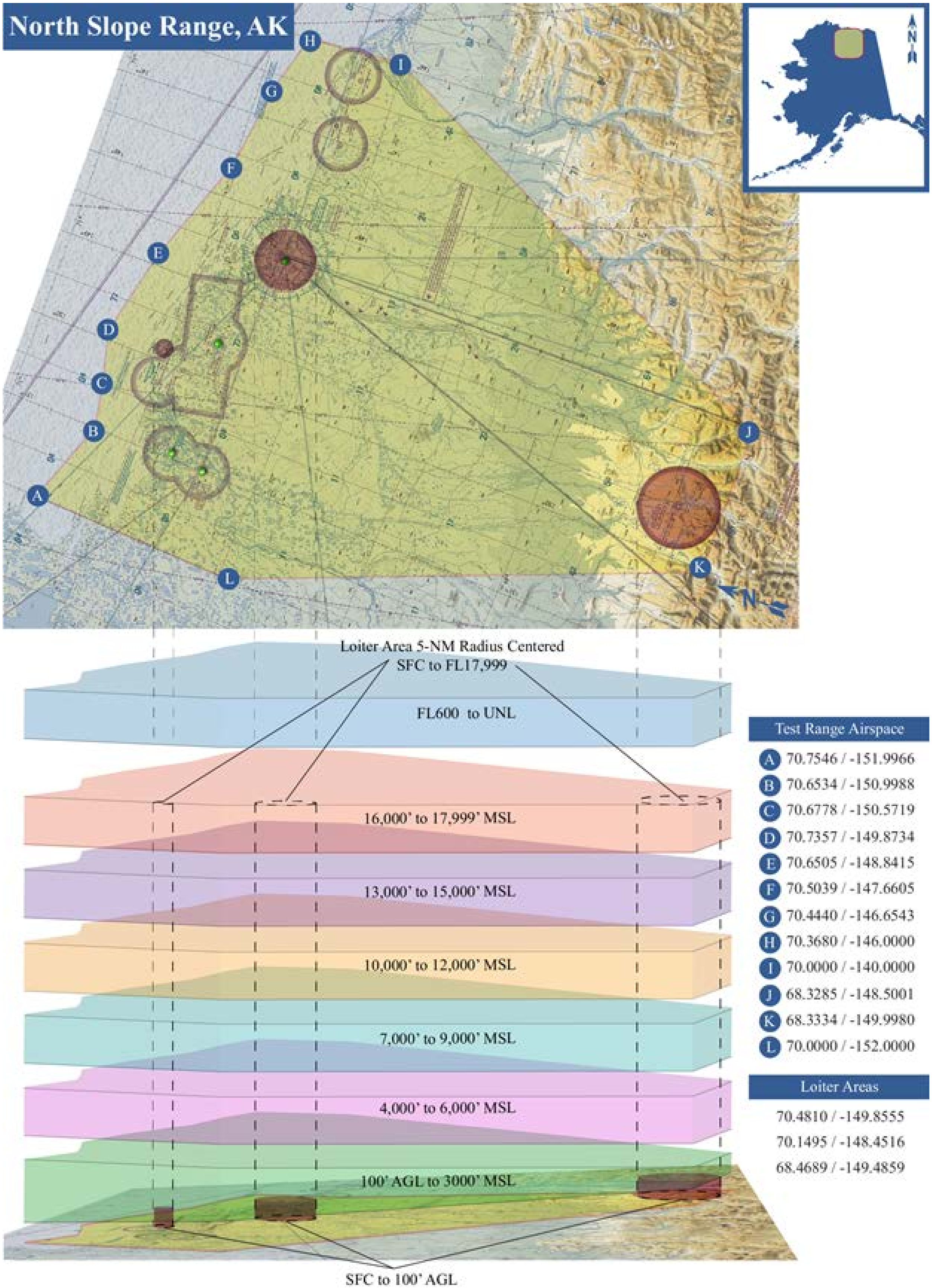


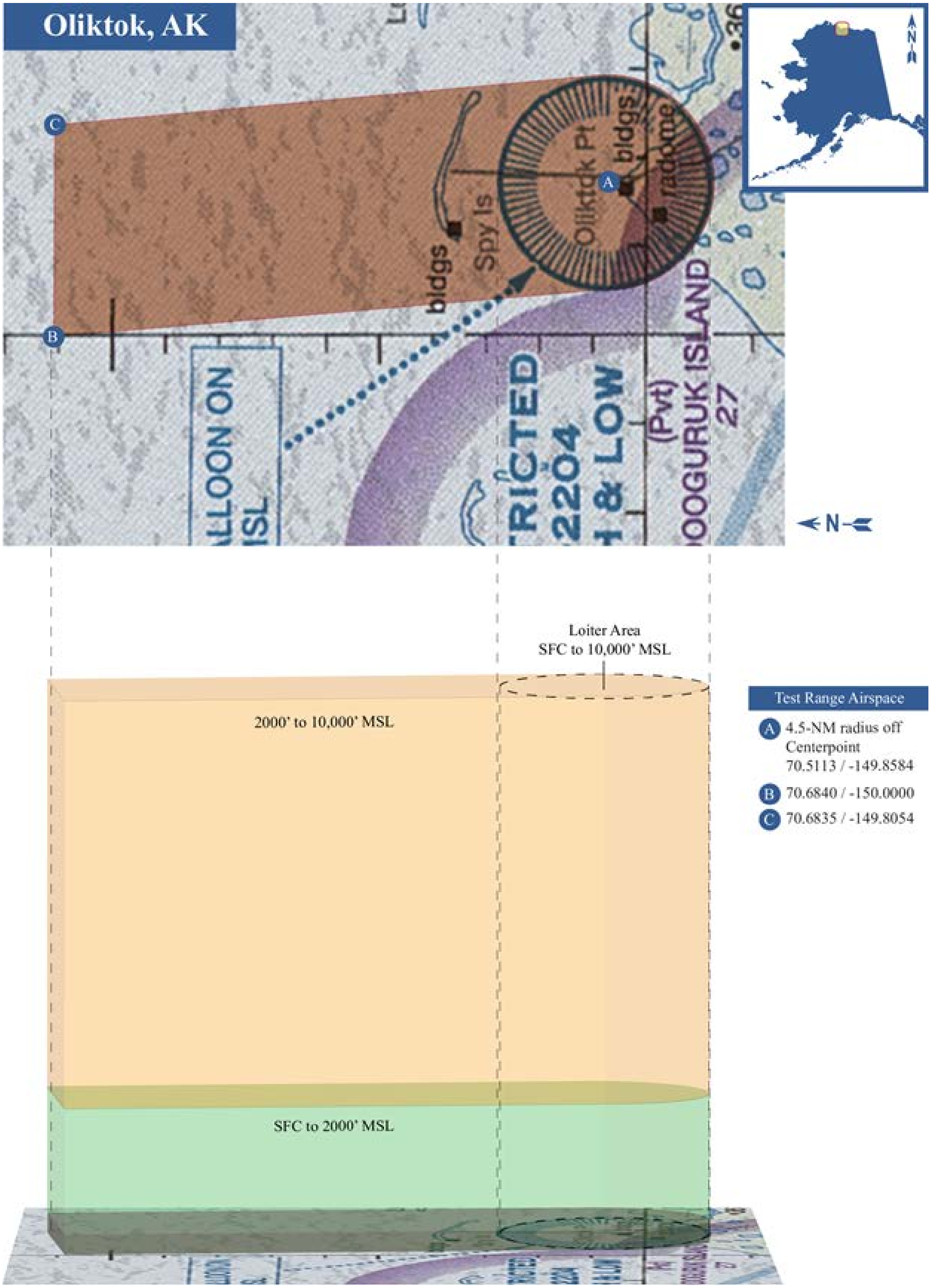
Test Range Airspace

- A 62.5000 / -148.8500
- B 63.9653 / -148.0089
- C 64.3756 / -147.9803
- D 64.9000 / -146.9134
- E 65.3505 / -146.0719
- F 66.1668 / -145.0934
- G 66.1692 / -141.0817
- H 65.0000 / -141.0821
- I 64.0000 / -143.0159
- J 63.9364 / -145.8266
- K 63.7156 / -145.9051
- L 63.4974 / -145.9046
- M 62.5000 / -146.7279

