HANFORD MISSION INTEGRATION SOLUTIONS

Plans

HMIS-PLN-EFS-62407

Aviation Safety Management System Program

Revision 1, Change 2

Published: 01/22/2026
Effective: 01/22/2026

Program: Infrastructure and Site Services
Topic: Environmental Field Support

Subject Matter Expert: LeCompte, John-Paul
Alternate Subject Matter Expert: Cowin, Benjamin J
Functional Manager: Cowin, Benjamin J

Use Type: Administrative

- Canister Storage Building/Interim Storage Area (CPCCo) :
  Categorical Exclusion: GCX-2 (Editorial Changes)
  Screener: Covey, Lori
- Solid Waste Operations Complex (CPCCo) :
  Categorical Exclusion: GCX-7 (Minor Change)
  Screener: Jacobs, Jake
- Waste Encapsulation and Storage Facility (CPCCo) :
  Categorical Exclusion: GCX-1 (Safety Basis Implementation)
  Screener: Covey, Lori
- 324 Facility (CPCCo) :
  Categorical Exclusion: GCX-2 (Editorial Changes)
  Screener: Hicks, Jarrod
- 105 KW Facility (CPCCo) :
  Categorical Exclusion: GCX-2 (Editorial Changes)
  Screener: Hicks, Jarrod
- Transportation Safety (CPCCo) :
  Excluded from USQ
  Exclusion Reason:
  Excluded from USQ by CPCC-PRO-NS-062 N/A per section 1.3 (A Bridges 01/15/26)
- D-4 End States (CPCCo) :
  Categorical Exclusion: GCX-2 (Editorial Changes)
  Screener: Hicks, Jarrod

JHA: Administrative
Periodic Review Due Date:03/26/2029
Publication Correction:02/11/2026
Rev. 1, Chg. 2

Change Summary

Description of Change

Editorial change to switch 414.1D to 414.1E

Publication correction (47073) - TOC update.

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1.0 INTRODUCTION

This Hanford Mission Integration Solutions, LLC (HMIS) Aviation Safety Management System Program (ASMSP) plan addresses the operational programming of both the Small Unmanned Aircraft System (sUAS) and manned aircraft overflights at the Hanford Site. This body of work incorporates U.S. Department of Energy (DOE) policy 450.4A (DOE P 450.4A Chg. 1 (MinChg)), *Integrated Safety Management Policy*, and Contractor Requirements Document (CRD) O 440.2C Admin Chg. 1, *Aviation Management and Safety*, which are focused on ensuring that all DOE elements and contractors are committed to conducting safe, efficient, and effective operations.

1.1 Purpose

The purpose of this plan is two-fold. First, it delineates an Integrated Safety Management System (ISMS) that provides a formal, organized process whereby people plan, perform, assess, and improve the safe conduct of work.

Second, this plan contributes to Hanford Site aviation mission safety as part of an overall ISMS, ensuring that the sUAS and manned aviation programming is standardized as it relates to certifications, training, procedural controls, mission planning, maintenance protocols and data management.

1.2 Aviation Safety Management System Scope

A safety management system (SMS) is a systematic approach to controlling risk. The HMIS ASMSP approach provides an organizational framework to execute a sound safety culture that controls exposure to risks at all levels within the organization. It also refers to the formal processes and tools used to manage a structured safety approach through established procedures to mitigate risks to acceptable levels.

The HMIS ASMSP structure and organization is based on the five core functions of integrated safety management (ISM) identified in DOE P 450.4A Chg. 1 (MinChg). The five ISM core functions are listed as:

a. Define the scope of work

b. Analyze the hazards

c. Develop and implement hazard controls

d. Perform work within the controls

e. Provide feedback and continuous improvement

These core functions ensure a systematic approach to managing aviation safety activities. The HMIS ASMSP focuses on overseeing the planning and execution of aviation activities at the DOE Hanford Site, along with overseeing HMIS' management of its commercial aviation services (CAS) operators.

1.3 Aviation Integrated Safety Management System Objective

DOE P 450.4A Chg. 1 (MinChg) requires each department to implement SMSs to systematically integrate safety into management and work practices at all levels in the planning and execution of work.

The SMS provides a management framework to integrate safety into work practices to control risks associated with HMIS aviation operations. The work practices include functions such as the aviation mission approval process and CAS oversight. HMIS review of the aviation missions by safety, aviation management personnel and CAS operators ensure that hazards are sufficiently identified, evaluated, and mitigated.

1.4 Requirements

The HMIS ASMSP must adhere to the following requirements from the U.S. Department of Energy, Hanford Field Office (DOE-HFO) Aviation Management and Safety Program:

a. Comply with the terms of its contract, CRD O 440.2C Admin Chg. 1, *Aviation Management and Safety*, and this DOE-HFO AMSP.

b. Designate a qualified aviation safety officer (ASO) who (a) holds a valid Federal Aviation Authority (FAA) sUAS operator certificate (14 CFR 107, “Small Unmanned Aircraft Systems”); (b) has demonstrated experience as an aviation safety professional; (c) knows federal, state, and local aviation- related laws, regulations, and directives; and (d) keeps abreast of emerging sUAS industry practices.

c. Develop contractual aviation specifications for CAS operators. All contracts and subcontracts (at any level) that procure aviation activities must be coordinated with the DOE-HFO Aviation Manager (AvM) for review and concurrence.

d. Ensure all CAS operators are on the Accepted Operators List (AOL). If an operator is not on the AOL, then the DOE-HFO ASO coordinates the required audit of the CAS operator through the DOE-HFO AvM and Office of Aviation Management (OAM).

e. Ensure approved CAS operators develop satisfactory aviation safety plans (ASP) for sUAS missions; ensure approved CAS operators develop satisfactory ASPs for manned aircraft missions when missions pose risks not normally accepted by the public and/or when the missions are unique.

f. Complete environmental reviews and any follow-on actions, such as the *National Environmental Policy Act* (NEPA) evaluations, for all planned aviation missions before finalizing ASPs.

g. Approve all ASPs before submitting them to the DOE-HFO ASO for review and approval.

h. Perform direct oversight of CAS operators to ensure the safety of people, property, and the environment.

i. Provide job-related aviation safety training to the DOE-HFO Strategic Partner (DOE-HFOSP) (e.g, Hanford Site contractors) personnel prior to CAS operator aviation missions in the field.

1.5 HMIS Aviation Safety Management System Approach

1.5.1 Safety Commitment

HMIS leadership is committed to developing, implementing, and continuously improving aviation operations. HMIS is committed to the following:

- Developing and maintaining a safety culture that recognizes the value of safety management
- Building a safety culture that believes that safety management should be supported by everyone and integrated into every task, every day
- Defining the duties, responsibilities, and accountabilities for all employees
- Providing employees with adequate safety training
- Complying with or exceeding all regulatory requirements
- Proactively mitigating risks associated with aviation Operations, defining goals, and measuring performance against those goals while conducting safety reviews focused on improved performance
- Encouraging employees to report errors and safety issues

HMIS employees must not compromise safety by assuming excessive risk. HMIS leadership expects employees to take an active role in ensuring that the hazards and risks associated with aviation operations are identified and mitigated to an acceptable level.

1.5.2 Aviation Safety Implementation

The HMIS ASMSP provides guidance for CAS subcontractors to sufficiently plan each aviation mission; define the scope of work; identify mission hazards; implement necessary controls; safely perform work; and obtain feedback for continuous improvement. The mission approval process and ASP facilitated by the Hanford Flight Management System (HFMS) is a part of an overall ISMS that provides safety oversight of planned aviation operations.

1.5.3 Quality Assurance

Implementation of quality assurance activities and control processes, along with periodic audits, strengthen the HMIS ASMSP Program by providing a review of program effectiveness and regulatory compliance. CRD O 414.1E, *Quality Assurance*, ensures that DOE products and services meet or exceed customer requirements by setting

expectations to consistently meet mission objectives in a safe, effective, and efficient manner.

This HMIS ASMSP shall be reviewed no less than annually to ensure that it remains compliant with DOE guidance and applicable FAA regulations. Special assessments or audits may also be performed as technology and system changes occur. The results of the assessments/audits will be used to improve the HMIS ASMSP Program.

1.5.4 Military Aviation Operations

The safety of military aviation operations is the sole responsibility of the military organization conducting the operation. However, military aviation organizations operating on the Hanford Site or with DOE/contractor personnel on board their aircraft shall coordinate the operation with the DOE-RL ASO.

1.6 Acronyms

AID	Aviation Implementation Document
AMSP	Aviation Management Safety Plan
AOL	Accepted Operators List
ASME	Assistant Manager Safety and Environment
ASMSP	Aviation Safety Management System Program
ASO	Aviation Safety Officer
ASP	Aviation Safety Plan
ATC	Air Traffic Control
AvM	Aviation Manager
BTR	Buyer’s Technical Representative
C2	Command and Control
CAS	Commercial Aviation Service
COA	Certificate of Authorization
CRM	Crew Resource Management
CSM	Cybersecurity Manager
C-UAS	Counter UAS
C-UAS COR	Counter UAS Coordinator
DOD	U.S. Department of Defense
DOE	U.S. Department of Energy
DOE-HFO	U.S. Department of Energy, Hanford Field Office
DIU	Defense Innovation Unit
FAA	Federal Aviation Administration
FRAT	Flight Risk Assessment Tool

FRRB	Flight Readiness Review Board
GCP	Ground Control Point
GPS	Global Positioning System
HFD	Hanford Fire Department
HFMS	Hanford Flight Management System
HMIS	Hanford Mission Integration Solutions, LLC
IAA	Interagency Agreement
ISM	Integrated Safety Management
ISMS	Integrated Safety Management System
J-SOP	Joint Standard Operating Procedure
LOS	Line of Sight
NAS	National Airspace System
NEPA	*National Environmental Policy Act*
NOTAM	Notice to Airmen
NTSB	National Transportation Safety Board
OAM	Office of Aviation Management
OHOR	Operational Hazard and Occurrence Report
OP	Operational Plan
PIC	Pilot in Command
POC	Point of Contact
PSQS	Program Specific Qualification Standard
RAV	Risk Assessment Value
RPIC	Remote Pilot in Command
RTH	Return to home
DOE-HFOSP	DOE-Hanford Field Office Strategic Partner
RPIC	Remote Pilot in Command
SMS	Safety Management System
SP	Safety Plan
SRM	Safety Risk Management
SSI	Special Security Instructions
TFR	Temporary Flight Restrictions
sUAS	Small Unmanned Aircraft System
UAS	Unmanned Aircraft System
UOA	UAS Operating Area
VLOS	Visual Line of Sight

VO	Visual Observer

1.7 Definitions

Accepted Operators List: A list of accepted commercial aviation service operators vetted by DOE in accordance with CRD O 440.2C Admin Chg. 1, *Aviation Management and Safety*. DOE elements that contract or utilize CAS operations must select an operator from the AOL. The DOE Office of Aviation Management manages the AOL.

Aircraft incident: An occurrence other than an accident, associated with the operation of an aircraft, which affects or could affect the safety of operations.

Aviation Safety Management System: The formal, top-down business-like approach to managing safety risk. It includes systematic aviation procedures, practices, and approaches for the management of safety.

Aviation Safety Plan: An ASP, also known as aviation safety documentation, includes a description of an aviation mission, identifies personnel qualified and authorized to perform the work, includes a risk analysis of the mission hazards, and lists the controls to mitigate those hazards. The ASP identifies a risk level for an aviation mission and should be approved at the appropriate federal authority for that risk.

Certificate of Authorization: A Federal Aviation Administration authorization issued for "public use" unmanned aircraft operations only, for operations within the National Airspace System.

Commercial Aviation Services: Services that include leased aircraft; aircraft chartered or rented for exclusive use; full services (i.e., aircraft maintenance providers, aircraft, and related aviation services for exclusive use) contracted for or obtained through an interagency agreement (IAA), regardless of the length of the contract or agreement; or aviation services (i.e., services but not aircraft) obtained by commercial contract or IAA. A listing of accepted CAS operators may be found on the DOE OAM PowerPedia site, in the *Commercial Aviation Services Accepted Operators List*.

Government aircraft: Any aircraft owned, leased, chartered, or rented by an executive agency other than a branch of the U.S. Armed Forces or an intelligence agency; includes commercial aviation services.

Hazard: Any existing or potential condition that can lead to injury, illness, or death; damage to or loss of a system, equipment, or property; or damage to the environment. A hazard is a condition that has the potential to cause an accident or incident.

Hazardous material: As defined by the Department of Transportation, a hazardous material is a substance or material that the Secretary of Transportation has determined can pose an unreasonable risk to health, safety, and property when transported in commerce, and has designated as hazardous under 49 USC 5103. The term includes hazardous substances, hazardous wastes, marine pollutants, elevated temperature materials, materials designated as hazardous in the Hazardous Materials Table (see 49

CFR 172.101), and materials that meet the other defining criteria for hazard classes and divisions in 49 CFR 173.

Interagency Agreement: An IAA is an interagency assisted acquisition and interagency transaction. The IAA provides the statement of work, terms and conditions, funding, billing, and payment data in support of a reimbursable agreement. An IAA is between two agencies – one is the requesting agency and the other is the servicing agency. The interagency agreement serves as a master agreement with at least one or more orders or actions being issued against the agreement.

***National Environmental Policy Act*:** NEPA, signed into law in 1970, is a procedural statute that requires federal agencies to assess the environmental impacts of proposed major federal actions. NEPA screening must be performed in accordance with Council on environmental Quality NEPA regulations (40 CFR 1500-1508) and DOE NEPA implementing procedures (10 CFR 1021) to determine the level of documentation required for the aviation program (e.g., categorical exclusion, environmental assessment, or environmental impact statement). The NEPA determination must be informed by reviews of cultural, ecological, natural, and other resource areas potentially affected by aviation program activities to evaluate the significance of impacts and existence of extraordinary circumstances. NEPA is an inherently governmental function and all NEPA determinations must be made by, and be traceable to, the DOE NEPA Compliance Officer.

Remote pilot in command: A person who holds a remote pilot certificate with an sUAS rating and has the final authority and responsibility for the operation and safety of an sUAS operation conducted under 14 USC Part 107.

Small Unmanned Aircraft System: A small-unmanned aircraft and its associated elements (including communication links and control components) that are required for the safe and efficient operation of the aircraft. An sUAS is an unmanned aircraft weighing less than 55 pounds, including everything that is onboard or otherwise attached to the aircraft, and can be flown without the possibility of direct human intervention from within or on the aircraft. For DOE, an sUAS is not used for sport or hobby, but for purposes to conduct aerial research; aerial photography; aerial survey; or research and development of platforms, sensors, cameras, or other such devices. An sUAS is operated in the National Airspace System.

sUAS accident: An occurrence associated with the operation of an sUAS that takes place between the time the sUAS motor(s) are started with the intention of flight until the shutdown of motor(s) and where any person suffers death or serious injury, or property damage occurs per the FAA 14 CFR Part 107 or established Certificate of Authorization reporting requirements.

