

**Pacific Northwest National Laboratory**

# **Flight Operations Manual**

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Pacific Northwest National Laboratory  
Richland, Washington 99352

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PACIFIC NORTHWEST NATIONAL LABORATORY

*operated by*

BATTELLE

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UNITED STATES DEPARTMENT OF ENERGY

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# Policy

This Flight Operations Manual provides a guideline for Pacific Northwest National Laboratory (PNNL) staff and management personnel in the operation and use of leased, chartered, or PNNL-owned aircraft. The procedures and policies contained here are supplemental to Federal Aviation Regulations (FAR) and to U.S. Department of Energy (DOE) and PNNL policy designed to provide for safe and correct operating practices. Flight and maintenance personnel are required to become familiar with the contents of this manual and with the correct procedures for the planning and performance of all flight activities. It is highly recommended that project and line management also become familiar with this manual.

# 1.0 Introduction

## 1.1 Purpose and Scope

This *Flight Operations Manual* outlines the policy relative to the use of Pacific Northwest National Laboratory (PNNL) aircraft by PNNL employees and clients in the course of doing U.S. Department of Energy (DOE) and Laboratory business. This manual provides a guideline for PNNL staff and management personnel in the operation and use of leased, chartered, or PNNL-owned aircraft. The procedures and policies contained here are supplemental to Federal Aviation Regulations (FAR, a subsection of Title 14 of the Code of Federal Regulations) and to DOE orders and PNNL policies designed to provide for safe and correct operating practices. Flight and maintenance personnel are required to become familiar with the contents of this manual and with the procedures for the planning and performance of all flight activities.

Under most circumstances, this manual describes acceptable practices; all operating personnel are expected to adhere to the provisions of this manual and the applicable FARs in the performance of PNNL flight operations. However, this manual is not intended as a substitute for common sense and the sound judgment of the Pilot in Command (PIC), especially in matters that may require the modification of such procedures in the light of emergencies, adverse weather, or other extenuating circumstances.

This manual covers all aspects of PNNL flight operations associated with DOE work, including leased or chartered aircraft and PNNL-owned aircraft. This material also includes pilot and management responsibilities and authority, aircraft maintenance, planning and conducting of flight operations, and the training of flight and ground crew.

## 1.2 Publication and Organization of the Manual

The PNNL Environment, Safety and Health Directorate is the publisher of this manual. All questions concerning this manual should be directed to the Director of Environment, Safety, and Health or to the Aviation Safety Point of Contact (ASPOC).

Following the general policy statement, this *Flight Operations Manual* is organized into seven sections:

- Introduction
- Departmental Organization
- PNNL Aviation Policy and Procedures
- Standard Operational Procedures
- Training Curriculum
- Hazardous Materials
- Appendixes

The abbreviations and rules of construction of FAR 1.2 and FAR 1.3 are used in this manual. Forms used in flight operations are presented in Appendix A. References used as guidance for this manual are listed in Appendix B. Appendix C contains a list of definitions and acronyms used in the text. Important telephone numbers are in Appendix D. Supporting material for the section on accident and incident reports is in Appendix E. Two charts further defining duty time limitations are included in Appendix F. A copy of the *Richland Operations Office Aviation Manual 440.2* is included in Appendix G. The topic of Appendix H is low-altitude operations for the Gulfstream 159.

Certain requirements in this manual are followed by a parenthetical reference to the applicable FAR.

### **1.3 Manual Changes**

Amendments in FARs and normal usage will frequently indicate a need for additions, deletions, or corrections of selected subject matter in this manual. Revisions to the manual will be issued periodically to reflect these changes. In addition, users of the manual who observe or experience a need for change are encouraged to submit their suggestions to the ASPOC for review and consideration.

PNNL issues a copy of this manual, including all revisions, to all flight crew members, maintenance personnel, and ground operations personnel. All recipients are required to keep their manual up-to-date with the revisions furnished to them. All PNNL flight, ground, and maintenance personnel must use this manual in the conduct of all operations. At least annually, the Chief Pilot tests all pilots on their knowledge of this manual.

PNNL has also furnished the DOE Richland Operations Office (DOE-RL) and DOE Headquarters with a current and complete copy of this manual. The Director of Flight Operations will provide DOE with all future revisions to this manual.

PNNL keeps a current and complete copy of this manual in each aircraft. When a PNNL airplane is away from home base, the PIC will make this manual available to local ground and flight personnel for their use. The Chief Pilot is tasked with keeping current the manuals assigned to the aircraft.

