

SUBORBITAL AND SPECIAL ORBITAL PROJECTS DIRECTORATE

**Wallops Flight Facility
Uninhabited Aerial Vehicle (UAV)
User's Handbook**

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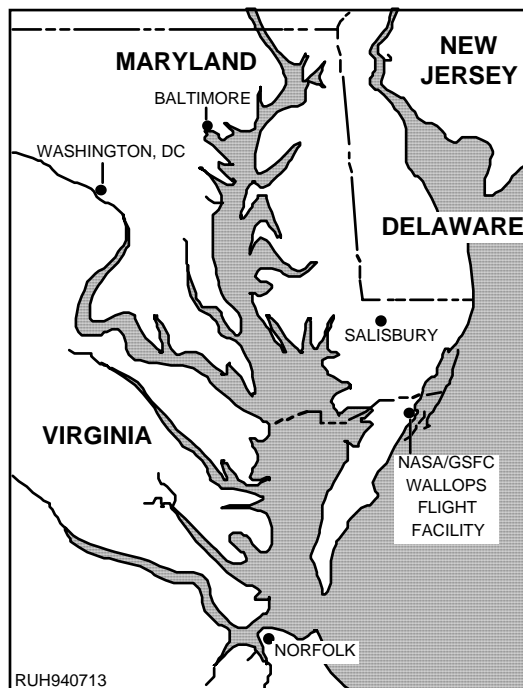
Goddard Space Flight Center
Wallops Flight Facility
Wallops Island, Virginia 23337

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Preface

The NASA/Goddard Space Flight Center (GSFC) operates the Wallops Flight Facility (WFF) located on the Eastern Shore of Virginia. NASA supports space and Earth science research and aerospace technology development through the use of rockets, balloons, aircraft, and uninhabited aerial vehicles (UAVs). In support of these activities, Wallops offers a variety of services and operates a number of unique research facilities, including a launch range, research airport, separate UAV runway on Wallops Island, scientific laboratories, and manufacturing and testing facilities. Because of unique scientific requirements, Wallops also maintains capabilities to conduct research activities worldwide. Wallops' customers represent NASA, other United States Government agencies, foreign and commercial organizations, and educational institutions. The *Wallops Flight Facility Uninhabited Aerial Vehicle (UAV) User's Handbook* provides descriptions of Wallops Research Range facilities and summarizes policies and procedures for facility use.



Additional copies of the *UAV User's Handbook* may be obtained from the Policy and Business Relations Office, NASA, GSFC/Wallops Flight Facility, Wallops Island, VA 23337-5099; or it may be downloaded from the WFF Web site at <http://www.wff.nasa.gov>.

Abbreviations and acronyms used in the *UAV User's Handbook* are listed in Appendix A. Detailed technical information regarding research range instrumentation and facilities is contained in documentation listed in Appendix B, References.

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Section I: Introduction

1.1 Introduction

The National Aeronautics and Space Act of 1958 (Space Act), as amended, charters NASA to plan, direct, and conduct space activities. The Space Act authorizes NASA field installations to establish policies and operational interface procedures for users of NASA resources. Activities under the Space Act are to be conducted to optimize America's scientific and engineering resources. NASA is authorized to enter into contracts, leases, cooperative agreements, and other transactions on such terms as it may deem appropriate with any person, firm, association, or corporation. NASA is also authorized to cooperate with public and private agencies in the use of Government-provided launch support, services, equipment, and facilities.

Ongoing programs and projects at Wallops Flight Facility support all NASA centers and science and technology focuses. In certain cases, WFF may provide a carrier and mission services through their ongoing contract with Aerosonde Corporation for NASA customers and for other science and technology customers on a reimbursable basis.

1.2 Purpose

The Aircraft Office at Wallops manages NASA's Low Altitude Airborne Science Project, which utilizes different aircraft assets, including UAVs, for science and surveillance projects. This handbook is a guide for planning UAV operations at the Wallops Research Range. It provides a summary of the policies, procedures, and capabilities of the range. Included are procedures for obtaining authorization for range use and for efficient project coordination between the range user and Wallops personnel. In addition, this handbook describes the facilities and systems available at WFF for supporting UAV research projects.

1.3 Geography

The Wallops Main Base is located on Virginia's Eastern Shore 5 miles west of Chincoteague, Virginia, approximately 90 miles north of Norfolk, Virginia, and 40 miles southeast of Salisbury, Maryland. The Facility consists of three separate parcels of real property: the Main Base, the Mainland, and the Wallops Island Launch Site. The Mainland and Island are approximately 7 miles southeast of the Main Base. Figure 1 shows WFF and the relationship of the three properties.

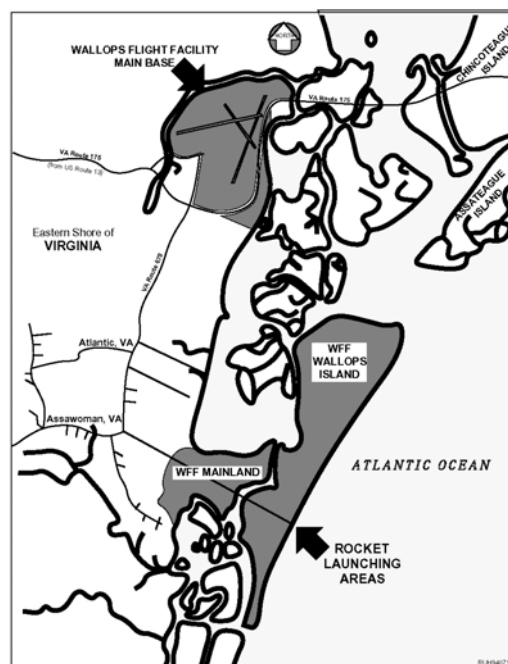


Figure 1. Wallops Flight Facility

1.4 Wallops Research Range

The Wallops Research Range is part of Wallops Flight Facility and is managed by GSFC Suborbital and Special Orbital Projects Directorate (SSOPD). The range consists of a launch range, an aeronautical research airport, a UAV runway on Wallops Island, and associated

tracking, data acquisition, and control instrumentation systems. The range includes authorized operating space, primarily over the Atlantic Ocean, and authorized frequency spectrum. Scientists and engineers from NASA, other United States Government agencies, colleges and universities, commercial organizations, and the worldwide scientific community have conducted experiments at the range.

1.5 Operational History

In 1945, NASA's predecessor agency, the National Advisory Committee for Aeronautics (NACA), established a launch site on Wallops Island under the direction of the Langley Research Center. This site was designated the Pilotless Aircraft Research Station and conducted high-speed aerodynamic research to supplement wind tunnel and laboratory investigations into the problems of flight.

In 1958, Congress established the National Aeronautics and Space Administration (NASA), which absorbed Langley Research Center and other NACA field centers and research facilities. At that time, the Pilotless Aircraft Research Station became a separate facility - Wallops Station - operating directly under NASA Headquarters in Washington, DC.

In 1959, NASA acquired the former Chincoteague Naval Air Station, and engineering and administrative activities were moved to this location. In 1974, the Wallops Station was renamed Wallops Flight Center. The name was changed to Wallops Flight Facility in 1981, when it became part of Goddard Space Flight Center, Greenbelt, Maryland.

Since 1945, the Wallops Research Range has launched thousands of research vehicles in the quest for information on the flight characteristics of airplanes, launch vehicles, and spacecraft, and to increase the knowledge of the Earth's upper atmosphere and the near space environment. The launch vehicles vary in size and power from the small Super Loki meteorological rockets to orbital class vehicles.

Wallops Flight Facility continues to be a small, fast response, matrix organization that can accomplish rocket and balloon projects, spacecraft orbital tracking, airborne science support, and aeronautical research.

1.6 Controlled and Special Use Airspace

The authorized airspace includes the following areas:

- The WFF Class "D" Airspace: Extends vertically to 2,500 feet in a 5-statute mile radius of the airport and has an arrival corridor.
- Restricted Area R-6604: Restricted airspace connecting WFF and offshore warning areas (Figure 2) is available 24 hours a day, 7 days a week (24/7) unconditionally to unlimited altitude.
- Airspace extending from Restricted Area R-6604 into the offshore warning areas: The extended area varies with the particular mission/project activity and is limited to that area for which specific use has been cleared with the responsible agencies, e.g., the Federal Aviation Administration (FAA) and USN Fleet Area Control and Surveillance Facility (FACSFAC). These areas are available 24/7 unconditionally to unlimited altitude.