Unmanned aircraft: An aircraft operated without the possibility of direct human intervention from within or on the aircraft. Also alternatively called Unmanned Aerial Vehicle, Remotely Piloted Aircraft, Remotely Operated Vehicle, or Drone.

UAS flight crew member: A remote pilot, visual observer, payload operator or other person assigned duties for a sUAS for the purpose of flight or training exercise.

Visual observer: A person acting as a flight crew member who assists the sUAS remote PIC and the person manipulating the controls to see and avoid other air traffic or objects aloft or on the ground.

2.0 ROLES AND RESPONSIBILITIES

2.1 DOE-HFO Key Personnel

2.1.1 DOE-HFO Deputy Manager

The DOE official responsible for all aviation operations at the Hanford Field Office (DOE-HFO) and the Office of River Protection aviation programs. The DOE-HFO Deputy Manager:

- Ensures aviation operations supporting the DOE-HFO mission is conducted in a safe, efficient, and effective manner and consistent with the requirements of DOE O 450.2, Chg. 1 (MinChg), *Integrated Safety Management*.
- Empowers the DOE-HFO organization to stop or pause work because of reasonable belief that an activity may pose a safety hazard.
- Delegates CRD O 440.2C Admin Chg. 1 requirements to the DOE-HFO Assistant Manager Safety and Environment (ASME).
- Approves emergency flight operations, in coordination with the AvM/ ASO and pertinent security personnel, to support emerging needs.

2.1.2 DOE-HFO Assistant Manager Safety and Environment

The DOE-HFO ASME has full authority throughout the DOE organizations under DOE-HFO to execute and oversee CRD O 440.2C Admin Chg. 1 activities delegated by the DOE-HFO Deputy Manager.

- Appoints the DOE-HFO AvM and ASO.
- Approves the DOE-HFO ASMSP program and subsequent revisions; submits the DOE-HFO ASMSP program to the DOE OAM Director for co-approval.
- Identifies contracts to which CRD O 440.2C Admin Chg. 1 applies; notifies the DOE-HFO Contracting Officer(s) that the CRD O 440.2C Admin Chg. 1 must be incorporated into these contracts.
- Approves or rejects all proposed medium or high-risk sUAS missions.
- Concurrently approves or rejects medium or high-risk manned aircraft missions in coordination with the OAM, DOE-HFO Deputy Manager, OR a qualified federal

designee qualified as an AvM or ASO, in accordance with the DOE Aviation Safety Program Specific Qualification Standard (PSQS).

2.1.3 DOE-RL Aviation Manager

The DOE-HFO AvM DOE-HFO is responsible for the management and safety of the DOE-HFO Aviation Program and should be competent in all aspects of the program. The AvM complies with all applicable laws, regulations, and policy requirements concerning aviation activities and performs the following:

- Implements DOE aviation management and safety policies and establishes standards for the DOE-HFO Aviation Program that will ensure safety, efficiency and effectiveness of government and contractor aviation programs in accordance with CRD O 440.2C Admin Chg. 1.
- Develops this DOE-HFO AMSP and reviews it annually to ensure it stays current.
- Provides revisions of DOE-HFO ASMSP Program to the DOE-HFO Contracting Officer to ensure revisions are made to ASMSP documents.
- Assesses the DOE-HFO ASMSP and personnel assigned aviation-related duties to ensure compliance with the CRD O 440.2C Admin Chg. 1 and ASMSP requirements.
- Develops and implements a DOE-HFO Aviation Integrated Safety Management System (A-ISMS), as per CRD O 440.2C Admin Chg. 1.
- Provides direction to DOE-HFO contractors performing aviation-related services through the DOE-HFO Contracting Officer's Representative, consistent with the DOE-HFO contract statement of work and the CRD O 440.2C Admin Chg. 1.
- Reviews DOE-RL contracts and subcontracts (at any level) that fund aviation missions to ensure that the CRD O 440.2C Admin Chg. 1 are incorporated.
- If qualified in accordance with the unmanned technical components of the PSQS, has authority to audit sUAS CAS operators to ensure the safety of sUAS operations; submits audit reports to the OAM for subsequent addition or removal of CAS operators from the DOE CAS AOL.
- Coordinates aviation missions with the DOE-HFOSPs and project managers.
- Ensures DOE-HFOSPs comply with the aviation directives, policies, and procedures.
- Appoints and chairs a Flight Readiness Review Board (FRRB) comprised of SMEs to review high-risk aviation missions and ensures FRRB deliverables are approved by the DOE-RL ASME.
- Collects and consolidates CAS operator costs and flight hour utilization information and ensures reporting to the Federal Aviation Interactive Reporting System (FAIRS); provides other required reports and information to the OAM regarding aviation activities at DOE-HFO.

- Coordinates reviews and approvals with the OAM and DOE Office of General Counsel for senior federal travelers, including DOE-HFO contractor equivalents and all other nonfederal official travel on Government aircraft.
- Disseminate, as appropriate, a disclosure statement to all crew members and qualified non-crew members and some federal and non-federal travelers who fly aboard Government aircraft, in accordance with 41 CFR 102-33.165 (e).
- Meets and maintains the DOE aviation safety PSQS for DOE AvM certification and completes no less than 80 hours of aviation management and safety training every 5 years.
- Serves as backup to the DOE-HFO ASO, prepared to take full responsibility for all functions if requested to do so by DOE-HFO management.

2.1.4 DOE-HFO Aviation Safety Officer

- The DOE-HFO ASO reviews ASPs for proposed manned and unmanned aviation missions and verifies that appropriate risk levels are assigned to those missions; approves or rejects proposed low-risk UAS missions. In coordination with the DOE-HFOSP Safety Officer, submits all proposed medium and high-risk aviation missions to the DOE-HFO Assistant Manager Safety and Environment to approve or reject.
- Ensures that all aviation accidents and incidents on Hanford, along with the associated corrective action and follow-up actions, are reported in accordance with the following:
- CRD O 225.1B (Supp. Rev. 0), Accident Investigations
- 49 CFR 830, “Notification and Reporting of Aircraft Accidents or Incidents and Overdue Aircraft, and Preservation of Aircraft Wreckage, Mail, Cargo, and Records”
- FAA 107.9 “Safety Event Reporting”
- CRD O 231.1B Admin Chg. 1, Environmental, Safety, and Health Reporting
- Immediately notifies the DOE-HFO AMSE of an aviation accident or incident; notifies immediate DOE-HFO supervisor consistent with this program Federal Incident Reporting; documents occurrence in written form and reports occurrence to the OAM DOE-HFO Deputy Manager and DOE-HFO AvM with supporting documentation.
- Performs the appropriate level of field oversight of the DOE-HFOSP and DOE-HFO ASP and manages CAS operators to ensure the safety of flight operations, as required by CRD O 440.2C Admin Chg. 1.
- Gathers, trends, and analyzes aviation safety performance data to ensure the safety of the program.

- Identifies and reports safety concerns and events to the DOE-HFO AvM when intervention is required and works to eliminate potential hazards.
- Participates in the Aviation Safety Awards Program to ensure that personnel are recognized for their contributions.
- Reviews this DOE-HFO ASMSP annually to ensure it remains current.
- Meets and maintains the DOE aviation safety PSQS for DOE ASO certification and completes no less than 80 hours of aviation safety training every five years.
- Serves as backup to the DOE-HFO AvM and is prepared to take responsibility for all functions, if requested by DOE management.
- Reports aviation accidents and incidents to the DOE-Headquarters Emergency Operations Center.
- Reviews and concurs on the adequacy of the ASPs submitted for medium and high-risk aviation (manned and unmanned) missions.
- Serves as the Emergency Operations System Lead for the DOE-HFO ASMSP.

2.1.5 DOE-HFO Point of Contact for UAS Special Security Instructions Airspace

The DOE point of contact (POC) is the individual who manages access to the UAS Special Security Instructions (SSI) airspace over the 200 East Area of the Hanford Site. The POC's contact information is associated with the published Notice to Airmen (NOTAM) for the Hanford SSI airspace. All HMIS and DOE UAS flights from the surface to 400 feet above ground level are prohibited without the coordination and approval through the DOE POC.

The FAA/DOE Joint Standard Operating Procedure (J-SOP) is established to support their cooperation on implementation of UAS-specific temporary flight restrictions (TFR) for SSI airspace, as defined by FDC 7/7282 and implemented pursuant to 14 CFR 99.7, "Special Security Instructions," for national security-sensitive locations, now and in the future at the Hanford Site.

The DOE-RL POC responsibilities are listed at Appendix A-6 of the J-SOP for UAS-specific SSIs.

2.1.6 Flight Readiness Review Board

The purpose of the FRRB is to evaluate high-risk aviation missions. The FRRB Chairperson is the DOE-HFO AvM. The FRRB performs the following:

a. Includes no less than the Board Chairperson and two SMEs, one of whom must be the DOE-HFO ASO.

b. Provides technical recommendations to the DOE-HFO Deputy Director and the DOE-HFO Safety and Health Program Manager.

c. Submits a formal report on the FRRB's findings and recommendations to the DOE-HFO Deputy Director and OAM.

2.2 HMIS Key Personnel

2.2.1 HMIS Aviation Manager/Aviation Safety Officer

The HMIS AvM / ASO isresponsible for the management of the ASMSP and should be competent in all aspects of the program to include manned and unmanned aviation operations. The HMIS AvM /ASO:

- Implements the DOE Aviation Implementation Document (AID) and HMIS ASMSP in accordance with CRD O 440.2C Admin Chg. 1.
- Reviews the HMIS ASMSP annually.
- Ensures that HMIS aviation activities comply with DOE-HFO AID.
- Reviews aviation and sUAS missions, including ASPs at the HMIS level. Verifies that the appropriate risk level determination is completed for each mission.
- Submits aviation and sUAS missions to DOE-HFO for approval at the appropriate DOE level.
- Ensures all aviation incidences and accidents involving HMIS personnel and CAS Operators along with the associated corrective and follow-up actions are reported to the DOE-HFO ASO in accordance with
- FAA 107.9 sUAS safety event reporting criteria
- DOE National COA accident reporting criteria
- Performs the appropriate level of field oversight of CAS operators to ensure the safety of flight operations, as required by CRD O 440.2C Admin Chg. 1.
- Identifies and reports safety concerns and events to the DOE-HFO AvM when intervention is required and works to eliminate potential hazards.
- Holds a valid FAA sUAS operator certificate, as per 14 CFR 107
- Has demonstrated experience as an aviation safety professional.
- Knows federal, state, and local aviation-related laws, regulations, and directives; and keeps abreast of emerging aviation industry practices. This position requires the highest level of technical and applied knowledge in aviation integration across the spectrum of uses at the Hanford Site to maximize the full potential of increasing safety and efficiency of the many operational workflows.

2.2.2 Counter-UAS Coordinator

The Counter-UAS Coordinator (C-UAS COR) works as part of the Hanford Integrated Security Team. The C-UAS COR:

- Oversees the procedure for mitigating safety risk associated with controlled UAS operations while mitigating adversarial UAS in the protected airspace over the Hanford DOE facility.
- Works closely with the DOE and the FAA for the coordination of restrictions associated with the SSI airspace overlying the Hanford DOE facility.
- Keeps abreast of current and evolving C-UAS technologies and the emerging UAS threats to critical Infrastructure across the U.S.
- Shall coordinate with the DOE and FAA for approval to integrate C-UAS technology to identify or mitigate potential UAS threats to Hanford sensitive infrastructure. See HNF-65776, *Counter Unmanned Aerial System (CUAS) Security Plan for the Hanford Site*.

2.2.3 Cyber Security Manager

The Cyber Security Manager (CSM) is responsible for the information security of the Hanford DOE computer architecture, in addition to the information security of data collected within the facility. The CSM:

- Publishes restrictions and/or constraints associated with the handling/management of all media collected or handled within the confines of the Hanford DOE facility.
- Assesses sUAS and sUAS firmware vulnerabilities focused on the handling, protection, and security of sensitive data at the Hanford Site.

2.2.4 Emergency Manager

The Hanford Emergency Preparedness Manager and staff will ensure that procedures at all levels are coordinated to eliminate problems caused by poor communications resulting in uncoordinated responses to emergencies.

HMIS Aviation personnel and DOE Aviation personnel must coordinate with the Emergency Manager on all preparedness and response strategies.

2.3 Aviation Mission Reviewers

The following personnel may be part of the aviation mission review process and the ASP, which is integrated into the HFMS. Individual reviewers are selected based on the mission scope.

- Ecological compliance SMEs – Reviews biological sensitive areas and associated protocols. Indicates during the review within the HFMS if they have issue of the

noise level of the sUAS mission path and coordinates with the requestor to ensure that the distance of receptors to the sUAS do not have adverse impacts related to noise.

- Environmental compliance SMEs – Review environmental compliance.
- Emergency management SMEs – General situational awareness
- Cultural compliance SMEs – Reviews culturally sensitive areas and associated protocols. Indicates during the review within the HFMS if they have an interest to review captured data prior to release and coordinates with HMIS Information Security and the HMIS AvM/ASO for immediate post flight assessment.
- Electrical Utilities – Reviews flight path and operational areas to mitigate damage to infrastructure and identify potential hazards to the aircraft.
- Facility managers – Reviews facility restrictions associated with potential overflight or flight paths.
- Legal – Reviews legal requirements.
- Information Security – Reviews information security compliance.
- Land Management – Reviews land management and associated protocols.
- Nuclear Safety – Reviews for compliance with nuclear safety requirements.
- Physical Security – Reviews physical security requirements and associated protocols.
- Radiological controls – Reviews radiological requirements and associated protocols.
- Safety – Reviews ground/general safety and associated protocols.

2.4 Hanford Site Aviation Service Requestors

The Hanford Site aviation service requestors will:

- Utilize aviation support to support program needs and conduct aviation operations only when such use is appropriate.
- Coordinate the mission request through the HMIS AvM/ASO and the HFMS.
- Be responsible for identifying location-specific reviewers to be included on the mission in the HFMS.
- Ensure the appropriate environmental reviews and any evaluations (e.g., ecological, nuclear safety, site evaluation, NEPA, cultural) are completed during aviation mission-planning activities, as well as hazard mitigation, as part of the mission review and approval process.

NOTE: *For planned flights over or-adjacent to Hazard Category 2 or 3 nuclear facilities, requestors must obtain an Unreviewed Safety Question (USQ) or receive confirmation that a USQ is not required for the aviation activity.*

This process needs to be completed for each adjacent safety basis in accordance with the affected contractor procedure and 10 CFR 830.203.