Great care has been taken to ensure the material in this manual is not contrary to any applicable FAR, DOE regulation, PNNL policy, operations procedure, or foreign regulation. However, should a conflict occur, the FARs will take precedence. Staff are required to bring any such conflict to the attention of the Director of Flight Operations for correction.

### **1.4 Document Custody Form**

I am responsible for keeping this manual (number PNNL-MA-530) in usable and current condition, inserting revisions when received, and recording revision dates and insertion instructions on the Record of Revisions page.



## 2.0 Departmental Organization

### 2.1 PNNL Aviation Staff Directory

Title	Name	Address	Company	Telephone Number
Director, Environment, Safety, Health & Quality (ESH&Q)	R.D. Enge	ROB/1134	PNNL	O: (509) 375-6908
Aviation Safety Point of Contact (ASPOC)	R.V. Hannigan	ETB/2322	PNNL	O: (509) 372-6176
Level II Manager, Atmospheric Science & Global Change Division	C.A. Geffen	ETB/2336	PNNL	O: (509) 375-3646
Director of Flight Operations	R.V. Hannigan	ETB/2322	PNNL	O: (509) 372-6176
Chief Pilot	R.V. Hannigan	ETB/2322	PNNL	O: (509) 372-6176
Director of Maintenance	K. Bergstrom	Pasco Airport	Bergstrom Aircraft	O: (509) 547-6271
Pilots Captain (PIC) Copilot(s)	R.V. Hannigan J.D. Hone E.W. Svancara	ETB/2322 Enterprise, OR Richland, WA	PNNL PNNL PNNL	O: (509) 372-6176 C: (541) 398-0915 H: (509) 628-2223
Scheduler	J.M. Hubbe	ETB/2321	PNNL	O: (509) 372-6134 H: (509) 375-3040 C: (509) 308-3699
Contract Specialist	A. Garcia, Jr.	Sigma V/2419	PNNL	O: (509) 375-2954
DOE/RL Aviation Safety Officer (ASO)	E. Parsons	825 Jadwin/504-A	DOE/RL	O: (509) 376-2876

### 2.2 Qualifications, Duties, and Responsibilities

PNNL staff that serve in positions of authority and exercise control over operations conducted for PNNL and DOE/PNNL must be qualified through training, experience, and expertise, and have a full understanding of the following flight operations.

- Aviation safety standards and safe operating practices
- All appropriate maintenance and airworthiness requirements of the PNNL *Flight Operations Manual*
- 14 Code of Federal Regulations (CFR) Chapter 1 (FAR) (for example, Parts 1, 21, 23, 25, 43, 45, 47, 61, 65, 91, and 135)
- PNNL may request from the DOE/RL Aviation Safety Officer (ASO) authorization to employ a person who does not meet the applicable airman, managerial, or supervisory experience requirements of a specific position as stated in this manual. If that person has comparable experience, and can effectively perform the functions associated with the position, such requirements can be waived.

### **2.2.1 Level II Manager**

A Level II manager within the Fundamental Science Directorate will be designated by the Associate Director to be responsible for aircraft operations. The designated Level II manager, along with Laboratory Safety, is responsible for implementation of aviation safety policy and for conducting periodic reviews of the *Flight Operations Manual*. The designated Level II manager has the authority to employ, discharge, promote, give awards to, and assign staff to support aircraft operations.

### **2.2.2 Aviation Safety Point of Contact**

The Aviation Safety Point of Contact (ASPOC) for PNNL reports to the Director of the ES&H Directorate and acts as the top-level PNNL contact with RL and the FAA.

#### **2.2.2.1 Qualifications**

The ASPOC for PNNL must hold a current Airline Transport Pilot (ATP) certificate for any aircraft operations for which the PIC is required to hold such a certificate (FAR 119.69). In addition, to hold this position the ASPOC must have successfully completed the required DOE Aviation Managers/Safety Officers training program described in Section 5.6 of this manual.

#### **2.2.2.2 Duties and Responsibilities**

The Aviation Safety Point of Contact (ASPOC) shall:

- When appropriate, conduct periodic safety reviews of PNNL flight operations and contractor aviation operations/activities in accordance with DOE Order 440.2, and this manual.
- Provide status reports to the DOE/RL ASO regarding the reviews made of aviation functions/activities.

- Conduct safety assessments of proposed charter aircraft operators.
- On a periodic basis, review the contractor and subcontractor aviation services procurement process.

### **2.2.3 Director of Flight Operations**

The Director of Flight Operations reports to the designated Level II Manager for Aviation Safety matters and has operational control of all Laboratory flight activities.