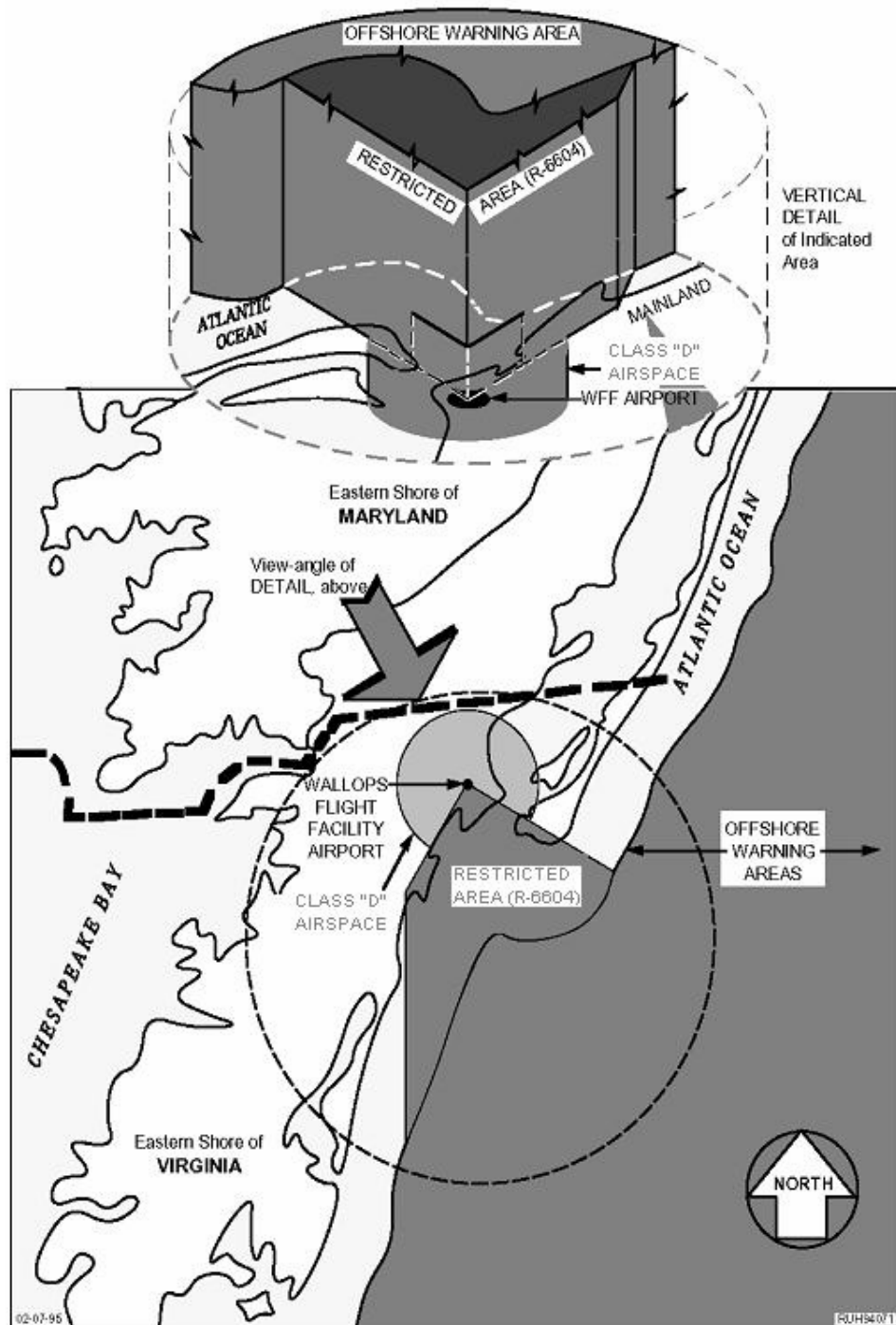


Figure 2. Wallops Range Controlled and Special Use Airspace

Check the Wallops Documentation Web site at <http://www.wff.nasa.gov> to verify this is the correct version prior to use.

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Section II: UAV Safety Criteria and Certification

2.1 Introduction

NASA has ultimate safety authority for all activities conducted at WFF. WFF, however, also strives to provide a customer-friendly safety program while carrying out its responsibilities. Safety Office personnel must review and approve all projects prior to their initiation. For flight projects this typically involves review of mission plans, vehicle and payload design, and operational procedures. WFF safety requirements are defined in RSM-2002, *Range Safety Manual for Goddard Space Flight Center/Wallops Flight Facility*, available from key WFF personnel or on the WFF Web site at <http://www.wff.nasa.gov/~code803/pages/RSM20022.pdf>. The Safety Office works with customers to define documentation requirements and to establish operational plans that assure that safety requirements are satisfied while minimizing the burden to the project. For projects previously conducted at other sites or otherwise subjected to safety review, WFF Safety Office personnel will take advantage of previous safety analyses, minimizing cost and impact to the project. It is a WFF practice to involve safety personnel early in a project's life in order to identify any potential problems that can be resolved without impacting schedule or cost.

2.2 Mission Management

Once the Wallops Senior Manager accepts a UAV project, all mission operations will be managed and conducted by the Range and Mission Management Office (RMMO) in concurrence with the Safety Office. If UAV operations are ongoing, the RMMO will establish a Standard Operating Procedure (SOP) to facilitate the process of flying the UAV.

2.3 Key Range Personnel

The following paragraphs define the functions, responsibilities, and authority of key range personnel.

2.3.1 WFF Test Director (TD)

The WFF Test Director has authority over all operations conducted on the Wallops Research Range. The Test Director is responsible for ensuring that all range policy, criteria, and external agreements are satisfied during the operations. The TD is the only person with authority to resume the countdown after a hold has been declared.

2.3.2 Project Manager (PM)

The Project Manager is the primary point of contact for the range user. The designated WFF Project Manager has the authority to plan, coordinate, and direct operational support for assigned projects conducted at the Wallops Research Range. The PM writes the Mission Operations Directive (MOD) or Operations and Safety Directive (OSD), either of which outlines the UAV flight scenario. The MOD or OSD is designed to accomplish project objectives while complying with established policy, criteria, and procedures. The PM is responsible for coordinating and directing project activities as necessary during countdown. The PM will apprise the TD and Range Safety Officer of project status details and likewise keep project personnel properly informed of range operational status. The PM also serves as Assistant Test Director.

2.3.3 Range Safety Officer (RSO)

The WFF RSO, or designee during operations, is responsible for assuring the Wallops Research Range safety policy, criteria, and procedures are not violated during operations and to ensure that risks are understood and are within acceptable limits. The RSO has authority to stop work, hold a launch, or terminate a mission in flight if necessary. The RSO will keep the TD and PM apprised of safety status, which could affect launch operations.

2.3.4 Flight Safety Officer (FSO)

The WFF Flight Safety Officer is responsible for assuring the WFF safety policy, criteria, and procedures are not violated during operations, and to assure that risks are understood and are within acceptable limits. The FSO has the authority to stop work and/or hold a launch if necessary. The FSO will keep the TD and PM apprised of safety status, which could affect launch operations.

2.3.5 Operations Safety Supervisor (OSS)

The Operations Safety Officer has authority over all hazardous operations performed during preparation and launch activities. The OSS or his designated representative must be present during launch activities and shall monitor all procedures involving hazardous operations. No hazardous procedures will be initiated without the knowledge and consent of the OSS. The OSS is also responsible for implementation of ground safety plans and operating procedures.

2.3.6 Customer

The Customer is responsible for assuring that programmatic objectives are achieved. The Customer has authority, with PM and TD concurrence, to conduct tests of program systems in accordance with procedures approved by NASA. The Customer will keep the PM apprised of program status.

2.3.7 Airport Manager

The Airport Manager is responsible for overseeing all Wallops Flight Facility Airport operations and maintenance.

2.3.8 WFF Control Tower Operator (CTO)

The Control Tower Operator is responsible for operational control of aircraft operating in the vicinity of and on the WFF Airport. The CTO will coordinate the control of emergency equipment responding to any declared emergency landing. Once on the scene, emergency response groups will take direction from the lead Crash Fire and Rescue personnel at the site in accordance with established procedures.

2.4 UAV Safety Certification

The Wallops Safety Office certifies UAVs through processes similar to those in Range Commanders Council documents RCC 323-99, *Range Safety Criteria for Unmanned Air Vehicles* and RCC 323-99 (Sup), *Range Safety Criteria for Unmanned Air Vehicles, Rationale and Methodology Supplement*. These documents can be found online at <http://jcs.mil/rcc/PUBS/pubs.htm>.

The safety process has two basic elements, ground and flight. Safety approval incorporates the results of analyses of each of these categories. Ground Safety approval is

comprised primarily of approving the design of hazardous systems (ordnance, pressure, chemical systems, etc.), and approval of operational ground procedures (including mishap plans). Flight Safety approval entails approval of flight profiles, approval of Flight Termination System (FTS) elements (if the hazard analysis concludes that an FTS is required), and flight operational procedures. Approval includes conducting a Fault Tree Analysis, followed by a Failure Modes and Effect Analysis, or review of existing analyses if they already exist. Safety approval of design and operational practices for each mission is provided in the Ground Safety Plan and Flight Safety Plan, which are included in the OSD or attached separately to the MOD.

2.5 UAV Operations Standards

It is the intention of Wallops Flight Facility to establish operations standards for UAVs so they can be operated routinely on the Research Range with a minimal level of Safety Office oversight and mission participation.