3.0 SUAS PROGRAM PLAN

3.1 sUAS Safety Risk Management Approach

Risk management is a formalized way of dealing with hazards. It is a logical process of evaluating the potential costs of a risk against the potential benefits if that risk is allowed to stand uncontrolled. To better understand risk management, the terms “hazard” and “risk” need to be understood.

A hazard is a present condition, event, object, or circumstance that could lead to or contribute to an unplanned or undesired event, such as an accident. It is a source of danger. Examples of common aviation hazards include not completing a pre-flight of an aircraft, pilot fatigue, and the use of unapproved hardware on the aircraft.

Risk is the possibility, chance, or likelihood that something bad will happen.

If pilots do NOT recognize a hazard and choose to continue, then the involved risk is not managed.

The HMIS sUAS Safety Risk Management (SRM) approach will provide the company’s system of identification, analysis, and elimination or mitigation of hazards that threaten an sUAS mission and viability of the sUAS program. The sUAS SRM:

a. Examines aviation mission planning (as we respond to the questions of who, what, when, where, and why of the mission scope)
b. Reviews sUAS ASPs
c. Examines Implementation of hazard controls that enable the performance of work within the controls.
d. Provides feedback to maintain continuous improvement.

The sUAS SRM approach begins with overseeing the planning of an aviation mission, as documented in the HFMS. The HFMS is the framework of the HMIS sUAS ASP. The mission parameters and data are logged into the HFMS and reviewed at various intervals by all stakeholders, culminating with the necessary risk analysis and mitigations reducing risk to an acceptable level, followed by final mission approval and monitoring.

3.2 sUAS Safety Risk Management Assessment and Verification Procedure

3.2.1 Overview

The Hanford sUAS risk management and verification procedure involves the use of a quantitative Flight Risk Assessment Tool (FRAT) that is part of the risk assessment and verification process to identify the hazards or conditions that could negatively impact the mission, categorize, and measure risk. The analysis of the associated risk categories

(conditions or circumstances) is the most important part of the process, which is used to mitigate associated risk to an acceptable level or terminate the mission.

3.2.2 Requirements for sUAS Aviation Safety Plan Submission and Review

The sUAS ASP submission and review process uses the HFMS with the integrated FRAT. The HFMS serves as a one-stop-shop for integration of the hazard identification, mitigation, and review associated with the HMIS sUAS ASMSP.

The sUAS ASP consists of the pre-flight collection of data associated with a variety of mission parameters that are evaluated and approved as part of a web-based automated mission approval process focused on efficiencies and overall safety outcomes. Specific pre-flight, inflight, and post-flight data and conditions are identified and analyzed within the HFMS.

The collection and categorization of information associated with the sUAS mission, entered in the FRAT, is integrated into the HFMS to determine the level of risk associated with the mission based on current conditions and circumstances (i.e., hazard identification) resulting in a quantitative risk value. The associated risk value linked to the risk conditions or circumstances is analyzed and mitigated to assure mission risk is at an acceptable level prior to overall mission approval.

The data collected in the HFMS, along with the risk analysis, associated pre-flight, inflight, post-flight, and mission briefer checklist, makes up the overall sUAS ASP. The overall sUAS ASP is reviewed and approved at several decision points to ensure that all mission stakeholders have an opportunity to identify and analyze risks at all phases of the mission planning and execution process.

3.2.3 Hazard Identification Review

The HMIS AvM/ASO assess the mission-related hazards identified by all mission stakeholders and capture additional mission-related hazards identified. The HMIS AvM/ ASO will then verify the credibility of hazards identified as part of the sUAS ASP.

Examples of credible hazards identified in the sUAS ASP may include:

- sUAS equipment failure or malfunctions caused by lack of scheduled maintenance procedures
- Environmental conditions (e.g., weather, terrain, obstructions, time of day)
- Human factors (e.g., fatigue, illness, distractions, night vision limitations)
- Operator experience (e.g., total time, mission specific time, currency)
- Procedural compliance (e.g., use of checklist for all phases of the sUAS mission)

3.2.4 Assessment of Credible Hazards

The assessment of credible hazards evaluates the credibility of the hazards identified and examines the following:

- Determining the mission authorization/permitting (i.e., determining the 5 Ws of who, what, when, where, and why of the mission request)
- Timeline for planning (hasty or pre-planned will dictate the level of mission planning)
- Crew composition (i.e., qualifications and currency of the remote pilot in command (RPIC) and visual observer (VO), experience with mission type, number of VOs commensurate with the complexity of the mission)
- Operating environment (i.e., terrain, weather, visibility, cloud clearance, time of day, density altitude, man-made obstacles, airspace classification, hazard materials environment, tactical environment)
- Operational procedures (i.e., policies, procedures for normal, contingency, and emergency procedures, use of checklist for all phases of the mission)
- Air crew coordination (i.e., communications procedures and equipment, mission briefing checklist to verify roles, responsibilities, common terminology).

3.2.5 Risk Analysis

Risk analysis considers the severity of identified hazards and the likelihood that the hazard will manifest. The HMIS ASMSP uses a quantitative FRAT to assist in determining risk exposure, see Figure 1. Each sUAS mission type is evaluated based on the highest severity or likelihood that risk exposure will occur. The FRAT examines risk in methodical detail, resulting in a risk assessment value (RAV) that drives the mitigation or risk response control.

Flight Risk Assessment Tool

PC: Evans, Michael G	VO: Beckley, Kurt W	VO:	Flight Time: .7
PC:	VO:	VO:	Flight Time:
PC:	VO:	VO:	Flight Time:
			Total Flight Time: .7

	CATEGORY 1	CATEGORY 2	CATEGORY 3	CATEGORY 4	CATEGORY 5	CATEGORY 6	Actual Risk Value
	1 point	2 points	3 points	4 points	5 points	6 points	
Mission Type	Training	Mapping	Project Surveillance	Search & Rescue	Hazmat/EOD	Tactical	3
Cloud Height AGL	Clouds > 3000 ft		1000-3000 ft		< 1000 ft	< 600 ft	1
Forecasted Visibility	> 10 SM	5-10 SM	3 SM			< 3 SM	2
Winds (gusts included)	< 5 kts	5-9 kts	10-15 kts	15-20 kts	20-25 kts	> 25 kts	2
Crew Composition	RPIC + 2 VOs		RPIC + 1 VO			No VO	3
Average Flt Experience	> 500 hrs	250-499 hrs	100-249 hrs	50-99 hrs	25-49 hrs	0-24 hrs	1
Crew Rest	> 8 hrs rest	8 hrs rest	7 hrs rest	6 hrs rest	5 hrs rest	< 5 hrs rest	2
Crew Currency (last flight)	< 15 days	< 30 days	> 30 days	> 40 days	> 50 days	> 60 days	1
Airspace Category	Class G	Class E	Class E Surface	Class D	Class C	Class B	1
Lost Link briefed	YES					NO	1
Obstacles in Flt Path	NO	< 100 ft AGL	100-200 ft AGL	200-300 ft AGL	300-400 ft AGL	> 400 ft AGL	1
Day or Night	Day					Night	1
High Density Alt	NO				YES		5
Detailed Preflight	YES		Adequate		Hasty		1
Detailed Planning	YES		Adequate		Hasty		1
Daylight Survey	YES					NO	1
Overflight of Persons	NO	Overflight of People prohibited without waiver			Transition Flt	Hovering Flt	1
Anti-Collision Lighting	YES or Not Required	Mission cancellation required if anti-collision lights are inoperative when required				NO	1
Briefer Init: JPL						RISK VALUE	29
RAV: 29							
Date: 10/03/2023	Scores of 16-44 (Low Risk)		45-75 (Medium Risk)		76-105 (High Risk)		
Time: 1054							

Figure 1. HMIS sUAS Flight Risk Assessment Tool.

Eliminating all risks from sUAS operations is difficult. The only way to avoid all risks is to cancel the mission; however, that is not practical, and when the benefit of conducting a mission outweighs the risks, mitigating risk ensures the safest mission outcomes. The effective implementation of risk controls minimizes the occurrence and impact of the identified hazard. Risk controls are categorized as the following:

a. Systems design and technology to increase flight safety (e.g., obstacle avoidance, system redundancies, aircraft design)

b. Procedural controls (e.g., regulations, policies, and procedures, use of checklist).

c. Training.

Risk controls, or mitigation strategies, for sUAS operations are tailored to address sUAS unique hazards posed by limitations. Examples of unique sUAS risk controls include the employment of VOs to maintain FAA visual line of sight (VLOS) requirements, obstacle avoidance technology, standard operating procedures for normal, contingency, and emergency procedures, sUAS mission training and use of checklists.

3.2.6 HMIS Risk Assessment Value as a Basis of Approval or Rejection of Risk

The Hanford RAV and analysis methodology uses a standardized process to validate the overall mission risk associated with the sUAS ASP. This process enables the HMIS AvM/ASO to decide or recommend approval or rejection of the sUAS ASP. The overall mission risk level is determined from the RAV, analysis, and mitigation efforts focused on managing risk levels associated with sUAS missions.

The final mission approval authority for various risk levels will decide whether to restructure or cancel a proposed CAS operation based on the final mitigated RAV.

a. **Low-risk – Final mission approval authority–**In concurrence with the HMIS AvM/ASO, the DOE-HFO ASO is the final sUAS approval authority for low-risk missions.

b. **Medium-risk – Final mission approval authority**–In concurrence with the HMIS AvM/ASO and the DOE-HFO ASO, the DOE-HFO Deputy Director is the final mission approval authority.

c. **High-risk – final mission approval authority–**In concurrence with the HMIS AvM/ASO and the DOE-HFO ASO, the DOE-HFO Deputy Director is the final mission approval authority for high-risk sUAS missions and may choose to accept the risk associated with a high-risk mission. The DOE-HFO Deputy Director has the option to have the DOE-HFO AvM call the FRRB for high-risk mission mitigation to determine if additional controls can lower the risk to an acceptable level (if the DOE-HFO Director does not accept the higher risk level).

d. **CAS operator validation of risk assessment**–The HMIS AvM/ASO must ensure that the CAS operator conducts a validation of the risk assessment included in the

ASP before commencing flight operations. If conditions change, or if new or unforeseen hazards are discovered on the day of the aviation mission, the assigned risk level must be reassessed. If the reassessment elevates the risk level, HMIS should reschedule or delay operations until it is safe to conduct the mission within the approved parameters. If the risk level elevates beyond the approved risk level, the HMIS AvM/ASO must obtain the required DOE-HFO approval.

3.3 Aviation Accidents and Investigations

The HMIS sUAS CAS operator(s) shall immediately report all accidents or incidents to the HMIS AvM/ASO. The CAS operator (remote PICs) are responsible for reporting sUAS accidents that meet the FAA 14 CFR 107.9 safety event reporting criteria (within 10 days of the reportable accident). The CAS operators will also report accidents/incidents that meet the DOE National COA criteria for accident reporting to the HMIS AvM/ASO. The reporting chain is determined based on the FAA authority/rule under which the mission is being flown (FAA Part 107 or the DOE COA).

The HMIS AvM/ASO will report accidents meeting above criterion to the DOE-HFO ASO. The DOE-HFO AvM, in coordination with the OAM, will determine whether the CAS operator will continue to operate on Hanford during the accident investigation process. All sUAS operators shall become familiar with the DOE Blanket COA accident reporting requirements listed in Appendix A.

3.3.1 FAA Part 107 sUAS Accident Reporting Criteria

Accidents meeting the criteria set forth in 14 CFR 107.9 must be reported within ten calendar days of the operation of the sUAS involving:

- Serious injury to any person or any loss of consciousness.
- Damage to property, other than the sUAS, unless one of the following conditions is satisfied:
- The cost of repair (including materials and labor) does not exceed $500.
- The fair market value of the property does not exceed $500 in the event of total loss.
- The accident report must be submitted to the appropriate FAA Regional Operations Center or Flight Standards District Office electronically (www.faa.gov/uas) or by telephone.
- At a minimum, the agency and/or FAA report will contain the following information:
- sUAS remote pilot in command (RPIC) name and contact information
- sUAS RPIC FAA airman certificate number
- sUAS registration number issued to the aircraft

- Location of the incident
- Date of the incident
- Time of the incident
- Person(s) injured and extent of the injury, if any or known
- Description of what happened.

3.3.2 DOE Certificate of Authorization Accident Reporting Criteria

The proponent must provide initial notification to the FAA within 24 hours of an incident or accident that meets the criteria outlined in the DOE National Certificate of Waiver or Authorization (Appendix A). The HMIS AvM/ASO will report the details to the DOE-HFO ASO, as per the criterion listed in the DOE national COA.

3.3.3 HMIS sUAS Accident Prevention Program

The HMIS sUAS Accident Prevention Program:

- Focuses on promoting safety within the sUAS community through education and the application of techniques and policies oriented to unmanned aircraft systems.
- Defines procedures and processes used by aviation safety personnel to protect personnel and property while safely integrating sUAS into the National Airspace System (NAS).
- Provides policies, roles, and responsibilities for the integration of safety and risk management into all phases of sUAS operations.

Additionally:

- The Hanford operational procedure (OP) lists the roles, responsibilities, processes, training, and policy that form the basis of the company's accident prevention program.
- The HMIS AvM/ASO is responsible for developing an accident prevention survey based on the functions, policies, procedures, reporting, training, hazard mitigation, and resource requirements outlined in the UAS-ISMS.
- The HMIS AvM/ASO shall administer the accident prevention survey annually to validate the effectiveness of the program.

3.3.4 Operational Hazard and Occurrence Report

The Operational Hazard and Occurrence Report (OHOR) includes:

- Occurrences that are unplanned safety related events, including accidents and incidents that could affect safety. A hazard is something that has the potential to

cause harm. The systematic identification and control of all major hazards is foundational to safety.

- A concept that provides a mechanism to report hazards and occurrences, real and perceived, to those responsible for sUAS operations.
- No specific format because the information provided is what is important, not the format, and it should be used without hesitation to report any anticipated, current, or experienced safety hazard or occurrence. Anonymous submission of the OHOR to any level in the chain of command is not preferred; however, anonymous submissions are allowed to give the matter proper attention, without fear of reprisal.
- A written memorandum, email, or in-person report fully explaining the problem to the HMIS AvM/ASO.
- The authority of HMIS AvM/ASO or his/her designee to investigate all hazards and/occurrences. The results and corrective actions are communicated to all crew members.
- The services of an independent SME in some cases to assure a thorough and complete investigation.
- Ability to report hazards that require immediate attention to the HMIS AvM/ASO immediately. The immediacy may require a verbal report.
- The obligation that all members are authorized to take action to correct a hazard if in that member's opinion delay will result in accident or injury. The HMIS AvM/ASO notification should be immediate.