#### **2.2.3.1 Qualifications**

The Director of Flight Operations for PNNL must hold a current Airline Transport Pilot (ATP) certificate for any aircraft operations for which the PIC is required to hold such a certificate (FAR 119.69) and either:

- Have at least 3 years supervisory or managerial experience within the last 6 years in a position that exercised operational control over any operations conducting passenger transportation or
- In the case of a person becoming Director of Flight Operations for the first time ever, have at least 3 years experience within the past 6 years, as PIC of an aircraft operated for passenger transport or
- In the case of a person with previous experience as a Director of Flight Operations, have at least 3 years experience as PIC of an aircraft operated under Part 121 or 135.

#### **2.2.3.2 Duties and Responsibilities**

The Director of Flight Operations is responsible for:

- Supervising the Chief Pilot and other PNNL employees whose duties require work on, in, or around the aircraft.
- Safely conducting all flight operations and ensuring they are performed in compliance with DOE Aviation Procedures, FAA, and PNNL policies, rules, and regulations.
- Acting for Battelle/PNNL, including the signing of FAA correspondence and operations specifications.
- Communicating with the Federal Aviation Administration (FAA) Standards District Office and the National Transportation Safety Board (NTSB) and filing all required documents.
- Maintaining personnel, maintenance, and official correspondence files for PNNL flight operations.



- Revising this manual as needed, submitting the proposed revisions to DOE, receiving concurrence from DOE that revisions are accepted, and distributing those revisions to all manual holders.
- Ensuring that all aircraft are maintained in compliance with all applicable FAR, PNNL, and DOE directives.
- Coordinating with the Director of Maintenance regarding the timely correction of mechanical or electrical irregularities and discrepancies.
- Monitoring security and environmental affairs, including complete material safety data sheets on all chemicals, fire drills, and safety training.
- Scheduling aircraft availability in consultation with the Chief Pilot and the Scheduler.
- Directing the employment, oversight, and performance reviews of Flight Crew personnel.
- Managing the development of organizational, facility, and equipment recommendations.
- Providing input to the G-1 aircraft annual business and operating plans.
- Participating in industry associations.
- Completing special projects as assigned by PNNL management.
- Establishing and maintaining rapport with corporate executives, customers, and industry associates.
- Approving flight crew assignments in accordance with this manual.
- In the event of an incident/accident or off-normal event, the Director of Flight Operations will notify Battelle Columbus Operations' Vice President for Environment, Safety, Health & Quality (ESH&Q) with the pertinent details.

## **2.2.4 Chief Pilot**

### **2.2.4.1 Qualifications**

The Chief Pilot (FAR 119.69) for PNNL must hold a current ATP certificate with appropriate ratings and be qualified to serve as PIC on all PNNL aircraft. In addition,

- In the case of a person becoming Chief Pilot for the first time ever, have at least 3 years experience, within the past 6 years, as PIC of an aircraft operated for passenger transport or

- In the case of a person with previous experience as a Chief Pilot, have at least 3 years experience as PIC of an aircraft operated under Part 121 or 135.

#### **2.2.4.2 Duties and Responsibilities**

The Chief Pilot reports to the Director of Flight Operations, and may be delegated operational control of the flight operations in the absence of the Director of Flight Operations, and is responsible for:

- Establishing flight schedules, assigning aircraft and flight crews to specific flights, and determining that such assignments and flight schedules are within the guide-lines set forth in the sections on flight time/duty time limitations and the days scheduled.
- Ascertaining that crew members are assigned in a manner that will maintain the currency requirements outlined in this manual; in addition, keeping records and monitoring the flight crew currency requirements.
- Scheduling and notifying the crew members, at least one week in advance, of recurrent training and flight checks.
- Scheduling aircraft flight crew in support of approved operations.
- Monitoring and ensuring that all requirements of FAR 61 are complied with concerning pilot certificates, medical certificates, training, and currency. The Chief Pilot is the primary contact for all communications with the FAA concerning PNNL flight operations.
- Continually reviewing all flight operations and their conformance to safe operating procedures.
- Coordinating closely with the lead scientist or technician regarding research equipment matters. The Chief Pilot ensures that all research equipment installations and modifications are accomplished in a manner that satisfies structural load limitations, as well as flight performance limitations.
- Coordinating schedules for crew member training, vacation, and days off, as approved by the Director of Flight Operations.
- Providing to each passenger a Customer Satisfaction Survey form that is returned to the Chief Pilot following the completion of the flight. This survey contains questions on the passenger safety briefing, condition/cleanliness of the aircraft, pilot/crew member professionalism, and flight conducted in a safe manner (see Appendix A, page A.7).
- Disseminating information to all crew members about routes, airports, notices to airmen (NOTAMS), navigation aids (NAVAIDS), PNNL directives, proficiency records, pilot files, flight schedules, duty time records, reports, and correspondence about flight operation activities.