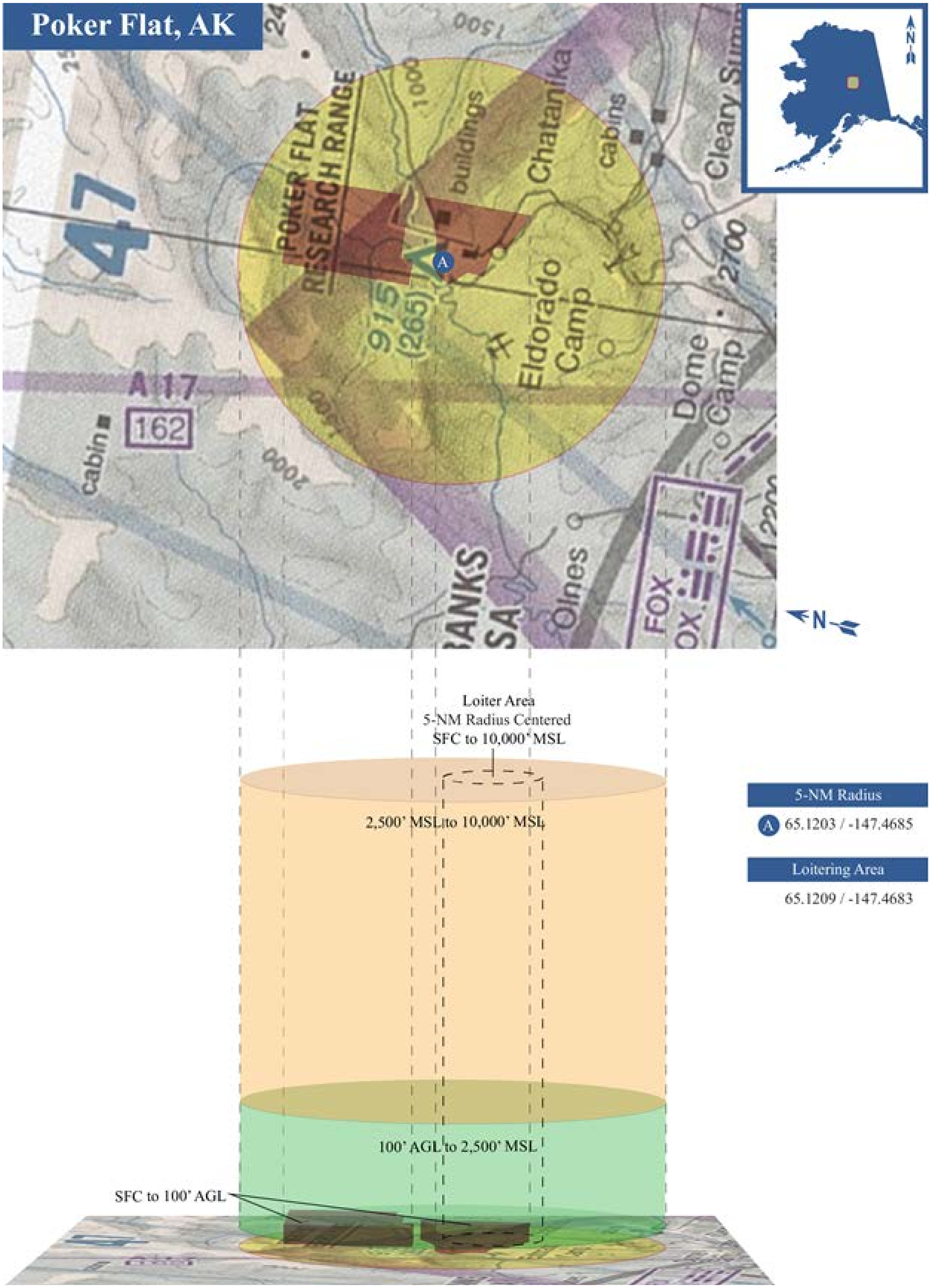


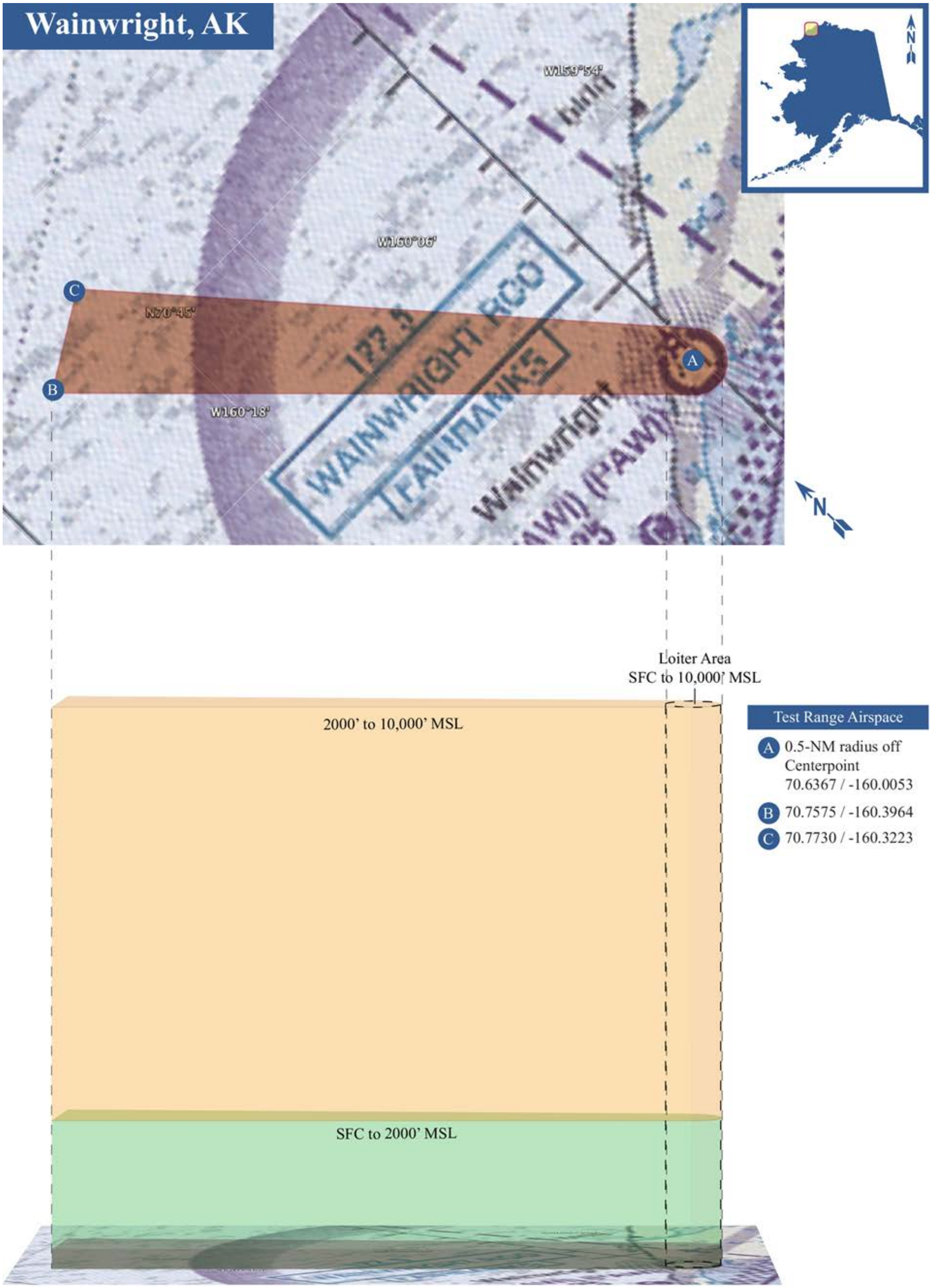
Kodiak Range, AK
A
B
C
D
E
F
G
H
I
INSET
Ugak Island
Narrow Cape
Pasagshak Pt
Shark Pt
Gull Pt
1050
875
(625)
32
ALASKA ADIZ
N
Loiter Area 1.5-NM Radius Centered
100'AGL to FL17,999
FL600 to UNL
16,000' to 17,999' MSL
13,000' to 15,000' MSL
10,000' to 12,000' MSL
7000' to 9000' MSL
4000' to 6000' MSL
1000' to 3000' MSL
100' AGL to 1000' MSL
SFC to 100' AGL
Test Range Airspace
A 57.4815 / -152.3244
B 57.4159 / -151.9348
C 57.1790 / -152.4419
D 57.4227 / -152.4838
E 57.4520 / -152.4473
F 57.4519 / -152.4299
G 57.4693 / -152.4290
H 57.4808 / -152.3576
I 57.3772 / -152.2822
For Radial arch info, from UGAK Island waypoint I, proceed on a heading of 78° 12 miles, then proceed along a southwestern arch to a point located 12 miles at sea on a heading of 200° from waypoint I.
Loiter Area
57.2395 / -152.1534