3.4 sUAS Operational Procedures

3.4.1 Purpose

The purpose of HMIS sUAS-OPs is intended to provide personnel who are assigned responsibilities associated with the deployment and use of sUAS with instructions on when and how to use this technology and the information it provides as part of the HMIS workflow, and to reduce injuries while increasing efficiencies for the use of sUAS.

3.4.2 HMIS sUAS Operations

The HMIS sUAS program is focused on the safe, efficient, and lawful operation of sUASs on the Hanford Site. The HMIS sUAS Operations adopt a systematic and disciplined approach to safe and efficient sUAS operations through research, training, and standardization.

HMIS recognizes that technology, equipment, personnel, and environmental change can occur overtime; therefore, the sustainment of current operations, along with the

implementation of new approaches to operations while addressing procedural changes, is the scope of HMIS sUAS operations.

3.4.3 HMIS sUAS Operational Rule/Authority

HMIS sUAS missions conducted by CAS operators in support of DOE-HFO missions must be conducted in accordance with 14 CFR 107, as amplified by FAA Advisory Circular 107-2 (AC 107-2), *Small Unmanned Aircraft Systems (sUAS)*.

CAS operators are subject to civil enforcement for violations of the FAA regulations. Alternatively, CAS operators should fly under the DOE national COA when an sUAS mission cannot meet 14 CFR 107 requirements. HMIS and its CAS operators cannot fly any mission under public status (DOE national COA rules) unless approved by DOE in advance.

3.4.4 CAS sUAS Pilots and Visual Observer

3.4.4.1 CAS sUAS Remote Pilots

The CAS sUAS RPIC is responsible for the overall direction and performance of the sUAS crew and exercises command and control over the assigned and approved missions. sUAS RPIC responsibilities include:

- The safe and effective operation of the sUAS.
- Knowledgeable of all FAA regulations, COA requirements, sUAS manufacturer's flight manuals, bulletins, and HMIS sUAS and DOE policies pertaining to sUAS.
- Verifying qualifications and currency of sUAS crewmembers prior to conducting sUAS operations.
- Reviewing sUAS maintenance records prior to conducting flight operations.
- Maintaining current knowledge of relevant DOE and HMIS procedures, FAA regulations, and COA requirements and compliance.
- Evaluating airframes based on mission needs and schedule basic aircraft maintenance, as per the manufacturers or established maintenance program requirements.
- Exercising mission command over sUAS operations and adhering to FAA operational rules, COA compliance, DOE procedures, and the HMIS sUAS ASMSP.
- Documenting and logging flight activities, as per the HMIS sUAS ASMSP.

RPICs knowledge skills and abilities include:

- Possessing an FAA Remote Pilot Certificate with an sUAS rating.

Additionally:

- The HMIS AvM/ASO, for reasons including performance, proficiency, and physical condition, may temporarily remove a RPIC from flight status at any time. If required, the CAS subcontractor will receive notification verbally and in writing of the reason, further action to be taken, and expected duration of such removal.
- The CAS subcontractor maintain a training file for each RPIC. Annual reviews of crewmember training files and qualifications ensures quality assurance compliance for the HMIS ASMSP to remain effective.

3.4.4.2 CAS sUAS Visual Observer

CAS sUAS VOs:

a. Must receive enough training to communicate instructions.

b. Are required to keep sUAS clear of conflicting air traffic and obstacles.

c. Shall also receive training on rules and responsibilities described in FAA 14 CFR Part 107 and the DOE National COA.

d. Primary duty is to communicate instructions to operate the sUAS clear of conflicting traffic and obstacles. They can also assist with sensors and communications equipment when not directly involved in aircraft and obstacle separation.

e. The CAS subcontractor shall maintain a training file for each VO. They should also review crewmember training files and qualifications to ensure quality assurance compliance necessary for the Hanford ISMS & OP to remain effective.

3.5 sUAS Safety Plan

3.5.1 HMIS sUAS Service Request

The overall sUAS Safety Plan is initiated with a sUAS service request. This begins with an entry in the HFMS or communication with the HMIS AvM/ASO from the requestor of sUAS services. Once all the requestors data is entered into the HFMS the review and approval process begins.

3.5.2 HMIS sUAS Aviation Safety Plan Approval Process

The sUAS ASP consists of the pre-flight collection of data associated with a variety of mission parameters that are evaluated and approved as part of an automated mission approval process focused on efficiencies and an overall safety outcome. Specific pre-flight, inflight, and post-flight data and conditions are identified and analyzed in the HFMS.

The Hanford sUAS ASP approval process involves two levels of approval. The first level of review/approval involves several organizations (such as Cybersecurity, Security, C-UAS, or land and facility managers where an overflight may occur).

Second, the collection and categorization of information associated with the sUAS mission is entered in the FRAT and integrated into the HFMS to determine the level of risk associated with the mission, resulting in a quantitative risk value. The associated risk value linked to the risk conditions or circumstances is analyzed and mitigated to assure mission risk is at an acceptable level prior to overall mission approval at the appropriate level of associated risk.

3.5.3 Emergency sUAS Approval Process

In the event of a critical incident involving the loss of life and limb or critical infrastructure, the personnel requesting an emergency response may require an expedited mission approval process. The HMIS AvM/ASO (if the DOE-HFO ASO or Deputy Director is not available) may assume the role as the final mission approval authority for low- or medium-risk sUAS missions. That person is still responsible for the risk assessment, analysis, and the mitigation necessary to achieve a safe mission outcome. Time permitting, the final mission approver must complete the ASP documentation in the HFMS and notify the DOE-HFO ASO as soon as practical.

If an emergency airspace request outside of the normal parameters of a FAR 107 for civil operations, or the approved DOE COA for public operations is necessary to respond to a bonafide emergency operation (e.g., security, firefighting, search and rescue), complete the *Special Government Interest Waiver Approval Request* form, email it to the address listed, wait a few minutes, then follow up with a phone call to the number indicated.

This process is for an emergency sUAS airspace request only.

The link is listed below:

https://www.faa.gov/uas/advanced_operations/emergency_situations/media/UAS-SGI_waiver_approval_request_form.docx

3.5.4 Flight Approval/Notifications

The HMIS AvM/ASO ensures the approval process remains fluid over the course of the approval timeline. The DOE-HFO ASO is the final approval authority for low risk sUAS missions. The DOE-HFO Deputy Director is the final mission approval authority for medium- and high-risk missions. Within the HFMS, the overall mission package and approval steps, which makes up the sUAS ASP, will show as approved in the system. The mission requester and the HMIS AvM/ASO with access to the HFMS can observe the entire process from initial request through the final mission approval.

Prior to commencing flight operations, the CAS operator conducts a validation of the risk assessment. If conditions change, or if new or unforeseen hazards are discovered on the day of the aviation mission, the assigned risk level must be reassessed. If the

reassessment elevates the risk level, the mission should be rescheduled or delayed until appropriate action is taken. If the risk level elevates to medium or high, then the HMIS AvM/ASO must obtain the required DOE-HFO approvals.

Immediately before each flight, the sUAS team will contact the Patrol Operations Center via telephone and receive positive confirmation prior to operating the sUAS. The team will also notify any other organizations/entities identified during the review and approval process. After the sUAS flight/mission is completed, the sUAS team will again contact the Patrol Operations Center via telephone to provide notification.

3.6 Data Management

3.6.1 Documentation

Documentation includes:

a. All records, data, and or imagery (e.g., paper documents, electronic files, scanned images, digital photographs, and storage medium, such as hard drives and SD cards) must be managed throughout their life cycle, which encompasses the period from creation or receipt until the record is either destroyed or transferred to the custody of the DOE or the National Archives and Records Administration.

b. Under the HMIS contract, all records and data collected as part of the sUAS program must be appropriately identified, dated, maintained appropriately, and retained, as per HMIS-PRO-RM-10588, *Records Management Processes*. HMIS-PRO-RM-32281, *Electronic Records Management* lists additional requirements for electronic records management.

3.6.2 Cybersecurity

sUAS technology offers numerous benefits; however, they can also pose cybersecurity risks. Cybersecurity best practices promulgated by the DOE Cyber Security Practitioners enable critical infrastructure operators to protect their networks, information, and personnel and is adopted by the HMIS Aviation ASMSP to ensure the maximum mitigation against cybersecurity threats.

The HMIS subcontractor sUAS/hardware must not be made in an adversarial country. The term “adversarial country” includes the Democratic People's Republic of Korea, the Islamic Republic of Iran, the People's Republic of China, the Russian Federation, or, as determined by the Secretary of Commerce, any other foreign nation, foreign area, or foreign non-government entity engaging in long-term patterns or serious instances of conduct significantly adverse to the national or economic security of the United States

This requirement extends down to the component level when manufactured by Huawei,®[1] ZTE,®[2] or Lenovo.®[3]

The U.S. Department of Interior's Defense Innovation Unit (DIU), along with the industry, develops and certifies sUAS for U.S. Department of Defense (DOD) tactical use. These sUASs meet or exceed DOE encryption requirements, are fiscal year 2020, section 848,-*National Defense Authorization Act*--compliant and are maintained on the DIU cleared list (i.e., blue listed) (Blue UAS Cleared Drone List (diu.mil) . The DIU blue listed government-approved sUASs have been made available to other government agencies and can be acquired via the U.S. General Services Administration contract. Proposed use of sUAS outside of the BLUE UAS list will require individual cybersecurity review and approval prior to use.

Contractor software and hardware components, to include developers from sensitive countries, are not allowed to integrate with Hanford data. This includes storing data on poorly secured Software-as-a-Service (SaaS) cloud servers associated with the sensitive country list.

The HMIS Cybersecurity team ensures HLAN system firmware and software remains up to date to reduce vulnerabilities caused by emerging threats.

The following include CAS subcontractor and operator requirements for Cybersecurity and Physical Security:

- Identify the make and model of the sUAS
- Supply a picture of the sUAS, along with manufacturer specifications
- CAS operator shall provide Remote Pilot Information required by the HMIS sUAS Program which will be integrated into the HFMS
- CAS operator shall list the Remote Pilot citizenship status (must be U.S.)
- CAS operator shall list the Remote Pilot's Name
- CAS operator shall provide the Remote Pilot Certificate number
- Authorized CAS operators must be in possession of a DOE-HFO-approved *Prohibited/Controlled Article Pass*, as per HMIS-PRO-SEC-417, *Controlling Prohibited and Controlled Articles*, required to transport prohibited articles or the use of UAS on the Hanford Site.

3.6.3 Information Security

The planned release of sUAS photos taken of any facility is not permitted without review and approval within the HMIS sUAS ASP, which includes HMIS Information Security

[1] Huawei® is a registered trademark of Huawei Technologies Co., Guangdong, China.
[2] ZTE® is a registered trademark of ZTE Corporation, South Shenzhen, China.
[3] Lenova® is a registered trademark of Lenova, Inc., Hillside, Illinois

and Physical Security personnel review. The HFMS procedure facilitates the review and mitigation of all sUAS missions by the relevant stakeholders, such as:

- During the mission request stage of the HFMS, imaging types/requirements must be identified (e.g., stills, video, streaming, forward-looking infrared).
- Media type must be removable with no latent imaging with the UAS imaging equipment.
- Imaging captured during the overflight of identified areas of security concern and intended for public release must be processed in accordance with applicable information release procedures with Information Security specified as a reviewer prior to release. Public release examples include release to regulators, posting to external web sites or social media, release to news media.
- Captured data must be processed only by U.S. citizens.
- Surveillance of employees is prohibited.

3.6.4 Data Storage and Transfer

Ensuring the security and privacy of sUAS data, while at rest or in transit, is essential to managing UAS cybersecurity risks. HMIS Cybersecurity and Information Security identifies the following process for sUAS data storage and transfer to be performed by HMIS personnel overseeing flight operations on the day of the flight:

- Storage of Hanford data on public cloud storage (e.g., iCloud,®[4] Google Drive,®[5] OneDrive,®[6]) is not permissible.
- Cellular transmission of Hanford data captured by sUASs is not permissible.
- Upon completion of the sUAS mission, the CAS remote pilot will provide the data on removable media.

NOTE: *The approved scanning and data transferring laptop needs to be connected to the Hanford local area network (HLAN), at a minimum monthly, to receive updates.*

a. To prevent transmission of electronic/computer viruses, non-DOE-contractor-owned removable media (e.g., SD cards) must undergo a virus scan prior to downloading data to the HLAN. The HMIS UAS representative or RPIC/VO will complete the following:

   i. Utilize the approved Hanford laptop for virus scanning and data transferring.

   ii. Disable access to the internet or HLAN.

[4] iCloud® is a registered trademark of Apple Inc., Cupertino, California
[5] Good Drive® is a registered trademark of Google LLC, Mountain View California.
[6] OneDrive® is a registered trademark of Microsoft Corporation, Cincinnati, Ohio.

iii. Antivirus scan the provided media.

1. If the virus scan results are clean, then step b. may be conducted.
2. If a virus is detected, leave the memory card in the memory card reader; do not copy or open the photos or videos. Contact the Computer Help Desk at 509-376-1234, press 2, and ask to speak to Joe Oertel or designee. Once the virus issues are resolved, photos will be downloaded onto an HLAN computer.

b. Transfer photos and/or videos to approved Hanford laptop or Hanford removable media which can be further transferred on HLAN.

c. Wipe via format contractor supplied media prior to the media leaving the site.

d. Wipe, via format (if not able to format, then delete the files), any internal storage of media associated with sUAS hardware prior to the device leaving the site.

e. Complete the post flight checklist and provide to the sUAS Program Office for storing the record.

f. Data owner submits the files for release processing in accordance with applicable information clearance procedures.

3.6.5 Secure (Live Streaming) Alternatives to Data Capture

The secure alternatives to capture data include:

- Capturing video for later analysis is extremely useful; however, the next level of efficiency and value comes from adapting real-time workflows to support real-time decision-making. The use of secure livestreaming options developed in the U.S. that meet DOD and other government cybersecurity standards have been limited. Recent advances in highly encrypted low latency livestreaming capabilities further mitigate the cybersecurity threat by ensuring secure real-time transmission of live video from sUASs, eliminating the need to physically transfer and store data while providing real-time situational awareness to incident command personnel with a need to know.
- The Hanford sUAS Program will work towards continuous improvement and innovation to capture the U.S.-led innovation in secure cloud based live streaming.
- Currently, livestreaming operations are not supported during HMIS sUAS operations.