UAV systems that have operated at Wallops Flight Facility generally receive the most rapid project acceptance and flight approval process as it generally only requires the coordination of facilities and airspace since flight operations have been previously approved. The chief requirement is verification that the approval has not been invalidated by extensive changes to the system.

UAV systems that have demonstrated their airworthiness elsewhere, but have never been operated at Wallops Flight Facility, will generally require a review by Wallops Flight Facility officials of documented activities, performance, and design characteristics prior to gaining flight approval. The level of effort to approve these systems for operations at Wallops will be substantially less than for UAVs that have never flown before.

New UAVs that have never flown before and are proposing to conduct their initial airworthiness verification flights at Wallops Flight Facility will generally require a review by Wallops Flight Facility officials of design characteristics and performance predictions prior to gaining flight approval. The safety criteria used in evaluating these systems is listed in 2.6 below.

2.6 Certification Requirements

The UAV operator must provide background information about the particular UAV system so that Wallops safety and range management personnel can attain a technical and operational understanding of the system and the procedures used in operating it. This background information is used as a starting point for identifying potential system hazards and review of existing system safeguards. Figure 3 is the Wallops Flight Facility UAV Safety Data Request.

DATA ITEM	RESPONSE
UAV MISSION NAME	
TEST CONDUCTOR	
MISSION LOCATION (Wallops Island or Main Base)	
UAV MANUFACTURER & MODEL	
UAV CONTROLLER MANUFACTURER & MODEL	
FLIGHT DURATION	
GROSS TAKEOFF WEIGHT	
ENGINE TYPE CHOICES: 1) Electric, 2) Air/Fuel Combustion, 3) Gas Turbine	
FUEL VOLUME	
IF USING FUEL, FUEL TYPE: 1) 1) Gas/Oil mix, 2) Gas, 3) Propane, 3) Kerosene	
IF USING GAS TURBINE, THRUST LEVEL PER ENGINE?)	
FUEL MSDS AVAILABLE? (yes or no)	
POWER SYSTEMS (any that apply & indicate voltages): 1) Ni-Cad, 2) Lithium, 3) Nickel-Metal Hydride	
BATTERY MSDS's AVAILABLE? (yes or no)	
BATTERIES CHARGED W/SUPPLIED SYSTEM CHARGER (yes or no)	
OPERATING FREQUENCY	
FREQUENCY APPROVED BY THE WALLOPS FREQUENCY UTILIZATION WORKING GROUP (WFUMWG)? (yes or no)	
IS THERE A LOSS-OF-SIGNAL (LOS) FAIL-SAFE? (yes or no)	
HOW ARE FOLLOWING CONCERNS FOR RADIO CONTROL SYSTEM ADDRESSED? 1) Receiving antenna not cut, folded, or bundled; 2) Protection against vibration, shock, and temperature extremes; 3) Receiver/antenna isolated onboard frequency generators; 4) Electro-magnetic interference.	
METAL PROPELLERS? (yes or no)	
HOW CONTROLLED? (radio operated control or autonomous flight)	
MISSION PROFILE 1) Max operating altitude (ft.) (400 ft. is the max until airworthiness is determined 2) Max operating range (ft.)	
A/C MAX SPEED (kts)	
EARPLUGS AVAILABLE? (yes, no, or not required)	
OPERATOR TRAINED? (yes, no, or trainee)	
UAV FLIGHT HISTORY	
PILOT FLIGHT HISTORY	
OTHER SYSTEM HAZARD? (yes or no)	

Figure 3. Wallops Flight Facility UAV Safety Data Request

In addition to the above system data, non-safety documentation should also be provided as soon as practical. Also needed are frequency utilization needs (see 800-HDBK-0001, *Wallops Flight Facility Frequency Utilization Management Handbook*) and any special environmental documentation, if applicable (see *Wallops Flight Facility Environmental Resources Document (ERD)*, dated October 1999).

2.7 Safety Risk Analysis

The Safety Office will provide a Safety Risk Analysis that defines the operations, restrictions, and precautions to be observed during UAV operations at Wallops. This analysis ensures that UAV risks during ground and flight operations are identified and eliminated, or at least mitigated to the lowest practical level. Following are key elements of any Safety Risk Analysis for UAVs.

2.7.1 Flight Termination System

A Flight Termination System is required for all UAVs operating in Wallops airspace unless the range is less than the range of all protected areas or the kinetic energy does not exceed 38 ft-lbs. For smaller UAVs, a loss-of-signal fail-safe system may be permitted as long as the transmitter in the OFF position triggers the fail-safe mode in the onboard receiver, thus activating preset functions that force descent. Verifying that the FTS or fail-safe system performs to specification, prior to take-off, completes the certification process.

2.7.2 Radio Control System

The receive antenna length must not be altered to avoid susceptibility to interference and high frequency noise, which will result in loss of range and control.

The receiver must be wrapped in foam rubber or other vibration-absorbing materials to protect it against vibration, shock, and temperature extremes.

The receiver/antenna must be isolated as far as practical from devices that may emit high frequency noise, such as motors, batteries, and wiring that handle heavy current loads.

Receiver power switches should be installed on the fuselage opposite the exhaust system so they do not come in contact with engine oil, dust, or other contaminants.

Other electronic instrumentation should be shielded against electromagnetic interference using copper foil, aluminum foil, or nickel spray. Components can also be shielded by installing each one in an aluminum box.

2.7.3 Airworthiness

The first flight of any UAV at Wallops without airworthiness documentation will be a test flight to determine if the UAV is airworthy. A configuration document will be maintained that describes the flight test, airworthiness, and configuration of the aircraft. Only experienced, essential personnel will be in the area during test flights until the UAV is certified airworthy. The Test Director will issue an airworthiness certification to the UAV user for operations at Wallops.

The airworthiness test will include, as a minimum, two successful shakedown flights for certification. The first flight(s), limited to a maximum altitude of 400 feet, will demonstrate satisfactory take-off, controlled flight, and landing. The final flight(s) will demonstrate satisfactory take-off, controlled flight, operations in the flight envelope, landing, and a flight time of at least one-third the maximum endurance.

2.7.4 System Hazards

The Safety Office also assesses hazards associated with UAV systems, such as mechanical systems, vehicle/payload and ground-based transmitters, hazardous chemicals and chemical systems, noise hazards, gas turbine hazards (e.g., exhaust flow, noise, fire), and other

hazardous systems, materials or requirements such as pyrotechnic systems, explosive systems, radioactive materials, lasers, or hazardous circuits.

2.8 UAV Operations Crew

Like manned aircraft, overall safety of operations is entirely dependent on the personnel operating and maintaining the equipment. Personnel must be sufficiently skilled and proficient in the tasks they are responsible for, procedures must be comprehensive and unambiguous, and discipline must be integral to all operations.

Crew positions may vary between different UAV systems. Wallops Flight Facility does not mandate specific crew positions and responsibilities and is open to reviewing the UAV operator's approach to ensure that safety concerns are satisfied. Of paramount importance is that those personnel, who are expected to act quickly and decisively, have access to the appropriate information and are empowered with authority that is consistent with their responsibility.

Section III: Doing Business at Wallops

3.1 Initial Contact Process

The Advanced Projects Office (APO) is the primary resource for initial contact with Wallops Flight Facility. The APO serves as the focal point for external organizations desiring to conduct business with WFF. The APO can address most preliminary questions and can organize any further discussions or meetings. Once a project becomes accepted, the APO hands off to a designated point-of-contact (POC) or Project Manager, who then becomes the customer interface for the duration of the project. The APO continues to serve as a customer advocate and is available should the customer have issues concerning our support. The APO can be reached from the WFF Web page or from the address and phone number listed in 3.9 below. If you have an established contact at Wallops, that person can direct you to the appropriate organization to meet your needs. Figure 4 at the end of this section depicts the business process flow at Wallops.

3.2 Support to Non-NASA Customers

While NASA's primary mission at WFF is the support of NASA science and technology programs, we can, and do, support other government agencies, commercial industry, or educational institutions on a cost reimbursable basis. Non-NASA support is a substantial portion of our workload and is accepted on a non-interference basis with our core NASA projects. The only major restriction is that we cannot compete with private industry for support on commercial projects.

3.3 Options for Conducting Work at WFF

There are several ways a customer may conduct activities at WFF. These options include:

- Direct agreement with NASA/WFF
- Agreement through the Mid-Atlantic Regional Spaceport (MARS) or our U.S. Navy tenants
- Agreement through our contractors

A direct agreement is the most frequent path for arranging NASA/WFF support. The process for establishing an agreement is described in 3.4 below.

Often an organization may have reason to establish a relationship with a WFF tenant organization such as the MARS or U.S. Navy. WFF can indirectly support this organization through an agreement with the tenant organization. Under these circumstances, NASA is officially supporting the tenant. The cost to the customer for NASA support should generally be the same as through a direct relationship.