- Maintaining proficiency as PIC on all PNNL aircraft.
- Conducting and documenting periodic safety meetings. Prior to each extended field program, a safety meeting will be conducted with all personnel included in the flight operation, including the project manager, to discuss and assess the specific risks of the program.
- Designating the PIC for each flight who is directly responsible for and is the final authority as to the operation of the aircraft. In matters affecting the safety of a flight operation, the PIC may deviate from any rule of the FAR and this manual to the extent required for ensuring the safety of the operation (FAR 91.3).
- Maintaining a file of applicable Material Safety Data Sheets for all on-board chemicals.
- Participating in industry associations.
- Completing special projects as assigned by PNNL managerial staff.
- Establishing and maintaining rapport with corporate executives, customers, and industry associates.

## **2.2.5 Director of Maintenance**

### **2.2.5.1 Qualifications**

The Director of Maintenance for PNNL [(FAR 119.69(a))] must hold a mechanic's certificate with airframe and power plant ratings, Inspectors Authorization, and have either of the following:

- 3 years of experience within the past 3 years maintaining aircraft as a certified mechanic, including, at the time of appointment as Director of Maintenance, experience in maintaining the same category and class of aircraft as PNNL uses or
- 3 years of experience within the past 3 years repairing aircraft in a certified airframe repair station, including 1 year in the capacity of approving aircraft for return to service.

### **2.2.5.2 Duties and Responsibilities**

The Director of Maintenance reports to the Director of Flight Operations. The Director of Maintenance has responsibility for the following:

- Inspection/Maintenance Program [FAR 91.409f(3)]
  - PNNL aircraft shall be maintained in accordance with the FAA-approved manufacturer's recommended maintenance inspection program.

- Major Work (Contractor to outside vendors)
  - Request for Proposals: The Director of Maintenance, in association with the Director of Flight Operations, shall solicit proposals from qualified vendors. Vendors shall be approved FAA repair stations, factory-trained technicians, or factory-authorized service centers.
  - Evaluation of Proposals: The Director of Maintenance, in association with the Director of Flight Operations, will evaluate all proposals and make vendor selection.
- Aircraft Maintenance Records
  - It shall be the responsibility of the Director of Maintenance to ensure that all aircraft log entries are accurate and current.
  - A (Manufacturers') Computerized Aircraft Maintenance Program (CAMP) will be maintained on the PNNL aircraft in order to assist the Director of Maintenance in tracking aircraft maintenance status.
- Aircraft Parts
  - All parts, when ordered from home base, will be ordered by the Director of Maintenance or his designee (maintenance technician).
  - The Director of Maintenance will check all maintenance material for condition and accuracy, and accept them for use upon their arrival at home base.
  - Inventory Control: All maintenance material will be rotated on a first-in-first-out-basis to ensure the timely usage of parts and supplies.
  - Periodic inventory and replacement of maintenance materials.
- Maintaining compliance with DOE, FAA, and PNNL directives.
- Ensuring appropriate and adequate tools and equipment are available.
- Maintaining budget responsibility for applicable budget line items.
- Ensuring tools and equipment are calibrated or certified and maintaining associated records.
- Maintaining all necessary work records and logbooks, including certification of the aircraft permanent maintenance records indicating the aircraft is approved for return to service. Maintaining the weight and balance records for aircraft.

- Participating in industry associations.
- Completing special projects as assigned by the Director of Flight Operations/Chief Pilot.
- Training and supervising maintenance personnel.
- Assisting with development of aviation policies, short- and long-range plans, the annual operating budget, and salary structure.
- Recommending the proper staffing and performance standards for maintenance.
- Establishing maintenance safety rules and procedures.
- Ensuring that maintenance personnel are thoroughly familiar with DOE and PNNL directives, applicable FAR, pertinent manuals, practices, and publications.
- Establishing programs for maintenance technician proficiency training, reviews, and upgrades in accordance with FAA and PNNL requirements.
- Establishing aircraft handling procedures.
- Coordinating maintenance activities with flight operations.
- Providing efficient and timely scheduling of all maintenance.
- Directing compliance of minimum equipment list (MEL) maintenance procedures.

## **2.2.6 Captain/Pilot in Command**

The Captain reports to the Chief Pilot. The Captain/PIC is responsible for ensuring the aircraft is in an airworthy condition prior to flight and for operating the assigned aircraft. The PIC is directly responsible for the safety of the passengers, crew, and cargo. The decision regarding whether a flight may be safely completed rests with the PIC, the final authority regarding the operation of the PNNL aircraft. The Captain must comply with this *Flight Operations Manual*, and with DOE and PNNL directives, and FAA regulations.