3.7 sUAS Certification and Training

The key to continued safe operations is maintaining an adequate level of competency. The first step in this process is establishing minimum qualifications for CAS operators and select HMIS sUAS staff. The second step involves continuous and standardized training of those personnel.

a. The CAS subcontractor shall assign a chief pilot who is responsible for the training and certification of their remote pilots.

b. The CAS Chief Pilot responsibilities should focus on a training and standardization program that facilitates similar crewmember performance and crew coordination based on a set of tasks, conditions, and standards for each mission profile and sUAS model.

c. The CAS subcontractor's standardization and training program should facilitate annual crewmember evaluations (academic and flight) based on set standards.

d. The CAS subcontractor must ensure that they remain on the DOE AOL. A CAS operator on the AOL remains in good standing for a 24-month term following a successful audit. After the 24-month term, or after management and operational changes that negatively jeopardized the outcome of the original audit, a new audit is required by DOE.

e. The HMIS AvM/ASO will track initial and recurrent FAA training of CAS operators with demonstrations of proficiency.

3.7.1 Certification and Initial Training for sUAS Operators

In conjunction with fulfilling all certification and training requirements for remote pilot/VO duties, all sUAS crewmembers must become familiar with sUAS flight mission profiles, each aircraft type, and its associated systems and emergency procedures. Certification and initial training requirements include:

a. Personnel operating sUAS must pass the FAA remote pilot knowledge test and acquire an FAA Remote Pilot Certificate.

b. VOs must have completed training to communicate to the pilot instructions required to remain clear of conflicting traffic.

c. This training, at a minimum, shall include knowledge of the rules and responsibilities described in 14 CFR Part 107.73, "Knowledge and training," (a).

3.7.2 Recurrent Training

The FAA Part 107 remote pilot must take the recurrency exam every 24 months to maintain remote pilot privileges. Other recurrency training/proficiency requirements include:

- sUAS crew members maintaining proficiency in their RPIC/VO duties.

- Recurrent training is not limited to actual operating/VO skills but includes all knowledge pertinent sUAS operations.

3.7.3 Night Operations Training

Prior to conducting night operations, the RPICs must demonstrate understanding of FAA Part 107.29, "Operation at night," requirements. The RPIC shall demonstrate knowledge on the following topics associated with conducting sUAS operations at night:

- Pre-flight considerations and checklist requirements
- Night operational considerations
- Aircraft lighting required for night flight
- Flight planning for night operations
- The physiology of vision
- Visual illusions associated with night flight

3.7.4 Safety Training

The sUAS crew members shall receive safety training in the following topics, as outlined in this plan, prior to operating sUAS at the Hanford Site:

- HMIS commitment to safety
- Hanford sUAS- Integrated Safety Management System
- Hanford sUAS safety risk management.

3.7.5 Crew Resource Management

The RPICs manage the crew and resources of the sUAS. The RPIC shall maintain situational awareness throughout all phases of mission planning and execution. The RPIC must assess the mission requirements, the equipment, performance capabilities, weather conditions, airspace, laws, and ordinances. The RPIC effectively uses all available resources, human, hardware, and information throughout all phases of the operation to achieve mission success by:

- Delegating operational tasks and manage crew members
- Recognize and address hazardous attitudes
- Establish effective team communications
- Be open to the questions and concerns of all crew members

3.7.6 Communications

Maintaining situational awareness during sUAS operations requires vigilance and proper crew coordination procedures, which are the products of good communications. The FAA requires that the RPIC and other crew members coordinate to scan the airspace in the operational area for collision hazards while maintaining situational awareness of the position of the sUAS through direct visual observation. To achieve this goal, the RPIC should:

- Foster an environment where open communication is encouraged and expected among the entire crew to maximize team performance
- Establish effective communication procedures prior to flight
- Select an appropriate method of communication (full duplex communications radios or systems) that will allow uninterrupted communications
- Keep crew members informed as to mission changes and adjustments to ensure a safe mission outcome.

The most important components of communications during aviation operations are the crewmembers' understanding each other and the timely transfer of information. Timely and effective communication is speaking a common language while using brevity. Aircrews should develop and use standard phraseology during sUAS operations to avoid misunderstandings, while enhancing safety.

3.7.7 Human Factors

RPICs and VOs shall deploy the sUAS when rested and emotionally prepared to safely perform the mission.

a. Physical illness, mental and physical fatigue, or exhaustion can seriously impair judgment, memory, and alertness. The safest rule is not to act as an RPIC or VO when experiencing the above challenges. Members should excuse themselves from sUAS duties when experiencing symptoms of fatigue and or exhaustion.

b. Prescription and over-the-counter medications can seriously hamper performance. The sUAS crewmembers are required to follow the FAA Part 107 rules and agency policy concerning the use of medications while performing sUAS crewmember duties.

c. According to the FAA Part 107 rules, crewmembers shall not act as an RPIC or VO within 8 hours after consumption of alcoholic beverages, while under the influence of alcohol, or while having an alcohol concentration of 0.04 or higher.

3.8 Operating Considerations

3.8.1 Search and Rescue Operations/Incident Awareness

Begin with the following considerations:

a. Planning phase (see mission planning checklist in Appendix B):

   i. Identify the search area – During an incident awareness situation, identification of the incident boundary and the necessary coordination is of primary importance.

   ii. When locating a person, consider their last-known location/direction, favorite places, or reason for being in the area.

   iii. Identify the subject's clothing, disposition, environmental hazards.

   iv. Determine the search pattern that is best suited for the environment (i.e., expanding square, sector search, parallel sweep (track) search, track line search, creeping line search, or contour search)

b. Capturing images of the search area using the following flight patterns/techniques:

   i. Free fly

   ii. Way point mission

   iii. Grid mission

c. Analysis phase

   i. Deliberately examine each photo captured during the flight. Inflight analysis can be conducted if the mission is conducted at slow speeds using multiple personnel viewing live streaming video.

d. Response phase

   i. If the search is in response to a missing person, the response phase is initiated once the victim is spotted and verified.

e. Capture phase

   i. Capture the coordinates (latitude and longitude) when a point of interest or if a victim is identified and transmit the coordinates to incident command and/or ground crews.

   ii. Stay on location, if possible, to direct crews and/or consider a mission hand off.

3.8.2 Crime Scene/Accident Scene Mapping

After the crime scene is secure and safe, the area must be cordoned off to prevent unauthorized entry while ensuring non-participants are safe to conduct the scene review, orientation and check for obstacles and other hazards.

a. The installation of ground control points (GCP) (total station or electronic GCPs) will take 30 to 45 minutes; therefore, timely GCP emplacement is critical to saving time.

b. 3D software, capture setup, and programming (i.e., altitude selection, grid versus double grid versus circular patterns) aircraft selection and camera settings are crucial to capture quality images with the proper amount of overlap and exposure values to achieve the perfect 3D image.

c. Deploying VOs is important to mitigate area hazards in the air and on the ground.

d. Quick check mission photos for proper exposure/quality before leaving the area.

3.8.3 Payload Operations

Aircraft selection for payload operations must be done carefully. The selected aircraft must have an approved payload delivery system that can handle the load limit for the selected aircraft. The RPIC must ensure the sUAS is operated within the manufacturer's weight and balance limitations.

a. If the manufacturer does not specify the aircraft weight limit, the RPIC must determine and document (by conducting test flights) the weight limitation of the aircraft that allows safe operations.

b. All crewmembers shall qualify on the aircraft and payload system prior to conducting payload operations.

c. The most important consideration during payload operations is to maintain proper weight and balance. Center the sUAS over the load before decreasing the slack on the sling to ensure that the payload is balanced and within the manufacturers or tested weight limitation. Caution: Always avoid side loading.

d. The following small items have been delivered by mid-sized sUASs successfully:

   i. Communications devices (e.g., portable radios)

   ii. Personal flotation device

   iii. First-aid kit

   iv. Lead line spreading and rope lifting

   v. Small meal and water delivery

   vi. Small tools.

3.8.4 "Operations Over Human Beings" (FAA Part 107.39)

Operations over human beings (FAA Part 107.39) are prohibited unless:

a. HMIS receives emergency authorization from the FAA or the conduct of such operations is authorized by the FAA as part of a COA under emergency use.

b. HMIS has an approved FAA Part 107.39 waiver.

c. Flight over crew members or personnel who are part of the UAS mission is authorized. All crew members should be briefed prior to mission execution.

d. Missions requiring flight over human beings shall only be flown by crew members trained and qualified to perform under the conditions of the waiver or emergency COA.

3.8.5 Contingency Operations Planning and Mitigation

Contingency operations begin with appropriate planning and coordination. Use of the Mission Planning/Briefing Checklist is integral to ensure the important items are covered to minimize risk to operational success. The essential items of mission planning consist of:

- Weather review and analysis
- Checking and filing of NOTAM/UAS operating area (UOA)
- Conducting mission area reconnaissance (e.g., Google Earth, visual flight rules sectional or actual reconnaissance, time permitting)
- Considering and identifying alternate/emergency landing areas during the planning process
- Conducting a detailed risk assessment designed to examine human, environmental and other factors to aid in risk analysis focused on decision making
- Examining the appropriate authorizations (DOE, HMIS, and FAA) prior to mission acceptance
- Conducting a mission briefing to all crewmembers and participants using checklists as appropriate
- Conducting a pre-flight of the sUAS and special mission equipment for safety, time management, and overall mission success.
- Planning for emergencies to mitigate risks associated with operating an sUAS in the NAS. Standardized and predictable procedures for managing contingency operations, especially those that are specifically related to sUASs and their unique communications architecture (i.e., loss of the command-and-control communications link[s]) require the annotation and the practice of immediate-

action drills to mitigate risk in the National Airspace System to humans and/or infrastructure on the ground

3.8.6 Contingency Operations/Emergency Procedures

The RPICs should always check with the sUAS manufacturer when considering responses to various emergencies. Different manufacturers and models may require specific and in-sequenced procedures to remedy emergencies. The procedures provided are common practice, general in nature, and are provided in the absence of manufacturer recommendations. The RPICs should become familiar with the sUAS equipment prior to conducting mission scenarios.

a. **Loss of orientation** can occur when the RPIC or VO loses sight of the sUAS and is unable to visualize altitude, attitude, or direction. If crew members find themselves in this situation, initiate the following actions:
    i. Release the controls to hover, if capable
    ii. Reference the telemetry data
    iii. Adjust altitude and direction to avoid potential obstacles
    iv. Orient the sUAS towards the established home point
    v. Return to the home point at a safe speed
    vi. Continue the mission (if desired) once VLOS is reestablished.

b. **Loss of Global Positioning System (GPS) signal** - Most sUASs can operate without significant degradation of control if GPS signals are not available or are lost in flight. Loss of the GPS does not constitute an emergency since a lack of GPS may only affect the stability of the sUAS, and flight can be maintained by manually controlling the sUAS. Manual control involves:
    i. Switching the aircraft to attitude mode (Atti mode), if capable
    ii. Returning to the home point
    iii. Landing as soon as practicable

c. **Loss of video feed** may be caused by the disruption of the 5.8 MHz frequency due to an out-of-range condition, line-of-sight (LOS) issues, or a faulty control station cable connection. If this occurs:
    i. Check the control station cable connections
    ii. Ensure the appropriate LOS elevation (if able) to improve signal reception
    iii. Initiate a recovery (return to the home point using telemetry data) to reduce the distance between the sUAS and the control station
    iv. If signal does not improve, reboot the application

v. Perform flight termination procedures if further flight of the sUAS cannot be achieved

d. **Lost link or loss of command and control** (C2) signal can occur because of radio frequency interference or when the LOS is limited between the C2 station. A lost link is an abnormal situation, but not an emergency. A lost link is not considered a flyaway; therefore, RPICs should conduct a thorough pre-flight briefing with crewmembers to discuss lost link procedures. A lost link is an interruption or loss of control link between the control station and the unmanned aircraft, preventing control of the aircraft. As a result, the sUAS may perform pre-set lost link procedures. Lost link procedures ensure that the sUAS:

i. Remains airborne allowing time to re-establish communications

ii. Auto lands, if available, after a pre-determined length of time or terminates the flight when the power source is depleted.

sUAS control station programming should default to a recovery function (i.e., Return to Home (RTH), Hover, or Land, if these features are available) command and RPICs should ensure the proper feature is set for the mission scenario during pre-flight programming of the sUAS. If the sUAS experiences a C2 signal loss/loss-link condition:

iii. Ensure the aircraft initiates the programmed command function within the expected time frame.

iv. If the programmed command function has not been initiated in the appropriate time frame, manually initiate the RTH command function.

v. Perform flight termination procedures.

e. **sUAS flyaway** often begins as a lost link. An interruption or loss of control link prevents control of the aircraft. As a result, the unmanned aircraft is not operating in a predictable or planned manner. In rare instances, software or hardware malfunctions may induce a flyaway. Frequency interference can sometimes be caused by disturbances in the earth's magnetic field and is measured by the Kp Index, which is one of the most common causes of a flyaway and proper cautions should be taken.

i. RPICs should assess the risk of such interference prior to and during flight (i.e., check Kp Index).

ii. Extra caution is necessary when operating in the vicinity of other sUASs.

iii. The loss of GPS may degrade the sUAS capabilities slightly but should not cause a flyaway.

iv. In a flyaway, the pre-set lost link procedures are not established or are not being executed by the sUAS, creating an emergency.

v. If a flyaway occurs while operating in airspace that requires authorization, notify Air Traffic Control (ATC) as outlined in the authorization and:

1. Switch the sUAS to Atti mode, if capable
2. Communicate location, altitude, and direction of flight to the ATC, if required
3. Communicate battery time remaining
4. Continue attempts to regain control and land as soon as possible if control is regained
5. Attempt to locate the sUAS.

3.8.7 Minimum Crewmember Requirements

The minimum personnel required on all missions and training will be a RPIC and a VO. The overall complexity of each flight and the need to mitigate overall mission risks will determine the crew mix and size.

3.8.8 Personnel Responsibilities for Deployments

Open communication/crew resource management (achieves safe operations)

Remote Pilot in Command

a. Solely responsible for and is the final authority over the actual operation of the sUAS.

i. Have absolute authority to terminate a flight based on personnel safety or violation of FAA regulations.

ii. No one, regardless of status, shall order an operator to conduct a flight when, in the opinion of the RPIC, it poses a risk to personnel, property or is in violation of FAA regulations.

iii. Responsible for compliance with this plan, HMIS policies/procedures, and FAA regulations.

iv. Main duty during the deployment of the sUAS is to operate the sUAS safely while accomplishing the goals of the deployment.

v. Shall see and avoid obstacles or aircraft that will affect safety during the mission.

vi. Shall be responsive to the requests of the VO to accomplish the deployment.

vii. Shall be responsible for administrative mission requirements to include completion and close out of mission logs.

Visual Observer

a. Shall see and avoid obstacles that will affect safety during the mission.

i. Responsible for the operational aspect of the deployment.

ii. Shall operate attachments to the sUAS, allowing the RPIC to maintain complete focus on the flight parameters of the sUAS.

iii. Shall remain alert for suspicious persons or activities on the ground and coordinate response by other sUAS flight crewmembers.

iv. Shall assist the RPIC with the safe operation of the sUAS.