For Commercial Space Launch Act (CSLA) projects, there may be advantages to contracting with the MARS for its services, as well as those provided by NASA. MARS has established CSLA agreements with NASA. This relationship allows NASA and MARS to quickly establish a project-specific Individual Support Annex (ISA), and eliminates the requirement to establish an Agreement and Subagreement as discussed in 3.4. MARS also offers additional services and business incentives not available through NASA.

NASA/WFF also encourages resident contractors to develop new business for WFF. Contractors may either refer potential customers to NASA, or may contract directly with the

customer to supply services that may include those provided by the contractor and/or NASA. Under these circumstances, the contractor would establish an agreement with NASA to supply services.

3.4 Acceptance Processes

The process for accepting new projects depends on the nature of the customer and the project proposed. The process generally starts with a letter of request to WFF. The letter should be sent to

Director of Suborbital and Special Orbital Projects Directorate
NASA/GSFC/Wallops Flight Facility
Wallops Island, VA 23337

For NASA or other U.S. Government organizations requesting a well-defined, relatively short-term task, WFF will respond with an acceptance letter, establishing the WFF POC, a cost estimate, and any terms of acceptance. For more complex or ongoing activities, a Memorandum of Agreement may be more appropriate, providing more explicit details of the agreement.

For commercial or educational organizations, a Space Act Agreement is the appropriate process. A Space Act Agreement is similar to a Memorandum of Agreement but contains additional language addressing legal concerns such as liability.

NASA can agree to support commercial launch service providers through a series of CSLA documents. The first is an Agreement established with NASA Headquarters. This is followed by a Subagreement with the Goddard Space Flight Center. Once these general agreements are in place, project-specific ISAs can be established with WFF. The multi-tiered agreements are required because the CSLA requires federal agencies to set aside some expenses that would otherwise be passed along to the customer.

The APO or the designated POC will assist in establishing any necessary agreements.

3.5 Single Point-of-Contact Concept

NASA/WFF operates on a single point-of-contact (POC) concept. Once WFF accepts a request for support, a POC is assigned, normally a project manager. While customer activities may involve support from numerous Wallops organizations, the POC will serve to assure that there is a single person to coordinate all customer services. The project support team includes administrative, technical, and operational personnel. While WFF encourages the establishment of close working relationships between our customers and WFF supporting organizations, customers will always have a focal point for their business.

3.6 Financial Policies

As a federal organization, NASA/WFF financial processes must comply with federal law. The following policies apply to our financial practices:

- For NASA customers, some of our expenses may be covered by NASA funding and may not be passed on to our customers.
- WFF cannot make a profit. We can only recapture our actual expenses in supporting a customer.

- According to federal law, NASA must recoup actual expenses, regardless of any cost estimate provided.
- NASA cannot support projects without adequate funding in place. We cannot begin work until funding is established, and we cannot continue work if available funding has been expended.
- For commercial projects, NASA cannot compete with commercial entities offering similar services.
- For projects accepted according to the Commercial Space Launch Act, certain NASA expenses cannot be passed along to customers.

The APO will be glad to provide a cost estimate for any prospective activity. The quality of the estimate will be dependent on our experience with similar activities and the level of detailed assumptions provided by the customer.

3.7 Funding Procedures

Funding should be received by WFF at least 6 weeks prior to start of work on the project. Work cannot proceed until funding has been processed. Charges are established by means of the full recovery of cost incurred for items such as materials, personnel, equipment, and facilities utilized. These charges can vary depending upon the work requested.

NASA accepts a number of funding mechanisms, depending on the customer type. For NASA projects, a budget guideline change to reallocate funding to GSFC is the normal approach. For DoD organizations, a Military Interdepartmental Purchase Request (MIPR) can be provided. For commercial activities a corporate cashier's check can be used. All funding should be provided to

Office of the Chief Financial Officer
Goddard Space Flight Center
Greenbelt, MD 20771

For extended projects, the POC can provide periodic financial status reports. Upon completion of a project, a final accounting of expenses will be compiled. The customer will receive a letter from the Comptrollers Office detailing final expenses and providing a refund for leftover funds, or requesting additional payment for any shortfall. The POC will address any financial issues the customer may have.

3.8 Technical Data Requirements

The following paragraphs outline technical data requirements, including documentation, scheduling, and reviews.

3.8.1 Requirements Document

The range user's project description and technical requirements are often conveyed to the Wallops Research Range through use of a Requirements Document.

WFF has adopted a modified format from the Universal Documentation System (UDS), which is the standardized documentation system accepted and used at ranges operated by the DoD. The primary UDS reference is RCC 501-97, *Universal Documentation System*, which can be found online at <http://tecnet0.jcte.jcs.mil/RCC/UDS/index.htm>.

Projects at the Research Range span a broad spectrum of complexity, and some flexibility in the application of standards is necessary; however, the Requirements Document provides an excellent checklist of information needed for projects conducted at the range.

A Requirements Document is not the only acceptable format. A customer can provide data in any manner that provides for a detailed understanding of the project and customer requirements.

3.8.2 Safety Data

The range user must provide a safety data package with ground and flight safety information, specifications, performance, and procedures for safety related items. The detailed information that must be included in the safety data package is identified in RSM-2002.

3.8.3 OSD/MOD

The OSD or MOD is prepared by the Project Manager and is NASA's response to the range user's requirements. Both documents provide a description of the project and the detailed support configuration for all Wallops equipment, instrumentation, and facilities. A ground safety plan, flight safety plan, countdown, and special procedures, as appropriate, are included in the OSD. The flight safety and ground safety plans are attached to the MOD rather than included.

3.8.4 Documentation Schedule

WFF attempts to avoid excessive documentation wherever possible. Range users are required to provide a Requirements Document or comparable document to aid WFF in defining support requirements. Only applicable sections need be provided.

Timelines can be compressed for small projects or expanded for larger projects. Exact data requirements will be determined during the planning process based on schedule and project-unique details. Earlier dates may be required if the range user begins processing at WFF earlier than 30 days prior to launch.

WFF encourages range users to provide documentation as early as possible to assure adequate time for review and approval. Failure to do so could require unnecessary redesigns or delays in schedule.

3.8.5 Operational Reviews

WFF conducts pre-mission reviews for all projects in order to assure that personnel are briefed on requirements and responsibilities and to assure that all necessary preparations have been satisfactorily completed. A synopsis of WFF reviews is included below:

- Range Readiness Review – Conducted for all major operations. A panel is established to review the WFF support preparations.
- Pre-mission Briefing – A mandatory briefing that serves to assure all key personnel are prepared to support the operation and that participants understand roles, responsibilities, and operational details.
- Pilot's Briefing – A mandatory briefing the morning of a proposed flight for every UAV operation.
- Operation Debriefing – A post-operation meeting intended to evaluate the operation and identify items requiring action prior to future operations.

Additional reviews may be required for large projects. In addition, it is highly recommended that range operations and safety personnel be invited to participate in project design reviews and technical interchange meetings to assure concerns are addressed early in the planning process.

3.9 Customer Feedback

We constantly strive to provide the highest caliber of service to our customers. In order to identify areas of improvement, we need feedback from you. You may be requested to evaluate our performance by your WFF point of contact. If not, you may provide any comments to

Advanced Projects Office
NASA/GSFC
Wallops Island, VA 23337
(757) 824-1275
Lucille.J.Fox@nasa.gov

Your thoughts on our support are important to us and assure that we continue to provide quality service.