### **2.2.6.1 Qualifications**

An individual shall be considered qualified for the position of Captain when the following requirements are met:

- Total flight time - 5000 hours
- Multi-engine turbine time – 2500 hours
- Time in type – 100 hours
- Airline Transport Pilot (ATP) Certificate
- Type Rating in equipment to which assigned
- Second Class Medical Certificate (current)

### **2.2.6.2 Duties and Responsibilities**

The following list describes the duties of the Captain/PIC:

- Notifying the Chief Pilot if he or she does not meet the currency requirements of this manual. No crew member will be scheduled for flight duty if any of the required certificates are not current.
- Performing a preflight self-evaluation of his/her mental and physical condition to competently and safely perform a scheduled mission and, without penalty, may cancel or refuse to fly that mission.
- Obtaining up-to-date weather, airport, and NAVAID condition reports, prior to each departure.
- Obtaining required training, regarding the handling of Classified or Business Sensitive material, as to how it shall be packaged and marked to meet the DOE or DoD requirements for the appropriate classification level.
- Ensuring complete material safety data sheets for all on-board chemicals are on board the aircraft and the flight crew is trained in their use.
- Maintaining contact with the Scheduler while on a trip to coordinate changes, as necessary.
- Completing Trip Sheet, Flight Logs, and Aircraft Discrepancy Reports, as necessary (see Appendix A).
- Completing administrative assignments as directed by the Director of Flight Operations/Chief Pilot.
- Ensuring the aircraft is clean and prepared for flight with all provisions on board for the safety and comfort of the passengers.
- Calculating and reviewing the aircraft weight and balance, fuel on board, and performance charts.

- Complying with published standard operating procedures.
- Supervising the first officer [Second in Command (SIC)] in any duties necessary for the smooth, safe, and efficient operation of the aircraft.
- Coordinating the functioning of all crew members assigned to the flight.
- Making decisions necessary to
  - Start, delay, or cancel the flight
  - Deviate the flight from the planned route or destination when operating conditions dictate.

## **2.2.7 Copilot and Contract Copilot (First Officer)**

The Copilot and the First Officer report to the Chief Pilot and are accountable to the PIC of the flight for the conduct and execution of assigned duties.

### **2.2.7.1 Qualifications**

An individual shall be considered qualified for the position of Copilot when the following requirements are met:

- Total flight time - 1500 hours
- Multi-engine time – 500 hours
- Time in type – 25 hours
- Airline Transport Pilot (ATP) Certificate or Commercial Pilot Certificate with appropriate category and class rating
- Second Class Medical Certificate.

### **2.2.7.2 Duties and Responsibilities**

Responsibilities of the copilot include:

- Assisting the Captain with discharging safety responsibilities.
- Performing duties as assigned during flight preparation and in flight.

- Being prepared to assume the PIC duties, in the event the PIC is incapacitated.
- Being familiar with and following all FAR, DOE, and PNNL directives pertinent to assigned duties.
- Notifying the Chief Pilot if he or she does not meet the currency requirements of this manual. No crew member will be scheduled for flight duty if any of the required certificates are invalid.
- Performing a preflight self-evaluation of his/her mental and physical condition to competently and safely perform a scheduled mission and, without penalty, may cancel or refuse to fly that mission.
- Notifying the Chief Pilot, if it appears he or she will exceed duty or flight time limitations.

### **2.2.8 G-1 Research Crew**

Personnel that install, operate, or maintain research equipment on the G-1 comprise the G-1 research crew and have the following responsibilities:

- Installing, operating, maintaining, and removing equipment according to the guidelines published in this manual.
- Providing to the PIC a copy of the complete material safety data sheet for all chemicals brought on board the G-1.
- Managing the safe transport, use, and disposal of all hazardous materials associated with their equipment.
- Having themselves and their research equipment ready for flight at least 15 minutes prior to the scheduled departure time.
- Knowing and adhering to the provisions of this manual.
- Following the directions of the PIC.
- Understanding and following in-flight emergency procedures.
- Stowing securely all tools, supplies, and hand-held equipment for takeoff and landing.
- Using their seat belts as instructed by the pilots and whenever seated during flight.
- Removing all refuse and unneeded supplies and equipment post-flight.



If research electrical power is to be used, at least one member of the research flight crew must be trained in the operation of the research power distribution system.

If the aircraft research data acquisition system is to be used, at least one member of the research flight crew must be trained in its operation.