3.8.9 Personal Protective Equipment

a. RPICs and VOs should always deploy dressed in a professional matter. They shall wear high-visibility clothing or vests that identifies them as sUAS flight crewmembers.

i. RPICs and VOs shall wear safety helmets when conducting flight operations.

ii. RPICs and VOs shall always wear eye protection while conducting flight operations.

iii. RPICs and VOs will take into consideration the current weather conditions associated with the mission environment when planning to deploy and wear appropriate clothing to remain comfortable.

iv. RPICs/the person flying the sUAS should avoid distractions with the use of radios or devices such as cell phones not associated with sUAS operational requirements.

3.9 Pre-and Post-Flight Procedures

3.9.1 sUAS Mission Planning

RPICs and VOs shall familiarize themselves with all available information concerning the sUAS mission, including, but not limited to, the weather conditions, performance planning, hazards, risk assessments, description of the incident, deployment goals, and environmental impacts to cultural or ecological resources.

a. Using the FRAT, RPICs shall complete a risk assessment for each flight.

i. Although cultural/ecological resource SMEs shall check planned launch points and flight paths, RPICs shall also review available map data to ensure that launch points and flight paths do not disturb cultural or ecological resources identified by cultural/ ecological SMEs in the review process.

ii. RPICs will ensure that the take-off location and potential emergency landing areas are adequate for a safe deployment.

iii. The take-off/landing area should be clearly marked and identifiable with a high-visibility landing pad or short cones.

iv. Identify at least one emergency landing area before flight.

v. RPICs will maintain situational awareness if an emergency landing is necessary. This includes the ability to recover the sUAS.

3.9.2 Use of Checklists

The sUAS crewmembers shall utilize pre-flight, post-flight, and mission-briefing checklists to ensure the highest level of safety for each deployment.

3.9.3 Inspections

The RPIC is ultimately responsible for the thorough pre-flight inspection of the sUAS:

a. Before and after each deployment (whether a mission or training), the RPIC shall ensure a thorough inspection of the sUAS is accomplished in accordance with the instructions contained in the manufacturer's user manual.

i. The RPIC must ensure a thorough check of maintenance logs to ensure sUAS maintenance deficiencies are corrected prior to operations.

ii. The sUAS equipment or system deficiencies shall be documented and resolved immediately prior to the flight.

iii. The use of a checklist is a significant tool to avoid sUAS accidents. A pre-flight checklist shall accompany each sUAS and is mandatory for use during all phases of the operation.

iv. Systems and equipment deficiencies affecting mission accomplishment must be resolved prior to flight. If not resolved, document and report the deficiency. The deficiency shall be corrected prior to operation of the sUAS.

3.9.4 Weather

Before each deployment, the RPIC will ensure that they monitor and assess the current and forecasted weather throughout the mission area.

a. The RPIC shall utilize the FAA-approved weather resources to obtain the latest and most current weather conditions. RPICs can also check current conditions broadcasted at the nearest HMIS weather stations throughout the Hanford Site to aid in their mission planning.

i. Using an anemometer to better estimate the wind speed is the preferred method to determine if wind speed exceeds the sUAS's capabilities.

ii. RPICs shall record weather conditions reported for the operation.

iii. The RPIC shall observe FAA visibility and cloud clearance minimums associated with the mean sea level altitude and class of airspace within the mission area.

3.9.5 sUAS Maintenance

a. There are few parts on the sUAS that need servicing; however, it is necessary to follow the manufacturer's maintenance schedule and properly document maintenance checks completed, or maintenance performed.

i. If the manufacturer has not published a maintenance schedule, a schedule will be developed and followed for that system.

ii. Document all firmware updates in the maintenance log for that specific sUAS.

3.9.6 Lithium-Ion Battery Care and Handling

a. Before each flight, batteries should be inspected for obvious damage, bloating, deformation, and excessive heat.

i. Both lithium-metal and lithium-ion batteries are highly flammable and capable of ignition.

ii. Lithium battery fires can occur when a battery short circuits or is improperly charged, heated to extreme temperatures, damaged because of a crash, mishandled, or is simply defective.

iii. The RPIC should follow the manufacturer’s recommendations to ensure safe battery handling and usage.

3.10 Counter-UAS

3.10.1 Counter-UAS Operations

Recognizing and implementing security practices that meet federal, state, and local regulatory requirements is key to successfully managing potential security incidents associated with sUAS.

Federal law prohibits the operation of certain C-UAS technologies described in the attached September 2019 U.S. Department of Homeland Security *Counter-Unmanned Aircraft Systems: Technology Guide*. Only the Departments of Homeland Security, Justice, Defense, and Energy have affirmative authority to take C-UAS actions that would normally violate federal law.

3.10.2 Counter-UAS Authority

Through the fiscal year 2017 and 2018 enactments of the annual NDAA, Congress provided the DOD and DOE with authority to respond to UAS that pose a threat to designated facilities and assets. To ensure that C-UAS are operated safely in the NAS, Congress requires close FAA coordination with the DOD and DOE to define what actions constitute a credible threat, develop a concept of operations for employing C-UASs, analyze and mitigate the spectrum impact of selected systems, and draft notification procedures and reporting requirements.

3.10.3 Counter-UAS Security Planning

The Hanford C-UAS Security Plan addresses C-UAS operations at the Hanford Site.

Although no single solution will fully mitigate this risk, the Hanford Physical Security team continually researches C-UAS identification and mitigation technologies and works with the DOE and FAA to coordinate C-UAS procedures and mitigations that can address Hanford UAS-related security challenges by:

a. Researching and implementing legally approved C-UAS technology
    i. Continued coordination with the FAA to consider enhanced UAS restrictions in proximity to fixed sites within the Hanford airspace
    ii. Updating emergency/incident action plans to include UAS security response strategies
    iii. Training employees that if they see something, say something
    iv. Reporting potential threats to Hanford security personnel
    v. Ensuring that all employees are aware of the C-UAS response and exercise the plan.

3.10.4 Unmanned Aircraft Systems Remote Identification

The FAA's final rule on remote identification (ID) will require most UAS operating in the NAS to have remote ID capability. Remote ID will provide information about UAS inflight, such as identity, location, and altitude of the UAS and its control station or take-off location.

Remote ID helps the FAA, law enforcement, and other federal agencies find the control station when a drone appears to be flying in an unsafe manner or where it is not allowed to fly.

The final rule was published in the *Federal Register* on December 31, 2020. Upon implementation of this rule, most operators (all commercial and public safety operators) will have to fly UAS equipped with standard remote ID or a remote ID broadcast module. In addition, remote ID of the UAS is confirmed prior to the start of each mission.

Public safety agencies are required to comply with the remote ID rule. There are provisions (under development) that allow for sensitive area operations without remote ID when authorized by the Administrator.

The Office of the Director of Aviation Management will consolidate questions for the FAA regarding impacts to DOE UAS operations.

4.0 MANNED AVIATION PROGRAM PLAN

4.1 Aviation Safety Risk Management Approach

Risk management is a formalized way of dealing with hazards. It is a logical process of evaluating the potential costs of a risk against the potential benefits if that risk is allowed to stand uncontrolled. To better understand risk management, the terms “hazard” and “risk” need to be understood.

A hazard is a present condition, event, object, or circumstance that could lead to or contribute to an unplanned or undesired event, such as an accident. It is a source of danger. Examples of common aviation hazards include not completing a pre-flight of an aircraft, pilot fatigue, and the use of unapproved hardware on the aircraft.

Risk is the possibility, chance, or likelihood that something bad will happen.

If pilots do not recognize a hazard and choose to continue, then the involved risk is not managed.

4.2 Manned Aviation Services Safety Risk Management Assessment and Verification Procedure

The Hanford Aviation Risk Management and Verification Procedure involves the use of the quantitative FRAT that is part of the risk assessment and verification process used to identify the hazards or conditions that could negatively impact the mission, categorize, and measure risk. The analysis of the associated risk categories (conditions or circumstances) is the most important part of the process, which is used to mitigate associated risk to an acceptable level or terminate the mission.

4.2.1 Overview

The HMIS Aviation Operations Plan is intended to provide personnel who are assigned responsibilities associated with the planning, procurement, deployment, and use of manned aviation assets with instructions on when and how to use this technology and the information it provides as part of the HMIS workflow, and to reduce injuries while increasing efficiencies for the use of manned aviation assets.

4.2.2 Requirements for Aviation Service Request and Safety Plan Submission and Review

An aviation service request begins with the submittal of Site Forms A-6006-314 and A-6006-316 to the HMIS AvM/ASO. The HMIS AvM/ASO will work with the requesting party, if assistance is needed to complete forms. All submitted forms are then entered into the HFMS. The HFMS serves as a one-stop-shop for integration of the mission request, pre-flight collection of data associated with a variety of mission parameters, hazard identification, mitigation, mission review/approval, and the recording and archival process.

The Aviation Service Request and Safety Plan (ASR-SP) consists of the pre-flight collection of data associated with a variety of mission parameters that are reviewed as part of a web-based automated mission approval process focused on efficiencies and overall safety outcomes. Specific pre-flight, inflight, and post-flight data and conditions are identified and analyzed within the HFMS.

The collection and categorization of information associated with the CAS request, entered in the FRAT, is then integrated into the HFMS to determine the level of risk associated with the flight based on current conditions and circumstances (Hazard Identification) resulting in a quantitative risk value. The associated risk value linked to the risk conditions or circumstances is analyzed and mitigated to assure mission risk is at an acceptable level prior to overall mission approval.

The data collected in the HFMS along with the risk analysis, associated pre-flight, inflight, post-flight and mission briefer checklist makes up the overall ASR-SP. The overall ASR-SP is reviewed and approved at several decision points to ensure that all mission stakeholders have an opportunity to identify and analyze risks at all phases of the mission planning and execution process.

4.2.3 Hazard Identification Review

The HMIS AvM/ASO assess the mission-related hazards identified by all SME reviewers and capture additional mission-related hazards identified. The HMIS AvM/ASO will then verify (with reviewers and customer if necessary) the credibility of hazards identified on the ASR-SP.

Examples of credible hazards identified on the ASR-SP may include, but are not limited to the following:

- Flight activity, altitude, external loads, proximity to structures or personnel, hazardous materials.
- Environmental conditions (e.g., weather, terrain, obstructions, time of day)
- Operator experience (e.g., total time, mission specific time, currency)
- Contract compliance.

4.2.4 Assessment of Credible Hazards

The assessment of credible hazards evaluates the credibility of the hazards identified and examines the following:

- Determining the mission authorization/permitting (determining the 5 Ws of who, what, when, where, and why of the mission request)
- Timeline for planning (hasty or pre-planned will dictate the level of mission planning)
- Crew composition (non-crewmembers, DOE, or other Hanford contractors on board).
- Operating environment (i.e., terrain, weather, visibility, cloud clearance, time of day, density altitude, man-made obstacles, airspace classification, hazard materials environment, tactical environment)
- Operational procedures (i.e., policies, procedures for normal, contingency, and emergency procedures, use of checklist for all phases of the mission)
- Air crew coordination (i.e., communications procedures and equipment, mission briefing checklist to verify roles, responsibilities, common terminology).

4.2.5 Risk Analysis

Risk analysis considers the severity of identified hazards and likelihood that the hazard will manifest. The HMIS ASR-SP uses a quantitative checklist to assist in determining risk exposure. Each flight request is evaluated based on the selected high-risk parameters outlined on the ASR-SP. The FRAT examines risk in methodical detail, resulting in a RAV that drives the mitigation or risk response control.

Eliminating all risks from aviation operations is difficult. The only way to avoid all risks is to not fly; however, that is not practical, and when the benefit of conducting a mission outweighs the risks, mitigating risk ensures the safest mission outcomes. The effective implementation of risk controls minimizes the occurrence and impact of the identified hazard. Risk controls are categorized as the following:

a. Systems design and technology to increase flight safety (e.g., obstacle avoidance systems, system redundancies, aircraft design, and the use of situational awareness enhancing devices (e.g., glass panels, foreflight or similar products, Automatic Dependent Surveillance-Broadcast (ADS-B) in and out)

b. Procedural controls (e.g., regulations, policies, and procedures, use of checklist)

c. Training.

4.2.6 Emergency Aviation Request Approval Process

In the event of a critical incident involving the loss of life and limb or critical infrastructure, the personnel requesting an emergency response may require an expedited mission approval process. The DOE-HFO AvM/ASO, and HMIS AvM/ASO, in that order (if the DOE-HFO ASO or Deputy Director is not available), may assume the role as the final mission approval authority for low or medium risk manned aircraft missions. That person is still responsible for the risk assessment, analysis, and the mitigation necessary to achieve a safe mission outcome. Time permitting, the final mission approver must complete the ASP documentation in the HFMS and notify the DOE-HFO ASO as soon as practical.

4.3 Aviation Accidents and Investigations

It is expected that anyone on the Hanford Site observing an aircraft emergency would notify either 911 or 509-373-0911, the Patrol Operations Center (509) 373-3800, or the Occurrence Notification Center 509-373-2800. These organizations would in turn initiate additional emergency notifications. These notifications would include the DOE-HFO AvM/ASO, and the HMIS AvM/ASO. Appendix C provides a list of aircraft events that require notifications. Initially, the CAS operator has the responsibility to contact the National Transportation Safety Board (NTSB) and the (FAA), as required.

4.4 Aviation Operational Procedures

4.4.1 Purpose

The HMIS Aviation-Operational Procedure is intended to provide personnel who are assigned responsibilities associated with the request and use of aviation assets with instructions on when and how to use this service and the information it provides as part of the HMIS workflow, and project efficiencies.

4.4.2 HMIS Aviation Operations

The HMIS Manned Aviation Operations Program is focused on the safe, efficient, and lawful operation of aviation assets in support of the Hanford Site. The HMIS Aviation Operations Program adopts a systematic and disciplined approach to safe and efficient flight operations through planning, training, assessment, and standardization.

HMIS recognizes that technology, equipment, personnel, and environmental change can occur overtime; therefore, the sustainment of current operations along with the implementation of new approaches to operations while addressing procedural changes is the scope of HMIS Manned Aviation Operations Program.

4.4.3 HMIS Aviation Operational Rule/Authority

HMIS flights, conducted by CAS operators in support of DOE-HFO missions, must be conducted in accordance with 14 CFR Parts 91, 119, 121, 129, 133, or 135. Some operations may require operations be conducted in public aircraft operator status; reference FAA Advisory Circular 00-1.1B (AC 00-1.1B) for assistance with determinations. The CAS operators are subject to civil enforcement for violations of the Federal aviation regulations. HMIS and its CAS operators cannot fly any mission under public status (DOE national COA rules), unless approved by DOE in advance.