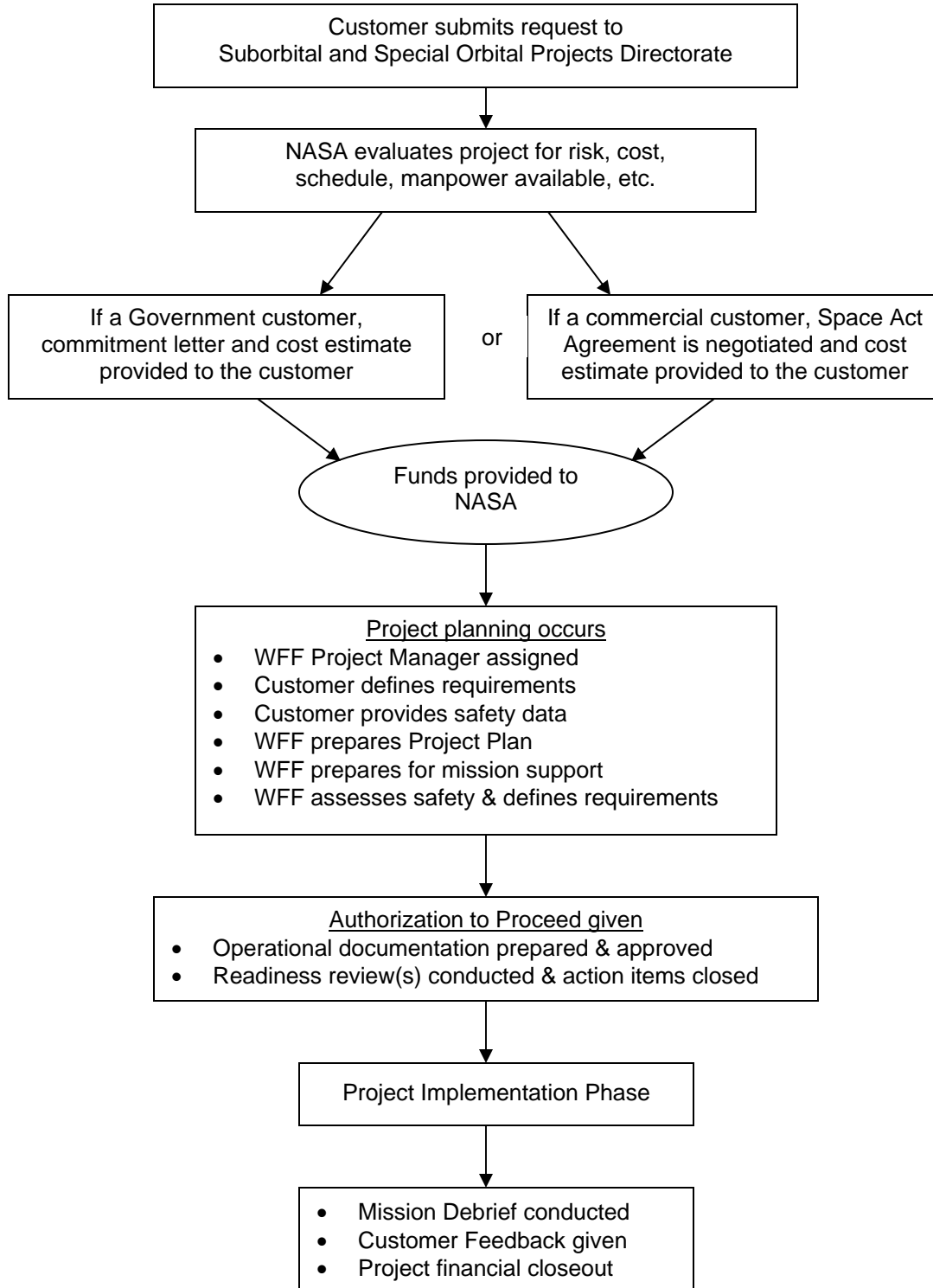


Figure 4. Wallops Flight Facility Business Process Flow

Section IV: Facilities and Capabilities

4.1 Facilities

The following paragraphs discuss facilities available to the UAV customer.

4.1.1 Wallops Flight Facility Runways

The Wallops UAV runway is located on the south end of Wallops Island (Figure 5). The runway is 750 feet long with 50-foot wide asphalt and 20-foot wide grass landing strips. Commercial UAV manufacturers and other users conduct product trials, pilot training, and science missions from the runways.



Figure 5. UAV Runway on Wallops Island

The WFF Research Airport is located on the Main Base. Figure 6 illustrates the Research Airport and associated facilities. There are three runways, two taxiways, three ramps, and one hazardous cargo loading area in active service. The runway dimensions are:

- 10-28 – 8,005 feet by 200 feet
- 04-22 – 8,750 feet by 150 feet
- 17-35 – 4,810 feet by 150 feet

The taxiways that service these runways are parallels of 04-22 and 10-28. Two ramps adjoin the two active hangars. The hazardous cargo loading area adjoins the approach end of runway 17.

All runways, with the exception of 35, are configured with FAA-approved circling and straight-in approaches. Runway 04-22, the primary research runway, has a test section with a variety of surface textures and materials for runway research projects.

For more information on Airport instrumentation, facilities, and services, see 840-HDBK-0001 and 830-AFOH-0001. Both documents can be found on the Wallops Web site at <http://www.wff.nasa.gov/>.

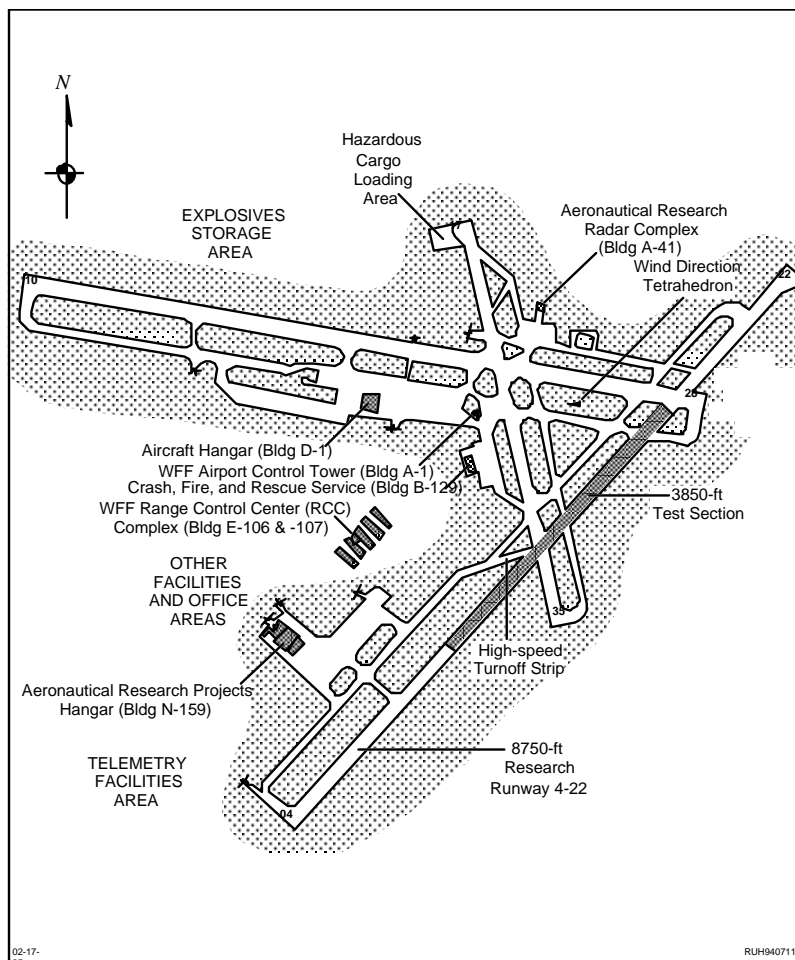


Figure 6. WFF Research Airport with Associated Facilities

4.1.2 Hangars

Wallops Flight Facility has two hangars (Figures 7), both of which are available for UAV activities. Depending on the type of mission, there may be a charge for maintenance workspace, office space, and services such as telephone and Internet access. A limited amount of office furniture is available but cannot be guaranteed. All services will be negotiated with the Aircraft Office before beginning mission activities. Certain institutional services, such as janitorial, will also be negotiated prior to mission startup.

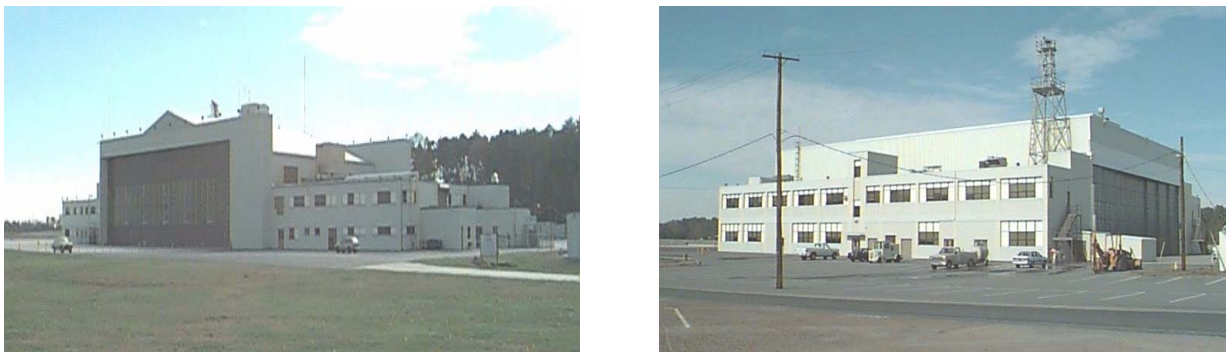


Figure 7. Wallops Flight Facility Hangars

4.1.3 Fuel Farm

The Wallops Fuel Farm contains five 20,000-gallon underground JP fuel tanks and pumping station; two 10,000-gallon JPTS underground tanks; one 10,000-gallon “off spec” underground tank; and one 12,000-gallon spill containment tank. Fuel is a billable commodity.

4.1.4 Control Tower

A FAA-certified VFR control tower operates on 126.5/394.3 MHz. The Control Tower is manned from 0700 to 1730 Monday through Friday, excluding holidays, and at other times to support specific missions. FAA AC No. 90-42 is in effect during non-tower operating hours. See 2.3.8 for Control Tower Operator responsibilities and authority.

4.2 Tracking and Data Collection

The following paragraphs lay out tracking and data collection capabilities, including telemetry and radar.