The Principal Investigator for a research mission, should submit to the Scheduler an Initial Aircraft Support Request Form at least 6 months prior to the intended date of use and a final Research Aircraft Deployment Document at least 1 month prior to scheduled use.

### **2.2.9 G-1 Research Aircraft Scheduler**

All inquiries about or requests for the use of aircraft for extended field study operations shall be directed to the G-1 Aircraft Scheduler using the Initial Aircraft Support Request form or the Research Aircraft Deployment Document found in Appendix A, pages A.30 and A.31, respectively. Requests should be submitted as early as possible to avoid any scheduling conflicts with aircraft availability and the flight crews.

The Scheduler is the manager of flight activities and reports to the cognizant Level II manager. Duties include:

- Coordinating and assimilating master flight schedules for the aircraft.
- Coordinating the schedules of remotely based aircraft and crew members, if applicable.
- Reporting aircraft usage to Laboratory officials.
- Formulating contingency plans for mechanical and weather delays, if appropriate.

### **2.2.10 Contract Specialist**

This senior position is responsible for evaluating proposals, negotiating, placing, and administering all subcontracts and/or purchase orders for charter aircraft services, in support of programs, projects, and related support services. These are typically complex and specialized in nature requiring the incumbent to secure the best balance of price, quality, delivery, and services available within the guidelines established by Battelle, the client, and applicable government acquisition regulations.

The position is responsible and accountable for ensuring that contractual business is accomplished in accordance with established Department of Energy (DOE) and Battelle, Pacific Northwest Division (Battelle) and Corporate policies. The position is responsible and accountable for maintaining and enhancing the business reputation of the client and Battelle Memorial Institute (BMI) at the highest of ethical standards.

## 3.0 PNNL Aviation Policy and Procedures

### 3.1 General Policy

PNNL recommends the use of Laboratory aircraft for all research conducted from the air and the use of scheduled airlines for company business whenever air travel is required. The general policy and philosophy of PNNL flight operations is that every effort will be made to accomplish each flight within the context of safety, FAR and DOE directives, and this manual. PNNL will revise this manual, as necessary, and will keep at least one copy at the principal operations base of PNNL, 4020 Stearman Ave., Tri-Cities Airport, Pasco, Washington.

At all times, the safety of the crew, passengers, equipment, and property will be paramount over other flight objectives. Pilots are required to plan flight missions from a standpoint of safety. Rescheduling, consideration of every alternate method, or even cancellation of a research or a passenger flight is permitted should any doubt arise concerning the safe completion of a planned flight. All operations will be conducted with maximum safety, consistent with flight requirements and reasonable economy, and in full compliance with applicable FAR and this manual.

All flight crew members are responsible for compliance with the FAR and policies set forth in this manual. All aircraft flight personnel will be knowledgeable of FAR (especially FAR Parts 61, 91, and 135) and this manual and will be responsible for assuring all their activities are in compliance with these provisions. Each flight crew member is responsible for maintaining the qualifications required by the FAR and the policies of this manual for the flight position each one holds.

Flight and scientific crew members are responsible for alerting other crew members, especially the designated PIC, of any condition, occurrence, procedural error, or malfunction that may affect the safe conduct of the flight. They are also responsible for a realistic evaluation of their own physical and mental well-being as it affects their duties. Pilots are expected to use good judgment relative to obtaining adequate rest prior to flight duty. All crew members are expected to discuss with the Chief Pilot any mental or emotional stress or physical condition that may have a detrimental effect on the performance of flight duties.

The procedures and guidelines in this manual are directed toward the safe and efficient operation of PNNL flight activities. However, it is emphasized throughout this manual that pilots will exercise prudence and good judgment in all flight operations. The policies and procedures outlined in this manual apply to all PNNL aircraft operations. The PNNL Aviation Risk Management Committee can grant deviations from these procedures and guidelines when circumstances are appropriate.

### 3.1.1 PNNL-Owned Research Aircraft

Aircraft operated by PNNL normally will meet the requirements of standard and restricted airworthiness categories, as set forth in the FAR. See Appendix A, pages A.25 and A.27 for standard and restricted airworthiness certificates with operations limitations for aircraft with multiple airworthiness certificates and registration. In isolated instances, an experimental category may be required. This policy is consistent with that of PNNL and DOE, assuring maximum safety at a reasonable operating cost.