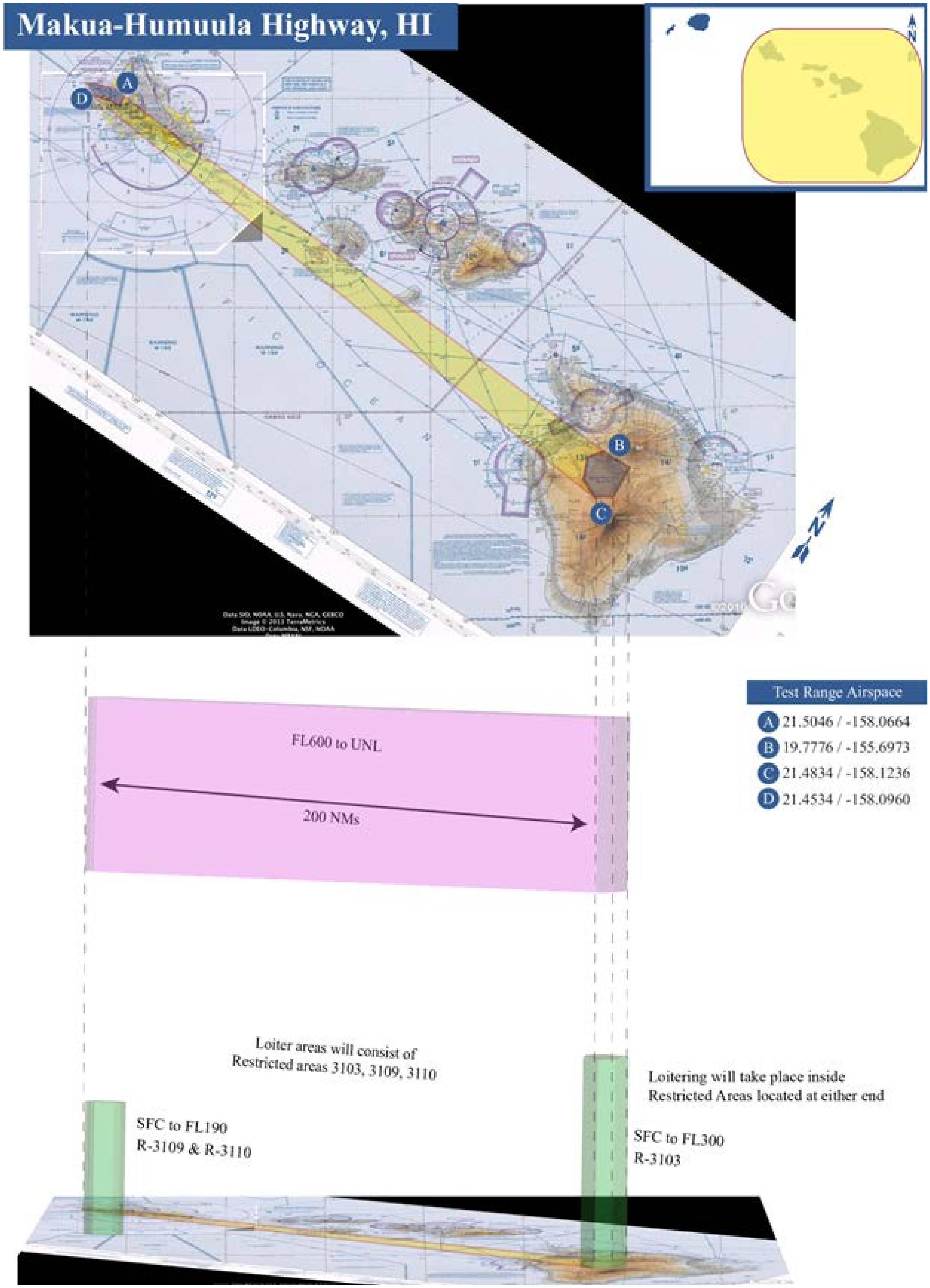

North Slope Range, AK
N
Loiter Area 5-NM Radius Centered
SFC to FL17,999
FL600 to UNL
16,000' to 17,999' MSL
13,000' to 15,000' MSL
10,000' to 12,000' MSL
7,000' to 9,000' MSL
4,000' to 6,000' MSL
100' AGL to 3000' MSL
SFC to 100' AGL
Test Range Airspace
A 70.7546 / -151.9966
B 70.6534 / -150.9988
C 70.6778 / -150.5719
D 70.7357 / -149.8734
E 70.6505 / -148.8415
F 70.5039 / -147.6605
G 70.4440 / -146.6543
H 70.3680 / -146.0000
I 70.0000 / -140.0000
J 68.3285 / -148.5001
K 68.3334 / -149.9980
L 70.0000 / -152.0000
Loiter Areas
70.4810 / -149.8555
70.1495 / -148.4516
68.4689 / -149.4859



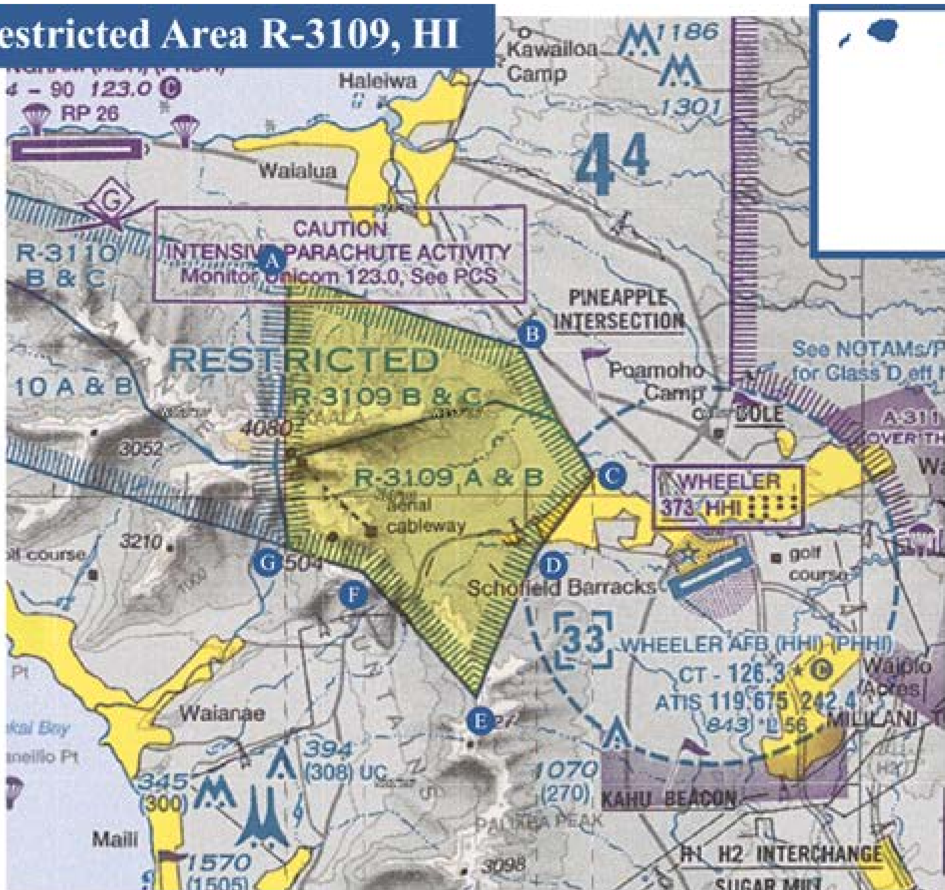
Oliktok, AK
C
A
B
Oliktok Pt
bldgs
radome
Spy Is
bldgs
ALLOON ON
ISL
RICTED
2204
& LOW
(Pvt)
OOGURUK ISLAND
27
N
Loiter Area
SFC to 10,000' MSL
2000' to 10,000' MSL
SFC to 2000' MSL
Test Range Airspace
A 4.5-NM radius off Centerpoint 70.5113 / -149.8584
B 70.6840 / -150.0000
C 70.6835 / -149.8054