4.2.1 Range Control Centers

The focal point for all Research Range operations is the Range Control Center located in building E-106 on the Main Base. Data from the range support instrumentation (e.g., closed circuit TV, radar and TM data) are acquired, processed, and made available for video display throughout the facility. This data assimilation, in conjunction with communications and command links, facilitates the coordination control and safe conduct of WFF missions.

The Aeronautical Projects Control Room (APCR) on the fourth story between buildings E-106 and E-107 provides visual observation of the Research Airport, including research runway 04-22 and aeronautical project activities in the surrounding area. The APCR has mission controller consoles, which provide communications and data display for monitoring and control of aeronautical projects.

The UAV runway on the Island is controlled remotely from building Z-40.

The Project Manager can provide information on the RCC, APCR, and Z-40 communications, data systems, and other capabilities available for project support at the Wallops Research Range.

4.2.2 Telemetry Facilities

Telemetry (TM) facilities at the Wallops Research Range include a variety of antennas, receivers, and display instrumentation systems. Command uplink and metric tracking capabilities are also available.

Post-flight telemetry data can be distributed via magnetic tape, CD-ROM, and magneto-optical disks.

See 840-HDBK-0001 for specifications on the TM facilities available at Wallops.

4.2.3 Radar Facilities

Radar systems perform tracking and surveillance functions. Tracking radar systems provide accurate velocity and positional data of launch vehicles, balloons, satellites, and aircraft. The Research Range has three fixed and four mobile tracking radar systems. The fixed radar systems are located at the Research Airport, on the Mainland, and on Wallops Island.

Surveillance radars provide range surveillance to detect water surface and airborne targets. The Mariners Pathfinder on Wallops Island and the ASR-7 are fixed surveillance radar systems that support operations on the Research Range. The AN/APS-143 is an airborne surveillance radar system that is installed on contract aircraft in partnership with NAS Patuxent River.

Specifications for all radar systems at Wallops can be found in 840-HDBK-0001.

4.2.4 Frequency Utilization and Management

The WFF Test Director is responsible for the operational control of the RF spectrum at Wallops. Frequency utilization and management policies and procedures applicable to all range user activities at Wallops are detailed in 800-HDBK-0001.

4.2.5 Weather Forecast Office

The Weather Forecast Office provides meteorological information in support of all WFF activities. The Forecast Office provides daily and special forecast support as required. National, regional, and local weather data are available. Data sources include the Advanced Weather Interactive Processing System (AWIPS); several lightning detection systems; field mills, which measure lightning potential; and a full complement of local surface instruments to measure wind, temperature, pressure, dew point and cloud height.

A daily forecast briefing covering the upcoming 12 hours is broadcast over the WFF closed circuit television. A forecast of the upcoming 36 hours is prepared in the afternoon and is available from the Weather Forecast Office. Weather briefings are available by telephone upon request, and the daily 12- and 36-hour forecasts are placed on a telephone recording (extension 2291) at 8 a.m. and 1 p.m.

Other weather and video switching network information is available on the WFF closed circuit television network:

- Weather radar display originating from the National Weather Service (NWS) radar
- Local weather conditions, including upper winds, based on sensors at WFF
- National Lightning Detection Network displays

The following meteorological facilities support launch operations:

- Fixed, balloon-borne, and optical sensors are available for obtaining atmospheric data.
- Current weather data from weather sensors on the Main Base and Wallops Island are continuously displayed on the local WFF closed circuit TV system, and the data can be made available remotely via modem interfaces.
- An Ionosphere Sounding Station provides detailed data on the ionosphere characteristics.
- Lightning detection systems display lightning conditions locally and over the United States.
- An Electric Field Measurement System aids in determining the probability of and detection of local lightning activity.
- Indigenous WFF radar data from the Atmospheric Sciences Research Facility and other Observational Sciences radars are also available in the Weather Office.

4.3 Engineering

The following paragraphs present engineering and fabrication capabilities at Wallops Research Range.

4.3.1 Mechanical Engineering

The Mechanical Systems Branch provides mechanical systems mission design and implementation for suborbital and special orbital projects and for Earth and space science instrument design and development activities at the Wallops Flight Facility. Personnel serve in the Product Design Lead role on key projects and technology development efforts and also provide technical expertise and implementation of integration, testing and launch operations.

The Mechanical Systems Branch is responsible for the entire life cycle of payload carrier mechanical systems, including technical support services in structural analysis; mechanical design; thermal engineering; materials research and development; and assembly, integration and testing

The Mechanical Systems Branch provides management and technical oversight of mechanical engineering and technical support tasks under the Wallops Engineering Services Contract, and maintains responsibility for the development and management of world-class integration and testing facilities at WFF.

4.3.2 Electrical Engineering

The Wallops Electrical Engineering Branch is responsible for conception, analysis, design, development, validation, and implementation of electrical/electronic, RF, microwave, and millimeter wave components and systems, which include flight and ground instrumentation, communication, and radar components and systems. The branch supports Wallops ELVs, sounding rockets, aircraft, balloons, satellites, Shuttle payloads, ocean-borne payloads, and support systems.

4.3.3 Guidance, Navigation and Control (GNC)

The GNC and Mission Systems Engineering Branch provides skills, vision and leadership in guidance, navigation and control systems, engineering, GNC related operations, and mission

analysis. Technical disciplines include flight dynamics, propulsion, flight mechanics, guidance, navigation and control engineering for space systems, experiments, suborbital missions, and launch vehicles. The branch also provides Mission Systems Engineering support for science missions and technology development efforts.

4.3.4 Software Engineering

The Wallops Systems Software Engineering Branch (WSSEB) is the GSFC Information Systems Divisions' engineering service provider at Wallops. The WSSEB develops integrated systems for real-time mission support; performs prototyping in collaboration with other NASA and government organizations, universities, and commercial partners; and develops test beds/simulators to provide proof of concepts in an operational environment. The WSSEB analyzes, designs, tests, develops, and integrates unique software, hardware, commercial off-the-shelf (COTS), and data systems solutions to meet customer needs.

4.3.5 Fabrication Facilities

Wallops has a fully equipped machine shop that can provide electronic, electrical, and mechanical support (see Figure 8). The 26,000 square foot machine shop includes a large selection of Computer Numerically Controlled (CNC) mills and lathes, manual machines, sheet metal fabrication, welding, and heat-treating facilities. Capabilities include full CAD/CAM implementation in developing and fabricating mechanical systems, optical instrumentation, and payload components for flight research.



Figure 8. View of Machine Shop Floor

Check the Wallops Documentation Web site at <http://www.wff.nasa.gov> to verify this is the correct version prior to use.

The fabrication area is used for such tasks as sounding rocket launcher refurbishment, and design and fabrication of mobile telemetry and mobile radar support vans and antenna systems. The machine shop includes mechanical technician laboratories for assembly of scientific payloads. While the facility primarily supports the Sounding Rocket Program, it regularly supports other NASA and reimbursable projects. A more comprehensive description of mechanical and electrical fabrication capabilities is available in 810-HB-SRP, *Sounding Rocket Program Handbook* available online at <http://www.nsroc.com/front/what/SRHB.pdf>.

4.3.6 Environmental Test Facilities

Environmental testing of complete payloads, subassemblies, and components verifies flight readiness when exposed to an intended flight environment. Specialized facilities for environmental testing are available at Wallops in the Environmental Testing Laboratory in building F-10, adjacent to the Payload Integration Laboratory for convenience in payload handling and logistics. Additional engineering test facilities are available in the Balloon R&D Laboratory and Multi-port Payload Processing Center in building F-7. The Magnetic Calibration Facility is in building F-23, and the EMI/RFI chamber is in building N-134. The Dynamic Balance Facility is on Wallops Island in buildings V-45, V-50, and V-55. A more detailed discussion of these facilities is available in 802-HDBK-0001, *Doing Business at Wallops Flight Facility: A Customer Guide*, available on the Wallops Web site.

4.4 Science Facilities

The following paragraphs give an overview of science facilities and capabilities at the Research Range.

4.4.1 Observational Sciences

Observational Sciences Branch (OSB), working within the Laboratory for Hydrospheric Processes of the Earth Sciences Directorate at GSFC, conducts theoretical, experimental and applied research in the oceanic, atmospheric, and terrestrial sciences. Branch personnel design, fabricate and operate both remote and *in-situ* sensing instruments for aircraft, balloons, rockets, and UAVs. They plan and conduct laboratory and field measurements to improve the fundamental knowledge of Earth sensing and to evaluate sensor systems as well as quantify and demonstrate system performance. A more detailed discussion of various instruments and systems available for experiments is available at <http://osb1.wff.nasa.gov>.

4.4.2 Wallops Geophysical Observatory

The Wallops Geophysical Observatory (WGO) allows customers to conduct measurements from ground-based test equipment. The WGO is intended to augment and enhance flight vehicle-based test equipment during scientific missions. Eventually, the facility will include a fully integrated network of devices accessible locally at the Range Control Center and through connectivity to the NASA Intranet and World Wide Web.