### 3.1.2 International Operations

- The Scheduler shall notify the Director of Flight Operations and Chief Pilot, as soon as possible, of international trips, so that appropriate flight crew assignments can be made.
- The Director of Flight Operations and Chief Pilot will make the crew assignments for international trips.
- The Scheduler shall also coordinate with and provide assistance to the assigned PIC to make arrangements for such a trip.
- The PIC assigned to an international trip is responsible for handling the arrangements for the trip.

### 3.1.3 Charter Operations

#### 3.1.3.1 Contracting for Charter Aircraft Services

PNNL staff requesting charter aircraft services to fulfill travel or research requirements must work with the ASPOC and the Contract Specialist to place a contract with the charter service provider. All contracts for such services will be established in accordance with PNNL procurement policy.

#### 3.1.3.2 Guidelines for Use of Chartered Aircraft

**Policy** - Aviation services contractors shall hold Air Carrier, Commercial Operator, or other appropriate certificates under 14 CFR Parts 91, 121, 125, 127, 133, 135, 137, and 145, as applicable for the type of operations conducted. The specifications and ownership of the prospective aircraft shall be listed on the Operating Specification.

Multi-engine modern aircraft shall be utilized unless specific requirements call for single-engine aircraft. Flight crews shall include a minimum of two qualified pilots on multi-engine aircraft.

Minimum PIC qualifications are a FAA Commercial Pilot Certificate (ATP rating desired) with the appropriate category and class rating. PIC requirements are a second-class medical certificate, 1200 hours in category, 100 hours in class, 100 hours PIC in category during the previous 12 months, and 25 hours PIC in make and model of aircraft (10 hours of which shall have been in the preceding 6 months).

Pilots should be named in the operating specifications of the aviation service contractor and certified for the specific type of operations to be conducted. The pilots shall be full-time employees of the operator unless approved by PNNL. The charter operator and pilots shall be fully certified for the types of aircraft used.

All aircraft shall be certified for instrument flight and equipped in accordance with applicable FAA regulations. Manufacturer and FAA minimum equipment lists will be used as required. All aircraft, except military aircraft, shall have FAA certification. The charter operator shall have full control over aircraft maintenance, and all aircraft shall be maintained in accordance with applicable FAA directives.

PNNL-owned aircraft, not leased aircraft, shall be used whenever possible.

Training programs for charter flight and ground personnel shall meet, to the extent possible, the requirements of 14 CFR Part 121 for large aircraft (gross weight of 12,500 pounds or greater) and 14 CFR Part 135 for small aircraft (gross weight under 12,500 pounds).

The charter operator also shall provide a suitable flight and ground crew training program for the safe handling of the types of materials and cargo to be transported. Certain special safety requirements may be necessary for air shipments of radioactive cargo and other special cargo.

The charter operator shall provide a suitable survival and first aid kit on board the aircraft. Also, the charter operator, to the extent possible, shall provide shoulder-harness-type seat belts.

**Insurance** - The following items describe the insurance requirements for charter operations. A certificate evidencing this insurance is required

a. **For Contract 1831 Charters:**

*Aircraft and Passenger Liability* - \$5,000,000 combined single limit if 4 or fewer passenger seats; \$7,500,000 if 5 or more passenger seats; \$100,000 per person minimum passenger liability.

*Additional Insured* - PNNL should be named as an additional insured.

*Hull Coverage* - full coverage for the value of the aircraft.

b. **For Contract 1830 Charters:**

*Bodily Injury and Passenger Liability* - at least \$200,000 per person and \$500,000 per occurrence for bodily injury, other than passenger liability, and \$200,000 multiplied by the number of seats or the number of passengers, whichever is greater.

*Property Damage Liability* - at least \$200,000 per occurrence.

*Hull Coverage* - none.

**Documentation** - The leased or charter operator shall submit PNNL's Aviation Operations Checklist Charter Aircraft (included in Appendix A, page A.17) to document compliance with these requirements to the PNNL Contracts Specialist for verification.

**Contract Process** - This process uses the following steps.

a. **Purchase Requisition and Statement of Work**

The PNNL staff member (Technical Administrator or TA) requiring aircraft charter services must submit a purchase requisition (PR) and a Flight Operations Request form (shown in Appendix A, page A.28, and see SBMS Aircraft Flight Operations found at <http://sbms.pnl.gov/standard/12/1200t010.htm>). The PR and Flight Operations Request form, when properly prepared, authorize the Contracts Specialist to initiate procurement action.

A detailed statement of work (SOW) describing the entire project must be attached to the PR. The SOW should contain as complete a description of the services required as possible, including a general discussion of the type of work, the objectives of the work, and why it is appropriate to use a chartered aircraft to perform the work.

b. **Competitive vs. Noncompetitive Procurement**

It is PNNL policy that procurement of all services be competitive to the maximum practical extent. (A noncompetitive procurement is one in which only one source is solicited.)