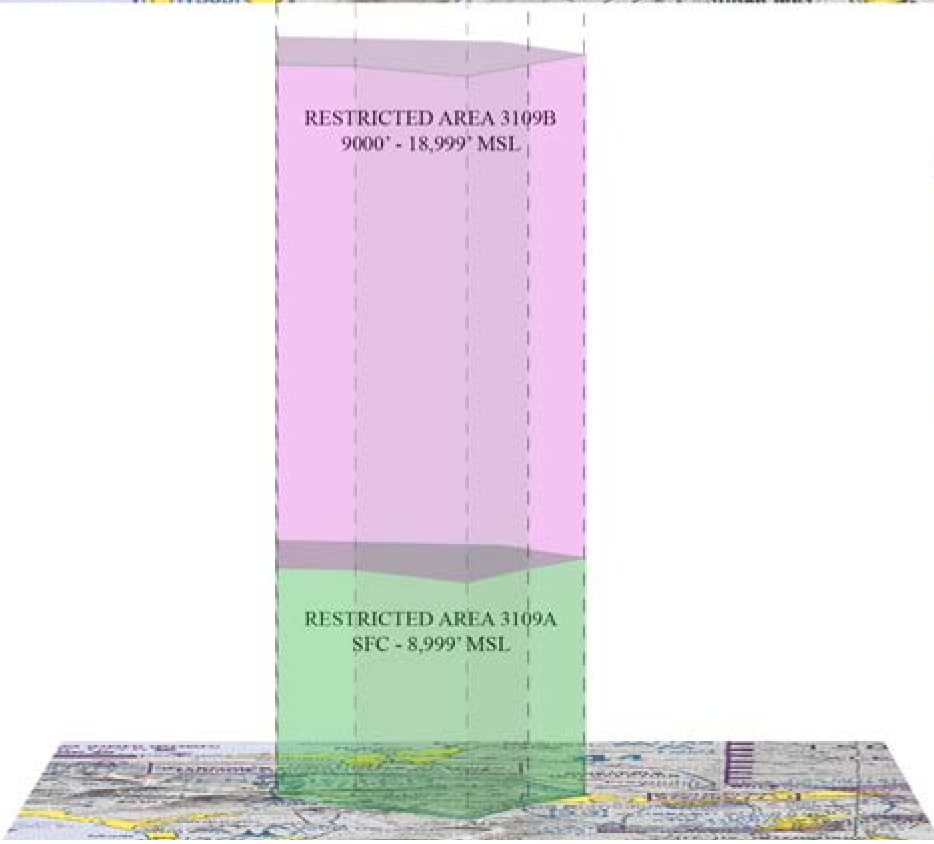

Poker Flat, AK
POKER FLAT RESEARCH RANGE
buildings
Chatanika
cabins
2700
915
(265)
Eldorado Camp
Dome Camp
A 17
162
cabin
2000
Olnes
FOX
N
Loiter Area
5-NM Radius Centered
SFC to 10,000' MSL
2,500' MSL to 10,000' MSL
100' AGL to 2,500' MSL
SFC to 100' AGL
5-NM Radius
A 65.1203 / -147.4685
Loitering Area
65.1209 / -147.4683


Wainwright, AK
W159°54'
W160°06'
N70°45'
W160°18'
A
B
C
N
Loiter Area
SFC to 10,000' MSL
2000' to 10,000' MSL
SFC to 2000' MSL
Test Range Airspace
A 0.5-NM radius off Centerpoint 70.6367 / -160.0053
B 70.7575 / -160.3964
C 70.7730 / -160.3223

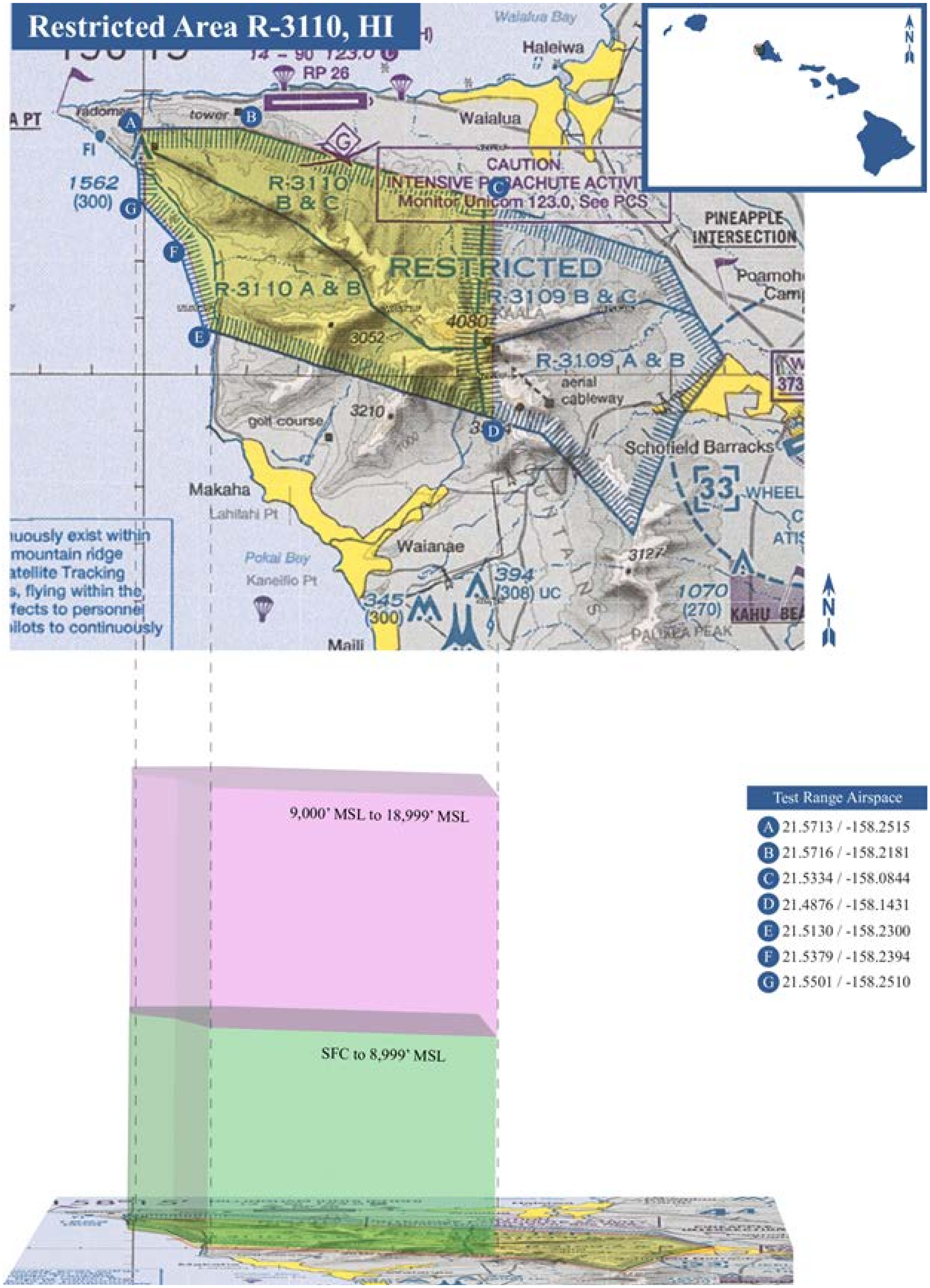

Makua-Humuula Highway, HI
A
B
C
D
Test Range Airspace
A 21.5046 / -158.0664
B 19.7776 / -155.6973
C 21.4834 / -158.1236
D 21.4534 / -158.0960
FL600 to UNL
200 NMs
Loiter areas will consist of
Restricted areas 3103, 3109, 3110
Loitering will take place inside
Restricted Areas located at either end
SFC to FL190
R-3109 & R-3110
SFC to FL300
R-3103