4.4.4 Pilot-in-Command Responsibilities

The PIC is responsible for the overall direction and performance of the crew (if applicable) and exercises command and control over the assigned and approved flights. PIC responsibilities include:

a. The PIC of an aircraft is directly accountable for and is the final authority for the operation of that aircraft.

b. In an in-flight emergency requiring immediate action, the PIC may deviate from any rule of this part to the extent required to solve that emergency.

c. Each PIC who deviates from a rule under paragraph (b.) of this section shall, upon the request of the FAA, send a written report of that deviation to the FAA.

4.5 Aviation Safety Plan

4.5.1 HMIS Aviation Service Request and Safety Plan

An aviation service request begins with the submission of HMIS Site Form A-6006-314and A-6006-316 or contact with the HMIS AvM/ASO by the requestor which will initiate the completion and entry of the forms and data into the HFMS. HMIS Flight Approval Process.

4.5.2 HMIS Flight Approval Process

The ASR-SP consists of the pre-flight collection of data associated with a variety of mission parameters that are evaluated and approved as part of an automated mission approval process focused on efficiencies and an overall safety outcome. Specific pre-flight, inflight, and post-flight data and conditions are identified and analyzed in the HFMS.

The Hanford flight approval process involves two levels of approval. The first level of review/approval involves several organizations (such as Environmental, Security, Legal, or land and facility managers where an overflight may occur).

Second, the collection and categorization of information associated with the flight is entered in the FRAT (on Site Form A-6006-314 and integrated into the HFMS) to

determine the level of risk associated with the mission, resulting in a quantitative risk value. The associated risk value linked to the risk conditions or circumstances is analyzed and mitigated to assure mission risk is at an acceptable level prior to overall mission approval at the appropriate level of associated risk.

4.5.3 Flight Approval/Notifications

The HMIA AvM/ASO ensures the approval process remains fluid over the course of the approval timeline. The DOE-HFO ASO is the final approval authority for low-risk flights. The DOE-HFO Deputy Director is the final mission approval authority for medium and high-risk flights. Within the HFMS, the overall mission package and approval steps, which makes up the ASR-SP, will show as approved in the system. The mission requester and the HMIS AvM/ASO with access to the HFMS can observe the entire process from initial request through the final mission approval.

Prior to commencing flight operations, the HMIS AvM/ASO and CAS operator conduct a validation of the risk assessment. If conditions change or if new or unforeseen hazards are discovered on the day of the flight, the assigned risk level must be reassessed. If the reassessment elevates the risk level, the flight should be rescheduled or delayed until appropriate action is taken. If the risk level elevates to medium or high, then the HMIS AvM/ASO must obtain the required DOE-RL approvals.

Prior to flying over the Hanford site, the PIC will contact the Patrol Operations Center via telephone/radio (123.05 MHz) and receive positive confirmation that they are authorized for flight and have all required flight information. The HMIS AvM/ASO will also notify other organizations/entities identified during the review and approval process. After the flight is completed, the PIC will again contact the Patrol Operations Center via telephone/radio (123.05 MHz) to provide notification.

4.6 Data Management

4.6.1 Documentation

- All records, data and or imagery (paper documents, electronic files, scanned images, digital photographs, and storage medium, such as hard drives and SD Cards) must be managed throughout their life cycle, which encompasses the period from creation or receipt until the record is either destroyed or transferred to the custody of the DOE or the National Archives and Records Administration.
- Under the HMIS contract, all records and data collected as part of aviation-related activities must be appropriately identified, dated, maintained appropriately, and retained, as per HMIS-PRO-RM-10588, *Records Management Processes*. HMIS-PRO-RM-32281, *Electronic Records Management* lists additional requirements for electronic records management.

4.6.2 Information Security

The release of imagery taken of any facility is not permitted without review and approval, which includes HMIS Information Security and Physical Security personnel. The HFMS procedure does not cover this review and this activity is handled through the Buyers Technical Representative (BTR) for the CAS contract.

- During the mission request stage with the BTR, all imaging areas/requirements must be identified (e.g., stills, video).
- Imaging captured during the overflight of identified areas of security concern and intended for public release must be processed in accordance with applicable information release procedures with HMIS Information Security specified as a reviewer prior to release. Public release examples include releases to regulators, posting to external web sites or social media, or the news media.
- Captured data must be processed only by U.S. citizens.
- Surveillance of employees is prohibited.

4.7 Certification and Training

The HMIS AvM/ASO will verify that the CAS pilots have proper certificates and medical clearances to participate in flights supporting work at the Hanford Site through data obtained on Site Form A-6006-316.

DOE, HMIS, and other Hanford contractor personnel flying aboard the CAS aircraft will attend a safety briefing conducted by the HMIS AvM/ASO prior to any flight. The safety briefing is an annual requirement for all personnel who will fly onboard CAS-procured aircraft.

4.8 Pre- and Post-Flight Procedures

4.8.1 Flight Planning

The PIC shall familiarize themselves with all available information concerning the flight, including, but not limited to, the weather conditions, performance planning, hazards, risk assessments, deployment goals, and environmental impacts to cultural or ecological resources. In addition, the PIC shall:

- Complete a risk assessment for each flight
- Review comments and conditions that were identified by the cultural/Ecological SMEs in the review process

4.8.2 Use of Checklists

The PICs shall utilize company- or aircraft-specific pre-flight, post-flight, and mission-briefing checklists to ensure the highest level of safety for each flight.

4.8.3 Inspections

The PIC is ultimately responsible for the thorough pre- and post-flight inspections of the aircraft. The PIC shall ensure:

- A thorough inspection of the aircraft is accomplished before and after each flight, in accordance with company and FAA requirements
- A thorough check of maintenance logs to ensure aircraft maintenance deficiencies are corrected prior to operations
- Aircraft equipment or system deficiencies are documented and resolved immediately prior to the flight.
- Systems and equipment deficiencies affecting mission accomplishment are resolved prior to flight. If not resolved, the PIC shall document and report the deficiency. The deficiency shall be corrected prior to operation of the aircraft in support of Hanford site work.

4.8.4 Weather

Before each flight, the PIC will ensure that they monitor and assess the current and forecasted weather throughout the flight area, which includes:

- Utilizing FAA-approved weather resources to obtain the latest and most current weather conditions. PICs can also check current conditions broadcasted at the nearest HMIS weather stations throughout the Hanford Site to aid in their mission planning.
- Recording weather conditions reported for the operation on Site Form A-6006-318.
- Observing FAA visibility and cloud clearance minimums associated with the mean sea level altitude and class of airspace within the mission area.

4.8.5 Maintenance

The CAS operators shall adhere to all maintenance protocols required under the specific FARs governing their operations.

5.0 REFERENCES

5.1 References

10 CFR 830.203, “Unreviewed Safety Question Process,” Title 10, *Code of Federal Regulations*, Part 830, as amended.

10 CFR 1021, “National Environmental Policy Act,” Title 10, *Code of Federal Regulations*, Part 1021, as amended.

14 CFR 91, "General Operating and Flight Rules," Title 14, *Code of Federal Regulations*, Part 91, as amended.

14 CFR 99.7, "Special Security Instructions," Title 14, *Code of Federal Regulations*, Part 99, as amended.

14 CFR 107, "Small Unmanned Aircraft System," Title 14, *Code of Federal Regulations*, Part 107, as amended.

40 CFR 1500-1508, "CEQ Regulations for Implementing the Procedural Provisions of NEPA," Title 40, *Code of Federal Regulations*, Part 1500-1508, as amended.

48 CFR 952.223-71, "Integration of environment, safety, and health into work planning and execution," Title 48, *Code of Federal Regulations*, Part 952, as amended.

48 CFR 970.5223-1, "Integration of environment, safety, and health into work planning and execution," Title 48, *Code of Federal Regulations*, Part 970, as amended.

48 CFR 923.7003, "Contract clauses," Title 48, *Code of Federal Regulations*, Part 923, as amended.

49 CFR 172.101, "Purpose and Use of Hazardous Materials Table," Title 49, *Code of Federal Regulations*, Part 172, as amended.

9 USC 5103, *General Regulatory Authority*, Title 49, U.S. Code, Chapter 5103, as amended.

CUAS-T-G-1, 2019, *Counter-Unmanned Aircraft Systems Technology Guide*, U.S. Department of Homeland Security, Washington, D.C.

CRD O 414.1E, 2024, *Quality Assurance*, U.S. Department of Energy, Washington, D.C.

CRD O 440.2C Admin Chg. 1, 2020, *Aviation Management and Safety*, U.S. Department of Energy, Washington, D.C.

DOE O 450.2, Chg. 1 (MinChg), 2011, *Integrated Safety Management*, U.S. Department of Energy, Washington, D.C

DOE P 450.4A Chg. 1 (MinChg), 2011, *Integrated Safety Management*, U.S. Department of Energy, Washington, D.C.

HMIS-PRO-RM-10588, 2023, *Records Management Processes*, Rev. 3-0, Hanford Mission Integration Solutions, LLC, Richland, Washington.

HMIS-PRO-RM-32281, 2021, *Electronic Records Management*, Rev. 1-0, Hanford Mission Integration Solutions, LLC, Richland, Washington.

HMIS-PRO-SEC-417, 2022, *Controlling Prohibited and Controlled Articles*, Rev. 0-2, Hanford Mission Integration Solutions, LLC, Richland, Washington.

HNF-65776, 2021, *Counter Unmanned Aerial System (CUAS) Security Plan for the Hanford Site*, Rev. 1, Hanford Mission Integration Solutions, LLC, Richland, Washington.

6.0 RECORDS IDENTIFICATION

All records are generated, processed, and maintained in accordance with HMIS PRO RM 10588, Records Management Processes, or HMIS PRO RM 32281, Electronic Records Management, as applicable.

Table 1. Records Capture Table

Name of Document	Submittal Responsibility	Retention Responsibility
Aviation Services Request and Safety Plan (Site Form A-6006-314)	Requestor	HMIS AvM/ASO
Contractor Aviation Audit Checklist for Charter Aircraft (Site Form A-6006-315)	DOE OAM, Contractor (sUAS Only) & HMIS AvM/ASO	HMIS AvM/ASO
Contractor Aviation Services (Site Form A-6006-316)	Contractor & HMIS AvM/ASO	HMIS AvM/ASO
Hanford Over Flight and Ground Hazards Briefing (Site Form A-6006-317)	Briefer (HMIS AvM/ASO)	HMIS AvM/ASO,
Aircraft Preflight Checklist and Safety Meeting Documentation (Site Form A-6006-318)	Contractor Pilot & Requestor	HMIS AvM/ASO
Aviation Customer/Sponsor Satisfaction Survey (Site Form A-6004-412)	Requestor	HMIS AvM/ASO & DOE-HFO ASO
Individual Flight Notifications/Approvals (email)	Requestor/HMIS AvM/ASO	HMIS AvM/ASO
FAIRS	HMIS AvM/ASO	DOE-HFO AvM / DOE-HFO ASO

Appendix A. Sample DOE Blanket Area UAS Class G Certificate of Authorization

DOE COAs are reviewed by OAM annually and are subject to change.

Always refer to the current approved COA

DOE National Certificate of Authorization

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DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

CERTIFICATE OF WAIVER OR AUTHORIZATION

ISSUED TO
Department of Energy (DOE) Part 91

ADDRESS
HQ, US DOE
1000 Independence Ave, SW
Washington, DC 20585

This certificate is issued for the operations specifically described hereinafter. No person shall conduct any operation pursuant to the authority of this certificate except in accordance with the standard and special provisions contained in this certificate, and such other requirements of the Federal Aviation Regulations not specifically waived by this certificate.

OPERATIONS AUTHORIZED
Operation of small Unmanned Aircraft Systems (UASs) weighing less than 55 pounds and operating a speeds of less than 87 kts in Class G airspace for the purpose of public aircraft operations.

LIST OF WAIVED REGULATIONS BY SECTION AND TITLE
N/A

STANDARD PROVISIONS

1. A copy of the application made for this certificate shall be attached and become a part hereof.
2. This certificate shall be presented for inspection upon the request of any authorized representative of the Federal Aviation Administration, or of any State or municipal official charged with the duty of enforcing local laws or regulations.
3. The holder of this certificate shall be responsible for the strict observance of the terms and provisions contained herein.
4. This certificate is nontransferable.

Note-This certificate constitutes a waiver of those Federal rules or regulations specifically referred to above. It does not constitute a waiver of any State law or local ordinance.

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Purpose: To prescribe UAS operating requirements in the National Airspace System (NAS) for the purpose of public aircraft operations. The holder of this COA will be referred herein as the "Proponent".

Public Aircraft:

1. A public aircraft operation is determined by statutes, 49 USC §40102(a)(41) and §40125.
2. All public aircraft flights conducted under a COA must comply with the terms of the statutes.
3. All flights must be conducted per the declarations submitted in the application, and as specified in the following Standard/Special Provisions.
4. This COA provides an alternate means of complying with 14 CFR §91.113(b) for unmanned aircraft operations.
5. All operations will be conducted in compliance with Title 14 CFR §91 and the conditions of the authorization issued herein. If the operator cannot adhere to any of these requirements a separate FAA Form 7711-2 Waiver application may be required.

STANDARD PROVISIONS

A. **General.**

1. The review of this activity is based upon current understanding of UAS operations and their impact in the NAS. This COA will not be considered a precedent for future operations. As changes occur to policy, procedures, and regulatory requirements, limitation and conditions for UAS operations will be adjusted.
2. All personnel connected with the UAS operation must read and comply with the contents of this authorization and itsprovisions.
3. A copy of the COA, including the special limitations, must be immediately available to all operational personnel at each operating location whenever UAS operations are conducted.
4. This authorization may be cancelled at any time by the Administrator, the person authorized to grant the authorization, or the representative designated to monitor a specific operation. As a general rule, this authorization may be cancelled when it is no longer required, there is an abuse of its provisions, or when unforeseen safety factors develop. Failure to comply with the authorization is cause for cancellation. The proponent will receive a written notice of cancellation.
5. During the time this COA is approved and active, a site safety evaluation/visit may be accomplished to ensure COA compliance, assess any adverse impact on ATC or airspace, and ensure this COA is not burdensome or ineffective. Deviations, accidents/incidents/mishaps, complaints, etc., will prompt a COA review or site visit to address the issue. Refusal to allow a site safety evaluation/visit may result in cancellation of the COA. **Note**: This section does not pertain to agencies that have other existing agreements in place with the FAA.
6. Radiofrequency spectrum authorization is independent of the COA process and requires the proponent to obtain equipment certification and frequency assignments (licenses) in the Aeronautical Radio navigation, Aeronautical Mobile (Route), or Aeronautical Mobile Services, as appropriate, from the National Telecommunications and Information Administration (NTIA) for all radiofrequency devices, including the control link, ATC radios, transponders, detect and avoid systems, and navigation systems, used to support this COA (47 CFR Part 300).