The Atmospheric Sciences Research Facility (ASRF), which is part of the WGO, houses the atmospheric radar installed on Wallops Mainland. The facility possesses unique capabilities for atmospheric data acquisition, processing, display, and recording. Permanent data acquisition systems available at the ASRF include two high power radar systems (one S-band and one UHF-band) and an Environmental Data Acquisition and Recording System (EDARS).

Additional capabilities will be available Spring 2005 with the installation of a DC (steady) magnetometer and high-frequency backscatter radar for ionospheric measurements.

The WGO supports the Coastal Zone Research Program.

Additional information on the ASRF and WGO can be found in 840-HDBK-0001.

4.4.3 GPS Simulator Facility

The GPS Simulator Facility is comprised of a 4-output Spirent GSS GPS simulator capable of reproducing the radio frequency (RF) signal that would be received by a GPS receiver as it travels any trajectory at any time, with parameters such as signal strength, multipathing, antenna patterns controllable for testing of navigation and attitude receivers; a single output Spirent GSS GPS receiver programmable and transportable for use in the field; and a Navigation Laboratories Tapestry GPS/IMU simulator.

These simulators may be controlled remotely to produce hardware-in-the-loop, Monte Carlo simulations of GPS and IMU for satellites and launch vehicle trajectories. No other civilian installation has the capability to develop and test sensors in this manner. Current users include the Sounding Rocket and Scientific Balloon programs and the Autonomous Flight Safety System. The GPS Simulator Facility, currently configured for stand-alone operation, will be available for use with the range and mobile range simulator in Summer 2005.

Section V: Institutional Services

5.1 Crash Fire and Rescue (CFR)

Crash Fire and Rescue provides a variety of emergency response services, including fire fighting, emergency medical services (EMS), and fire safety inspection and prevention. The Main Base and Island fire stations support all normal aircraft activities and generally provide mutual aid support to include HazMat, water supply, rescue, and EMS operations. The Emergency Operations Center (EOC) is manned at all times and serves as the communications and alarm center for all WFF emergency services. The EOC operates the UNICOM Control in an advisory capacity only for the airport when the control tower is not active (see 830-AFOH-0001, *Airport Facility and Operations Handbook*, and FAA AC No. 90-42, *Traffic Advisory Practices at Airports Without Operating Control Towers*).

5.2 Security

Wallops Flight Facility and Research Range maintains 24-hour security for all facilities. Personnel without current security badges will not be allowed access to the Main Base, the Mainland, or the Island. All visitors must check in with Security at the Main Gate. Foreign nationals must obtain prior approval to visit at least 20 working days (4 weeks) in advance of a visit of 30 days or less and 2 calendar months in advance for an assignment over 30 days. All visits to Wallops should be coordinated with the Project Manager. More information regarding security requirements can be found in NPR 1620.1, *Security Procedures and Guidelines*.

5.3 Metrology Laboratory

Wallops Flight Facility maintains a Metrology Laboratory equipped to perform repair and calibration of test instruments. Customer-furnished equipment is calibrated and certified at this facility. The equipment in the standards laboratory is traceable to the National Institute of Standards and Testing (NIST). These standards are part of a mandatory recall program for recalibration and certification.

5.4 Chemical Laboratory

Wallops Flight Facility maintains a chemical laboratory, which performs aviation fuel analysis in support of scientific aircraft and oil analysis in support of radar installations. The lab also performs wastewater analysis for the facility.

5.5 Environmental

The Wallops Environmental Office serves as the clearinghouse for National Environmental Policy Act (NEPA) compliance at Wallops. Services and responsibilities include hazardous waste management; pollution prevention; oil spill prevention and response; storage tank management; air pollution control; water pollution control; historical and archeological preservation; and environmental consulting. In most cases, Wallops has approved environmental documentation covering range users' activities at WFF. The *Wallops Flight Facility Environmental Resources Document (ERD)*, dated October 1999, provides the required environmental documentation for all Wallops "in-house" activities and also provides the required documentation for many range users' activities (see <http://www.wff.nasa.gov/~code205/>). Early in the project, the Project Manager will discuss environmental requirements with the range user

to identify potential environmental issues. Wallops Environmental Office personnel will make a determination of any formal documentation requirements.

5.6 Shipping/Receiving

Various shipping services are available, including United Parcel Service, Federal Express, and the U.S. Postal Service. The nearest commercial airfreight service is at the Salisbury-Wicomico County Regional Airport, Salisbury, Maryland. The range user should use the following information when mailing correspondence or shipping equipment for official project business:

Mail Address: Name/GSFC Code Number
NASA Goddard Space Flight Center
Wallops Flight Facility
Wallops Island, VA 23337
USA

Freight Destination Address: Name/GSFC Code Number
C/O Receiving Officer
NASA Goddard Space Flight Center
Wallops Flight Facility
Wallops Island, VA 23337
USA

Hazardous materials require special handling. See 5.12 and 6.7 for instructions and references.

5.7 Motor Freight Truck Service

Most cargo and freight are received at WFF Main Base, building F-19. However, construction material is delivered to the site, and commercial shipments may be received directly by commercial users.

Inbound shipments of Class “A” and “B” explosives and other designated hazardous materials require advance notice prior to arrival. The delivering carrier’s representative should provide advance notice by telephone to the explosives handling personnel in building M-15 (757-824-1433). The explosives handling personnel will furnish onsite escort, unloading, inspection, and shipment acceptance.

Normal receiving hours are 0800 to 1430 (for truckloads) and 0800 to 1600 (for partial loads), Monday through Friday, excluding holidays.

5.8 Air Cargo

Air cargo deliveries require special consideration and must be discussed with the assigned Project Manager and/or the Airport Manager.

GSFC/WFF Airport Manager
Phone (757) 824-1240
Fax (757) 824-1250

5.9 Customs

International shipments should clear U.S. Customs before arrival at WFF. Arrangements for shipments directly from overseas into WFF must be coordinated and approved by U.S. Customs prior to shipment.

5.10 Post Office

A United States Post Office is located in building E-7 on the Main Base. The address is Wallops Island, VA 23337 USA.

5.11 Material Handling Equipment

A variety of material handling equipment is available at Wallops, including forklifts, overhead hoists, cranes, basket trucks, and material moving equipment. Additional information on types of material handling equipment can be found in the 840-HDBK-0001.

5.12 Warehousing and Hazardous Materials Storage

Warehouse space is available on a limited basis. The customer should notify the Wallops point of contact in advance of the type and amount of storage required, including chemical, explosive, and inert hardware storage. All hazardous material must be packaged to conform to applicable Department of Transportation regulations. A Material Safety Data Sheet (MSDS) must accompany all hazardous materials shipped to Wallops. For more information regarding hazardous materials shipment and storage, see 810-HB-SRP and 840-HDBK-0001.

Radioactive sources require approval from the GSFC Safety and Environmental Office prior to arrival. The range user must provide the proper forms requesting the use of a radioactive material at WFF, including license information, to the Project Manager at least 90 days prior to the shipment/arrival of the source. GPG 1860.1, *Ionizing Radiation Protection*, defines procedures and provides the needed forms. This document may be seen online at http://msc-docsrv.gsfc.nasa.gov/GDMS_docs/GPG1000/GPG-1860.1-.pdf.

5.13 Fire Protection

There are two fire stations at Wallops, one on the Main Base and one on Wallops Island. Both stations are manned 24 hours a day by fully trained firefighters and emergency medical technicians. Each station is equipped to meet Wallops emergency response requirements. If both stations are called out, any aircraft or project requiring Crash Fire and Rescue services will be halted for the duration.

5.14 Medical Facilities

The Health Unit located on the Main Base is available for limited medical services in the event of an emergency during working hours. Emergency medical technicians from the fire station are available 24 hours a day. Ambulance services are also available. The Northampton-Accomack Memorial Hospital is approximately 40 miles south in Nassawadox, Virginia. The other local hospital is the Peninsula Regional Medical Center located approximately 40 miles north in Salisbury, Maryland.

5.15 Communications

Telephone service is provided through the Federal Telecommunications System (FTS-2000) for official U.S. Government business. Long-distance billing can be supported by

telephone credit cards or prorated FTS accounts for non-Government projects. Fax service is available. Modem support for range user computers may be provided through the digital PBX system. Pay phones are located in front of the cafeteria and in the dormitories. The WFF operator is available during normal working hours at (757) 824-1000.

The Outsourcing Desktop Initiative for NASA (ODIN) contractor can provide Internet access on a month-to-month basis. There are no restrictions on pagers and cell phones. Teleconferencing and video teleconferencing services are available through the customer's sponsor. Portable audio conferencing equipment is also available.

5.16 Library

NASA maintains a scientific and technical library in Building E-105, Main Base. Local and national newspapers and periodicals are available on site, as well as computers with access to the Internet. The library is open from 8:00 a.m. to 4:30 p.m. Monday through Friday.