Restricted Area R-3109, HI



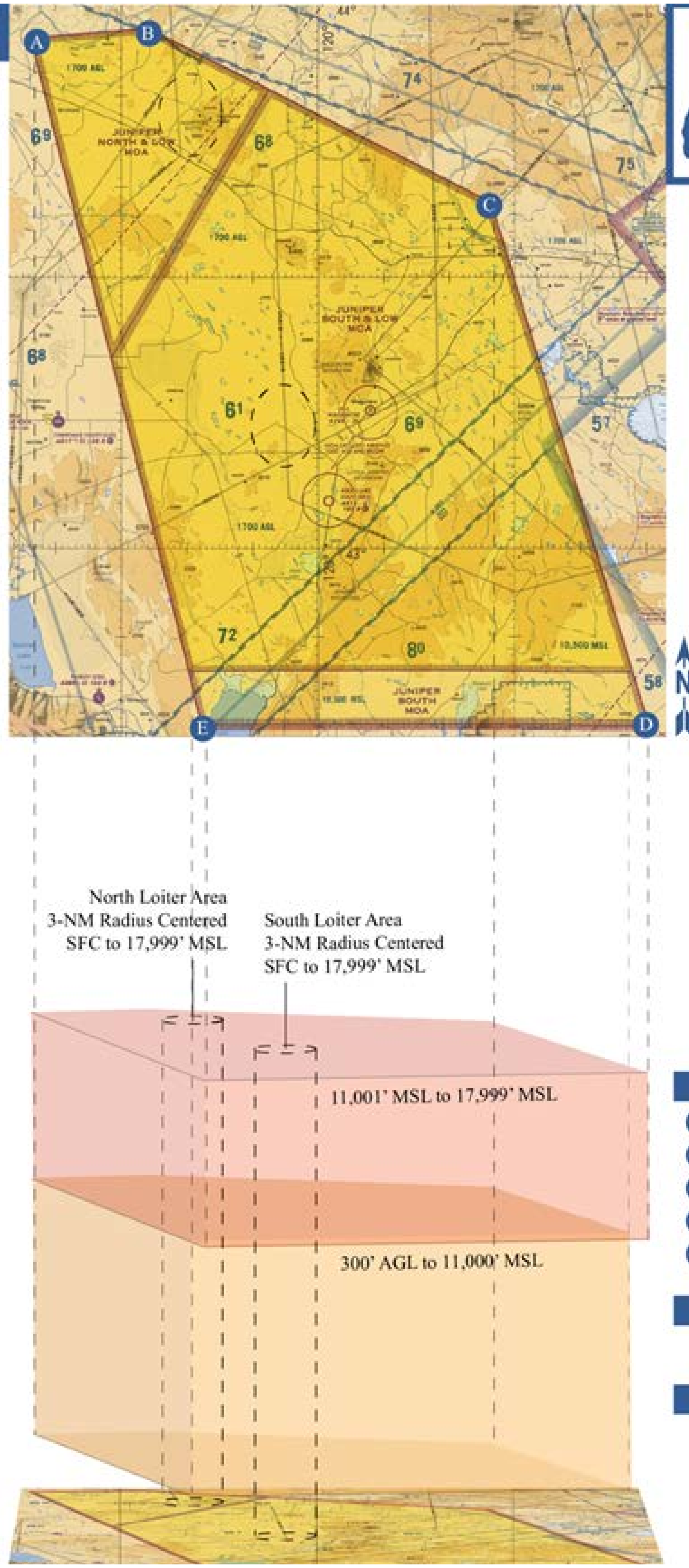


Test Range Airspace
A 21.5500 / -158.1411
B 21.5337 / -158.0842
C 21.5046 / -158.0664
D 21.4860 / -158.0807
E 21.4534 / -158.0960
F 21.4834 / -158.1236
G 21.4886 / -158.1433



Test Range Airspace
A 21.5713 / -158.2515
B 21.5716 / -158.2181
C 21.5334 / -158.0844
D 21.4876 / -158.1431
E 21.5130 / -158.2300
F 21.5379 / -158.2394
G 21.5501 / -158.2510

Juniper, OR



Test Range Airspace

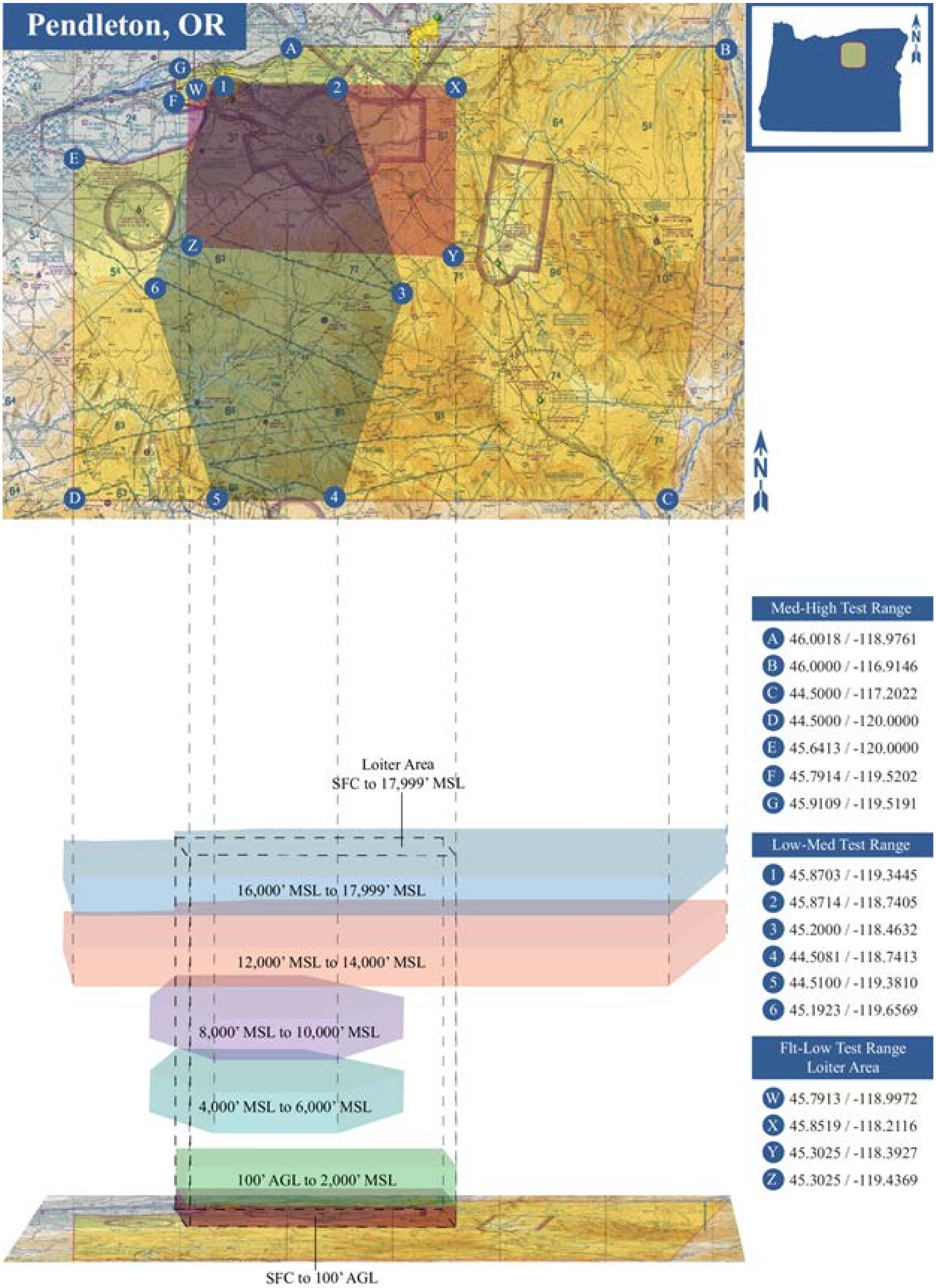
- A 43.9392 / -120.7296
- B 43.9575 / -120.4327
- C 43.6381 / -119.5600
- D 42.6700 / -119.1592
- E 42.6709 / -120.2951