B. **Airworthiness Certification.**

The Unmanned Aircraft System will be maintained in a condition for safe operation while conducting operations in the NAS. The proponent has made their own determination that the unmanned aircraft is airworthy. The unmanned aircraft system must be operated in strict compliance with all provisions and conditions contained in the Airworthiness Safety Release, including all documents and provisions referenced in the COA application.

C. **Operations.**

1. The UA must be operated within visual line of sight (VLOS) of the Pilot in Command (PIC) and the person manipulating the flight controls at all times. This requires the PIC to be able to use human vision unaided by any device other than corrective lenses. Although the remote PIC and person manipulating the controls must maintain the capability to see the UA, using one or more visual observers (VO)'s allows the remote PIC and person manipulating the

controls to conduct other mission-critical duties (such as checking displays) while still ensuring situational awareness of the UA.

2. Must yield right of way to other aircraft, manned or unmanned.
3. First-person view camera cannot satisfy "see-and-avoid" requirement but can be used as long as requirement is satisfied in other ways.
4. Maximum altitude of 1200' above ground level (AGL). In all cases, the UAS must remain within Class G airspace.
5. Minimum visibility of 3 statute miles from control station.
6. No person may act as a remote pilot in command or VO for more than one unmanned aircraft at one time.
7. No operations from a moving vehicle or watercraft unless the operation is over a sparsely populated area and the PIC and VO are co-located.
8. Lost link must remain within visual line of sight of the PIC and VO.
9. The remote pilot in command must:
   a. Make available to the FAA, upon request, the small UAS for inspection, and any associated documents/records required to be kept under the rule.
   b. Conduct a preflight inspection, to include specific aircraft and control station systems checks, to ensure the small UAS is in a condition for safe operation.
10. The remote pilot in command may deviate from the requirements of this rule in response to an in-flight emergency.
11. Tethered operations must adhere to the Obstruction Marking and Lighting Requirements of AC No: 70/7460-1L. Standards for marking and lighting obstructions that have been deemed to be a hazard to navigable airspace.

D. **Notice to Airmen (NOTAM).**

1. A Distant (D) NOTAM must be issued prior to conducting UAS operations not more than 72 hours in advance, but not less than 24 hours for UAS operations prior to the operation for routine operations. This requirement may be accomplished:
   a. Through the proponent's local base operations or (D) NOTAM issuing authority, or
   b. By contacting the NOTAM Flight Service Station at 1-877-4-US-NTMS (1-877-487-6867). The issuing agency will require:
      (1) Name and contact information of the pilot filing the (D) NOTAM request
      (2) Location, altitude and operating area
      (3) Time and nature of the activity.
2. The area of operation defined in the (D) NOTAM must only be for the actual area to be flown for each day defined by a point and the minimum radius required to conduct the operation.
3. Operator must cancel (D) NOTAMs when UAS operations are completed or will not be conducted.
4. <u>For first responders only.</u> Due to the immediacy of some emergency management operations, the (D) NOTAM notification requirement may be issued as soon as practical before flight

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and if the issuance of a (D) NOTAM may endanger the safety of persons on the ground, it may be excluded. If the (D) NOTAM is not issued, the proponent must be prepared to provide justification to the FAA upon request.

E. **Reporting Requirements.**

1. Documentation of all operations associated with UAS activities is required regardless of the airspace in which the UAS operates. NOTE: Negative (zero flights) reports arerequired.
2. The Proponent must submit the following information on a monthly basis through CAPS:
   a. Name of Proponent, and aircraft registration number,
   b. UAS type and model,
   c. All operating locations, to include city name and latitude/longitude,
   d. Number of flights (per location, per aircraft),
   e. Total aircraft operation hours,
   f. Takeoff or landing damage, and
   g. Equipment malfunction. Required reports include, but are not limited to, failures or malfunctions to the:
      (1) Control station
      (2) Electrical system
      (3) Fuel system
      (4) Navigation system
      (5) On-board flight control system
      (6) Powerplant
   h. The number and duration of lost link events (control, performance and healthmonitoring, or communications) per UAS, perflight.
3. Incident/Accident/Mishap Reporting
   a. The proponent must provide initial notification to the FAA via email at mail at 9-AJV-115-UASOrganization@faa.gov and via the COA Application Processing System forms (Incident/Accident) within 24 hours of an incident or accident that meets the following criteria:
      (1) All accidents/mishaps involving UAS operations where any of the following occurs:
         (a) Fatal injury, where the operation of a UAS results in a death occurring within 30 days of the accident/mishap
         (b) Serious injury, where the operation of a UAS results in:
            - Hospitalization for more than 48 hours, commencing within 7 days from the date of the injury was received;
            - A fracture of any bone (except simple fractures of fingers, toes, ornose);
            - Severe hemorrhages, nerve, muscle, or tendon damage;
            - Involving any internal organ; or

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- Involves second- or third-degree burns, or any burns affecting more than 5 percent of the body surface.

(c) Total unmanned aircraft loss

(d) Substantial damage to the unmanned aircraft system where there is damage to the airframe, power plant, or onboard systems that must be repaired prior to further flight

(e) Damage to property, other than the unmanned aircraft.

(2) Any incident/mishap that results in an unsafe/abnormal operation including but not limited to

(a) A malfunction or failure of the unmanned aircraft's on-board flight control system (including navigation)

(b) A malfunction or failure of ground control station flight control hardware or software (other than loss of control link)

(c) A power plant failure or malfunction

(d) An in-flight fire

(e) An aircraft collision involving another aircraft.

(f) Any in-flight failure of the unmanned aircraft's electrical system requiring use of alternate or emergency power to complete the flight

(g) A deviation from any provision contained in the COA

(h) A deviation from an ATC clearance and/or Letter(s) of Agreement/Procedures

(i) A lost control link event resulting in

- Fly-away, or
- Execution of a pre-planned/unplanned lost link procedure.

b. Initial reports must contain the information identified in the COA On-Line Accident/Incident Report.

c. Follow-on reports describing the accident/incident/mishap(s) must be submitted by providing copies of proponent aviation accident/incident reports upon completion of safety investigations.

d. The above procedures are not a substitute for separate accident/incident reporting required by the National Transportation Safety Board under 49 CFR Part 830 §830.5.

e. For other than Department of Defense operations, this COA is issued with the provision that the FAA be permitted involvement in the proponent's incident/accident/mishap investigation as prescribed by FAA Order 8020.11, Aircraft Accident and Incident Notification, Investigation, and Reporting

F. **Registration.**

The proponent must comply with the aircraft registration and marking requirements set forth in 14 CFR Parts 47 and 45, or Part 48, prior to conducting flight operations authorized by this COA. Title 49 United States Code (49 USC) sections 44101 through 44104 contain the laws requiring aircraft registration in the United States.

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G. **Night small UAS Operations.**

Small UAS operations may be conducted at night, as defined in 14 CFR § 1.1, provided:

1. All operations under the approved COA must use one or more VO;
2. Prior to conducting operations that are the subject of the COA, the remote PIC and VO must be trained to recognize and overcome visual illusions caused by darkness, and understand physiological conditions which may degrade night vision. This training must be documented and must be presented for inspection upon request from the Administrator or an authorized representative;
3. The sUA must be equipped with lighted anti-collision lighting visible from a distance of no less than 3 statute miles. The intensity of the anti-collision lighting may be reduced if, because of operating conditions, it would be in the interest of safety to do so.

H. **Minimum Safe Altitude Operations.**

A waiver from the requirements of 14 CFR 91.119(b) and (c) is approved as follows:

1. The groundspeed of the small UAS must not exceed 100 mph/87knots.
2. Except for those operations where it is necessary to safeguard human life, no person may operate a small unmanned aircraft over a human being unless that human beingis:
   a. Directly participating in the operation of the small unmanned aircraft; or
   b. Located under a covered structure or inside a stationary vehicle that can provide reasonable protection from a falling small unmanned aircraft.

   Note: People "directly participating in the operation of the small unmanned aircraft" may include qualified non-crewmembers, as defined in 49 USC 40125.
3. For those operations where it is necessary to operate over a human being in order to safeguard human life, the remote pilot in command must not operate any lower or in proximity to human beings necessary to accomplish the operation.

I. **Special Use Airspace.**

1. Coordination and de-confliction between Military Training Routes (MTR) and Special Use Airspace (SUA) is the operator's responsibility. When identifying an operational area the operator must evaluate whether an MTR or SUA will be affected. In the event the UAS operational area overlaps an MTR or SUA, the operator will contact the scheduling agency as soon as practicable in advance to coordinate and de-conflict. Approval from the scheduling agency is required for regulatory SUA, but not for MTR's and non-regulatory SUA. If no response to coordination efforts, the operator must exercise extreme caution and remain vigilant of all MTRs and/ or non-regulatory SUAs.
2. Scheduling agencies for MTRs are listed in the Area Planning AP/1B Military Planning Routes North and South America. If unable to gain access to AP/1B contact the FAA at email address mailto:9-AJV-115-UASOrganization@faa.gov with the IR/VR routes affected and the FAA will provide the scheduling agency information. Scheduling agencies for SUAs are listed in the FAA JO 7400.8.

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AIR TRAFFIC CONTROL SPECIALPROVISIONS

A. **Flight Planning Requirements.**

Operations must only be conducted beyond the following distances from the airport reference point (ARP) of a public use airport, heliport, glider port, or water landing port listed in the Airport/Facility Directory, Alaska Supplement, or Pacific Chart Supplement of the U.S. Government Flight Information Publications:

1. 5 nautical miles (NM) from an airport having an operational control tower, or
2. 3 NM from an airport having a published instrument flight procedure, but not having an operational control tower, or
3. 2 NM from an airport not having a published instrument flight procedure or an operational control tower, or
4. 2 NM from a heliport.

B. **Emergency/Contingency Procedures.**

1. Lost Link Procedures:

   In the event of a lost link, the UAS pilot will comply with the following provisions:

   a. The UA lost link will be programmed to ensure that lost link flight does not fly over persons and the landing location is within the view of the PIC.

   b. Rally and home locations will be programmed to remain within the area defined in the NOTAM where flight operations are being conducted.

   c. Lost link procedures will not transit or orbit over populated areas, Victor airways, or busy roadways/interstate highways.

   d. Lost link procedures will be programmed to remain within the operations area and altitude, avoid unexpected turn-around and/or altitude changes, and will provide sufficient time to communicate with ATC if necessary.

2. Emergency/Fly-Away Procedures:

   a. In the event of an emergency, the PIC will immediately contact the ATC facility having jurisdiction for the airspace, state the nature of emergency and pilot intentions.

   b. In the event of a UA fly-away, advise ATC of thefollowing:

      (1) Direction of flight.

      (2) Last know altitude.

      (3) Maximum remaining flight time.

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AUTHORIZATION

This Certificate of Waiver or Authorization does not, in itself, waive any Title 14 Code of Federal Regulations not specifically stated, nor any state law or local ordinance. Should the proposed operation conflict with any state law or local ordinance, or require permission of local authorities or property owners, it is the responsibility of the proponent to resolve the matter. This COA does not authorize flight within Temporary Flight Restrictions, Special Flight Rule Areas, regulatory Special Use Airspace or the Washington DC Federal Restricted Zone (FRZ) without pre-approval. The proponent is hereby authorized to operate small Unmanned Aircraft System in the NAS within the areas defined in the Operations Authorized section of the cover page.

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Appendix B. Mission Planning Checklist

Why Focus on Mission Planning

- Establishes a logical mission flow is essential to achieve standardization and efficiency, which translates to safety.
- Establishes the appropriate mission flow clearly mitigates the possibility of making mistakes.
- Mission flow supports crew resource management by aiding communications among crew members.
- Establishes roles and assigning tasks with the intent of bringing the pieces together from the mission brief through mission execution.

Mission Essentials

- Who is requesting?
- Can I accomplish the mission legally? (policies and the law)
- Does it fall within my operational authority? (Public COA/ 14 CFR 107)
- What are they asking for?
- Are subcontractor crews trained for the mission type?
- Does the agency have the right equipment for the mission?
- When is the mission to be accomplished?
- Does the agency or pilot in command have the appropriate training and authorizations?
- Does the mission require additional preparations?

Mission Planning Checklist

<u>The 5 Ws</u>

- **Where is the mission located?**
  - Hazard mitigation considerations
  - Airspace considerations
  - Privacy concerns
- **What is the purpose and details of the requested mission?**
  - Details provide information to assist with planning
  - Details assist with identifying implied tasks
- **Timeline will dictate the level of planning**

  - Hasty or detailed
  - Backwards plan from mission start time
- **Prepare equipment (aircraft, batteries, special equipment)**
- **Consider crew composition and assigned tasks**
- **Weather planning considerations (based on timeline)**
  - Cloud clearance
  - Visibility
  - Winds
- **Airspace considerations**
  - Authorizations or waivers needed
  - Emergency authorizations (first responders)
  - Airspace mitigations (NOTAMS, UOA, or TFR)
- **Pre-mission hazard mitigations**
  - Mission Site Survey vs. Map survey (Google Earth, sectional/digital charts)
- **Detailed risk assessment**
  - Mission risk
  - Crew qualifications and currency
  - Environmental conditions/considerations
  - Human factors affecting performance
- **Crew mission brief**
  - Mission details
  - Risks and mitigations
  - Emergency procedures
  - Roles and responsibilities

Appendix C. Aviation Emergency Notification Chart

Description	ONC	DOE Managers	DOE-HFO AvM/DOE-HFO ASO	FAA	NTSB	BCSO/ Police
Aircraft accident	X	X	X	X	X	X
Aircraft overdue or believed involved in an accident	X	X	X	X	X	X
Fatality injury	X	X	X	X	X	X
Serious injury	X	X	X	X	X	X
Flight crewmember injury or illness on duty	N	X	X	X	X	N
Substantial damage	X	X	X	X	X	N
In-flight fire	X	X	X	X	X	N
Engine or flight control failure	N	N	X	X	X	N
Bomb threat or hijacking	X	X	X	X	X	X
Aircraft ground damage	N	X	X	X	N	N
Engine shutdown	N	N	X	O	N	N
Substantial system malfunction	N	N	X	N	N	N
Diversions	N	N	N	N	N	N
X – Notify immediately	O – Notify within 24 hours		N – Notification not required			

Important Phone numbers:

DOE-HFO ASO
Andy Wiborg
Office: 509-376-9238
Cell: 509-316-8696

Agencies
FAA: 614-237-1039
NTSB: 1-202-314-6000
Police: 911 or 509-735-6555
Emergency Operation Center: 509-376-3030