5.17 Print Shop

The Print Shop features a variety of duplicating equipment that produces a wide range of products from door signs to Braille documents. The state-of-the-art high-speed duplicator produces copies quickly and with special features such as storing documents for reprints and simultaneous mail merging. Customers can transmit their documents electronically rather than providing a "camera ready" hard copy. Moreover, there is a wide range of binding options for documents. Not all services are available at Wallops, but the Print Shop can arrange to have those services performed at the Greenbelt location. Information on services offered can be viewed at <http://tisb.gsfc.nasa.gov/Svcs/dupl.htm>.

5.18 Photo Services

Photo Services supports technical, scientific, and administrative organizations at Wallops. The newly established Digital Imaging Facility complements the traditional photographic services and provides many new capabilities in-house. Photo Services also offers a videotaping capability, including video production and tape duplication, as well as distribution and life cycle management of finished programs. Many more services and areas of support provided by the Photographic Services Team, such as photographic stills and high-speed video tracking, can be found at <http://tisb.gsfc.nasa.gov/default.htm>.

5.19 NASA Federal Credit Union

The NASA Federal Credit Union maintains an office on Wallops Main Base. Personnel employed at GSFC may become members of the credit union. There is an ATM open 24 hours a day. More information on credit union services can be seen at <http://www.nasafcu.org>.

5.20 Cafeteria and Dormitories

The Wallops Exchange and Morale Association (WEMA) manages the cafeteria and dormitories. The cafeteria serves breakfast and lunch Monday through Friday, except holidays. Dormitory rooms are rented on a space-available basis. Morale activities can be viewed on base at <http://www.wff.nasa.gov/wemamac>.

5.21 Fitness Facility

Wallops maintains a fitness facility, which includes a gymnasium, weight room, Nautilus equipment room, locker rooms, and saunas. Guest memberships are available. The Morale Activities Committee (MAC) manages the fitness facility.

5.22 Public Affairs Support

The Wallops Public Affairs Office (PAO) is available to support range users with media and guest relations operations. The PAO can set up Web casts of missions and can accommodate groups that want to transmit broadcasts from Wallops using a small local radio station that provides launch commentary for local listeners. Initial requests for PAO support can be made through the Project Manager.

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Section VI: Wallops Research Range Policies

6.1 Working Hours

Although the normal workday at Wallops is 0800 to 1630 Monday through Friday, work hours can be established to meet mission requirements. There are work limitations established for safety purposes. Coordination of the work schedule with the Project Manager is necessary to ensure access to required facilities and the availability of necessary technical personnel.

6.2 Smoking

Smoking is prohibited in all WFF buildings, launch pads, aircraft, and aircraft support areas.

6.3 Safety, Reliability and Quality Assurance

WFF safety personnel will review all activities conducted on the Wallops Research Range. All range activities will be conducted in accordance with safety policy and criteria established in GMI 1700.2, *Goddard Space Flight Center Health and Safety Program*; NPR 8715.3, *NASA Safety Manual*; and RSM-2002. Reliability and Quality Assurance reviews may be required on a case-by-case basis.

6.4 Industrial Safety

Industrial safety procedures are typical of those enforced at other U.S. Government facilities. In addition, personnel are expected to obey all control signals and roadblocks on the airfield and launch range.

6.5 ISO 9001

In November 1999, NASA/WFF became ISO 9001 certified. All flight projects, mission operations, and other major services have established practices designed to provide high quality, customer oriented support.

6.6 Scheduling

The Office of the Test Director is responsible for establishing and maintaining the schedule of range activities. This includes publishing schedules and summaries, resolving scheduling conflicts between project requirements and resources, and acquiring required clearances from external organizations for programs conducted at the range.

The range user submits project scheduling information to the Project Manager, who relays potential conflicts as they are identified. Every effort is made to resolve conflicts between programs in a manner that permits each program to be successfully completed on an acceptable schedule.

Scheduling meetings are held monthly. As new information becomes available, activity schedules are updated and maintained on a computer database, which is accessible through remote terminals. The daily schedule is announced on the WFF paging system at 0830 and 1600 local time and is available online at

<http://wisdms.wff-wisdms.wff.nasa.gov/Schedule/dailyschedule.htm>.

The Test Director acquires clearances required for airspace and oceanic impact areas from the FAA, North American Aerospace Defense Command (NORAD), USN FACSFAC, and

the U.S. Coast Guard. The range user must submit information for the clearances to the Project Manager at least 2 weeks in advance of the required time to facilitate approval and scheduling.

6.7 Hazardous Material Handling

All hazardous materials shall be disposed of in accordance with the Virginia Department of Environmental Quality Regulations. The range user must provide a "Hazardous Waste Disposal Inventory," NASA Form WI-1550, to the WFF Environmental Office for disposal of all hazardous material. See 5.12 for additional information on handling hazardous materials.

Appendix A

Abbreviations, Acronyms, and Initializations

24/7	24 hours a day, 7 days a week
AFOH	Airport Facility and Operations Handbook
AOM	Aircraft Operations Manual
APCR	Aeronautical Projects Control Room
APO	Advanced Projects Office
ASRF	Atmospheric Sciences Research Facility
AT	Avionics Technician
ATM	Automatic Teller Machine
AVO	Air Vehicle Operator
AWIPS	Advanced Weather Interactive Processing System
CAD	Computer-aided Design
CAM	Computer-aided Manufacture
CFR	Crash Fire and Rescue
CNC	Computer Numerically Controlled
COTS	Commercial Off-the-Shelf
CSLA	Commercial Space Launch Act
CTO	Control Tower Operator
DC	District of Columbia
DoD	Department of Defense
ECF	Engineering Check Flight
EDARS	Environmental Data Acquisition and Recording System
EMI	Electromagnetic Interference
EP	External Pilot
ERD	Environmental Resources Document
FAA	Federal Aviation Administration
FACSFAC	Fleet Area Control and Surveillance Facility
FCF	Functional Check Flight
FCP	Functional Check Pilot
FM	Flight Mechanic
FSO	Flight Safety Officer
ft	Foot; feet
FTS	Flight Termination System; Federal Telecommunication System
GMI	Goddard Management Instruction
GNC	Guidance, Navigation and Control
GPG	Goddard Procedures and Guidelines
GPS	Global Positioning System
GSFC	Goddard Space Flight Center
HB	Handbook
HDBK	Handbook
IFC	Instructor Flight Crewmember
IMU	Inertial Measurement Unit
ISA	Individual Support Annex
ISO	International Organization for Standardization
lbs	Pounds
MAC	Morale Activities Committee
MARS	Mid-Atlantic Regional Spaceport
max	maximum
MC	Mission Commander
MD	Maryland
MIPR	Military Interdepartmental Purchase Request

MOD	Mission Operations Directive
MSDS	Material Safety Data Sheet
MTBF	Mean Time Between Failure
NACA	National Advisory Committee for Aeronautics
NASA	National Aeronautics and Space Administration
NFCU	NASA Federal Credit Union
NIST	National Institute of Standards and Testing
NORAD	North American Aerospace Defense Command
NPR	NASA Procedural Requirement
NWS	National Weather Service
ODIN	Outsourcing Desktop Initiative for NASA
OSB	Observational Science Branch
OSD	Operations and Safety Directive
PAO	Public Affairs Office
PBX	Private Branch Exchange
PFE	Proficiency Flight Examiner
PG	Procedures and Guidelines
PM	Project Manager
POC	Point of Contact
PRD	Project Requirements Document
R&D	Research and Development
RCC	Range Commanders Council; Range Control Center
RF	Radio Frequency
RFI	Radio Frequency Interference
RMMO	Range and Mission Management Office
RSM	Range Safety Manual
RSO	Range Safety Officer
SOP	Standard Operating Procedure
SRP	Sounding Rocket Program
SSOPD	Suborbital and Special Orbital Projects Directorate
TD	Test Director
TM	Telemetry
TV	Television
U.S.	United States
UAV	Uninhabited Aerial Vehicle
UDS	Universal Documentation System
UHF	Ultra-high Frequency
USA	United States of America
USN	United States Navy
VA	Virginia
vs	versus
WEMA	Wallops Employee and Morale Association
WFF	Wallops Flight Facility
WGO	Wallops Geophysical Observatory
WI	Work Instruction
WSSEB	Wallops Systems Software Engineering Branch

Appendix B

References

(listed in order of appearance)

1. Commercial Space Launch Act, Public Law 98-575
2. RSM-2002, *Range Safety Manual for Goddard Space Flight Center/Wallops Flight Facility*
3. 830-AFOH-0001, *Airport Facility and Operations Handbook*
4. FAA AC No. 90-42, *Traffic Advisory Practices at Airports Without Operating Control Towers*
5. RCC 323-99, *Range Safety Criteria for Unmanned Air Vehicles*
6. RCC 323-99 (Sup), *Range Safety Criteria for Unmanned Air Vehicles, Rationale and Methodology Supplement*
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