North Loitering Area

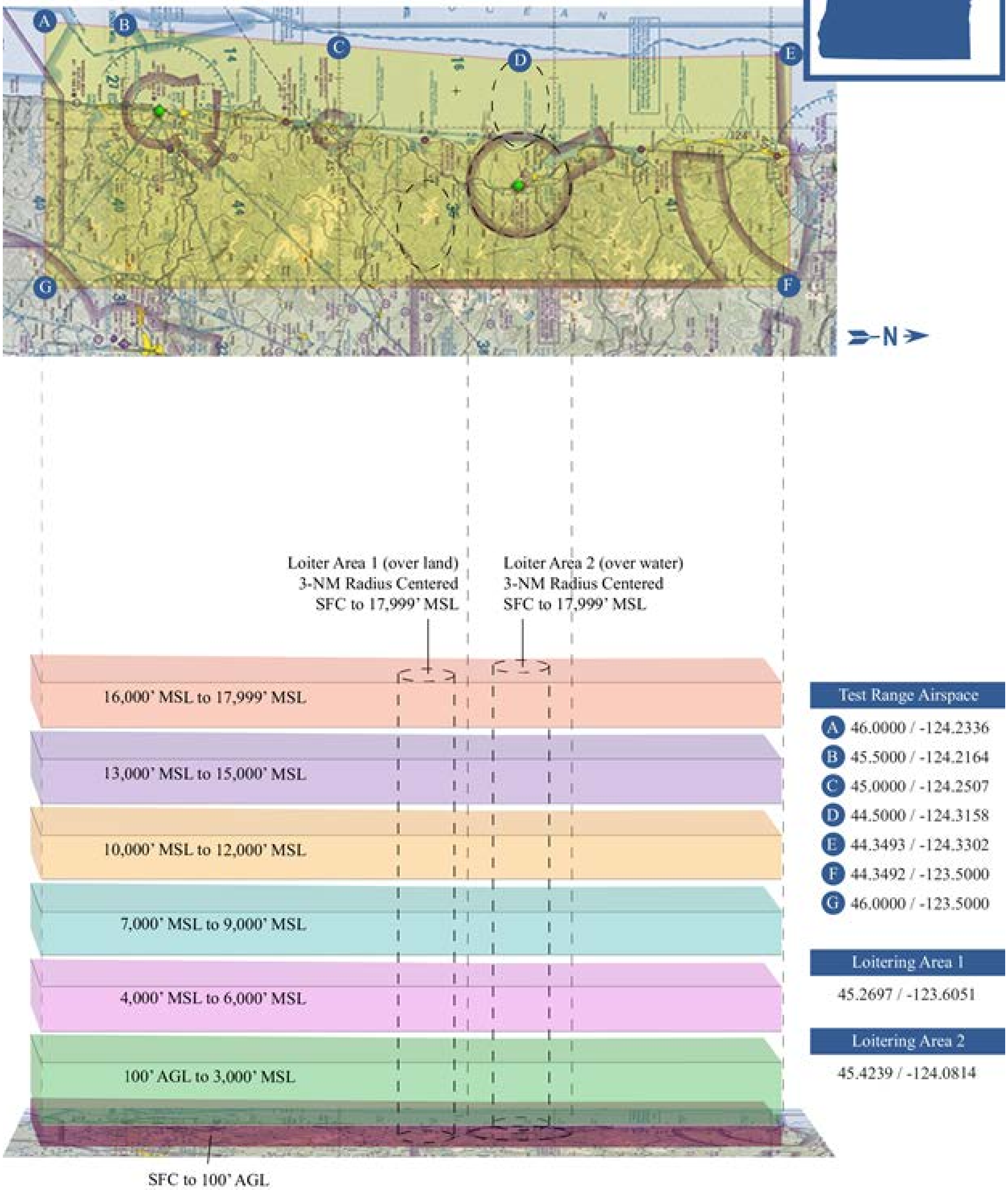
43.8126 / -120.3354

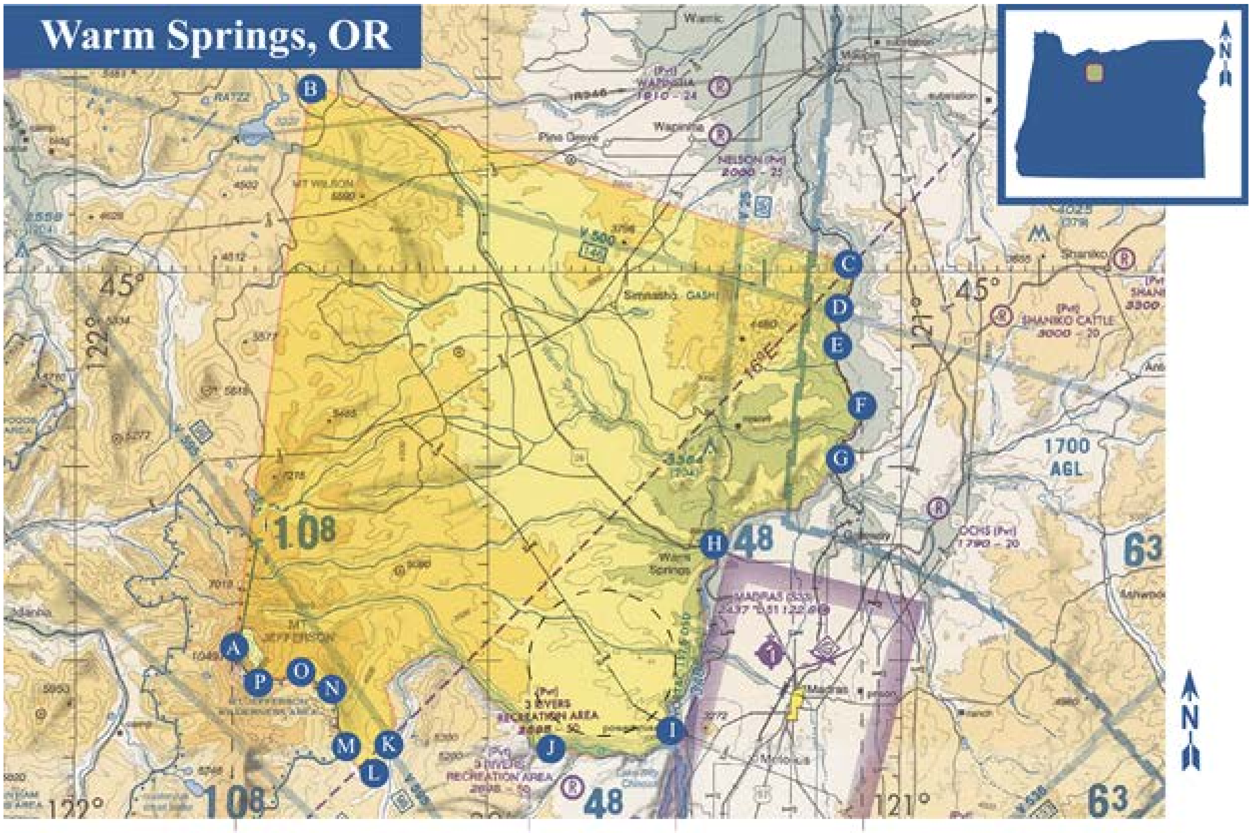
South Loitering Area

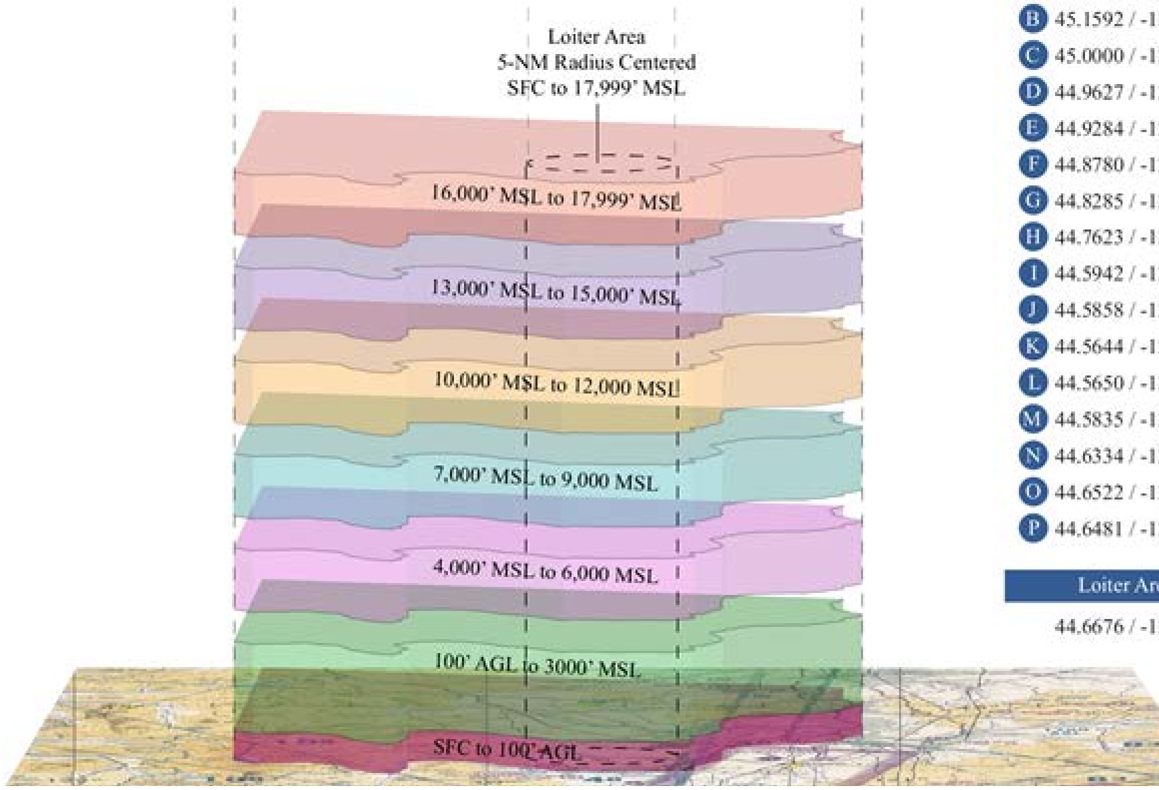
43.2300 / -120.1053


Pendleton, OR
A
B
C
D
E
F
G
W
1
2
X
Z
Y
3
6
5
4
N
Loiter Area
SFC to 17,999' MSL
16,000' MSL to 17,999' MSL
12,000' MSL to 14,000' MSL
8,000' MSL to 10,000' MSL
4,000' MSL to 6,000' MSL
100' AGL to 2,000' MSL
SFC to 100' AGL
Med-High Test Range
A 46.0018 / -118.9761
B 46.0000 / -116.9146
C 44.5000 / -117.2022
D 44.5000 / -120.0000
E 45.6413 / -120.0000
F 45.7914 / -119.5202
G 45.9109 / -119.5191
Low-Med Test Range
1 45.8703 / -119.3445
2 45.8714 / -118.7405
3 45.2000 / -118.4632
4 44.5081 / -118.7413
5 44.5100 / -119.3810
6 45.1923 / -119.6569
Flt-Low Test Range
Loiter Area
W 45.7913 / -118.9972
X 45.8519 / -118.2116
Y 45.3025 / -118.3927
Z 45.3025 / -119.4369

Tillamook, OR







Test Range Airspace
A 44.6740 / -121.8028
B 45.1592 / -121.7153
C 45.0000 / -121.0574
D 44.9627 / -121.0760
E 44.9284 / -121.0778
F 44.8780 / -121.0458
G 44.8285 / -121.0784
H 44.7623 / -121.2245
I 44.5942 / -121.2846
J 44.5858 / -121.4328
K 44.5644 / -121.6200
L 44.5650 / -121.6396
M 44.5835 / -121.6672
N 44.6334 / -121.6878
O 44.6522 / -121.7155
P 44.6481 / -121.7830

Loiter Area
44.6676 / -121.3566

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