If the TA believes it is reasonable to expect that only one offerer could perform the work, and thus the procurement would be noncompetitive, the TA must include a sole source justification (SSJ) with the PR. The SSJ must set forth enough facts and circumstances to clearly and convincingly establish that competition is neither feasible nor practicable.

c. **Risk Management**

On receipt of the PR, the Contract Specialist will contact the ASPOC to evaluate the operation and if an above-normal-risk operation exists, the ASPOC must convene a Aviation Risk Management Committee (ARMC) to discuss the various risk factors involved with the proposed flight. The ARMC may determine the risks cannot be satisfactorily mitigated, and thus the project should not proceed further. Alternatively, the ARMC may make recommendations to mitigate all identifiable risks.

d. **Service Contract Act of 1965**

Under the Service Contract Act of 1965 (hereafter referred to as the Act), the U.S. Department of Labor (DOL) considers pilots and flight crew as service employees. Battelle has an obligation, under its operating contract with DOE, to fulfill the requirements of the Act. Therefore, Battelle must ask the Washington State Department of Labor and Industries to issue a wage determination for any

contract in excess of \$25,000 requiring such services. This request for a wage determination must be made 70 days before a solicitation subject to the Act is issued. The TA must allow enough lead time to satisfy this 70-day waiting period.

If a contract is not in excess of \$25,000, the clause, Service Contract Act of 1965 (Short Form), shall be used in all appropriate written solicitations or contracts.

e. **Request for Proposal**

On successful completion of the ARMC review and request for wage determination, the Contract Specialist shall issue a Request for Proposal (RFP), inviting the offerer(s) to provide proposals for the required services. Depending on the estimated dollar value and complexity of the procurement, the offerer(s) will be allowed 7 to 30 days to respond to the RFP.

f. **Proposal Evaluation**

Proposal evaluation is the assessment, if specified by the RFP, of the offerer's ability (as conveyed by the proposals) to successfully perform the SOW described by the RFP. Proposals shall be evaluated solely in accordance with the factors specified in the RFP.

As part of an overall responsibility determination, pre-award audits of one or more of the offerers' sites may be required. Such audits will often include a review of the offerer's operations, as well as the qualifications of the pilot and any other key personnel, and the maintenance and general condition of the aircraft.

In addition to the pre-award onsite audit, the PNNL ASPOC will contact, on an as-needed basis, the cognizant FAA office in order to verify that the pilot and aircraft meet current FAA regulations.

The PNNL ASPOC will meet with the Contract Specialist to review all facts ascertained regarding the offerer's operations, pilot currency, and aircraft maintenance records. The review will be conducted in accordance with PNNL's Aviation Operator Checklist Charter Aircraft (Appendix A, page A.17).

g. **Cost/Price Analysis and the Technical Evaluation**

The Contract Specialist is responsible for ensuring that a fair and reasonable price is obtained for the charter aircraft services. The Specialist accomplishes this task in part by the performance of price analysis, or of cost analysis, or a combination of the two. The PNNL Cost/Price Analyst will perform these evaluations for any contracts in excess of \$100,000. Otherwise, the Contract Specialist will perform the analysis.

Generally, as part of the cost/price analysis, a technical evaluation performed by the TA on the selected offerer's cost proposal will be required. It is important the TA complete this evaluation in a timely manner, as the cost/price analysis cannot be completed without it.

#### **h. Contract Award**

The Contract Specialist shall incorporate, as appropriate, the recommendations provided by the cost/price analysis, technical evaluation, the Environment, Safety and Health Department, the Insurance Office, the Legal Office, and the ARMC into the provisions of a contract for the charter services to the selected offerer.

#### **i. Contract Administration**

- Only the PNNL Contracts representative has the authority to issue a contract to authorize the commencement of any flights. No person shall attempt to arrange for or participate in any flight under a contract for flight services unless the PNNL Contracts Specialist has issued a contract.
- Staff members may request the issuance of a contract for aircraft services for which a contract is established by
  - Completing a requisition via PNNL's electronic "WEBREQ" transmission for the specific contract to be used. A SOW or itinerary shall be attached to the Work Order describing the nature of the flights requested, the flight plan to be used, and the names of the staff members to participate in the flights.
  - The requisition shall show the name of and be signed by a PNNL Line Manager who will be aware of all details associated with the flight. The staff members using the flight services shall, for each flight, ensure this Line Manager is fully aware of the time of departure, the intended flight plan, and the return time of the flight.
  - In addition to the Line Manager, the individual requesting the flight services, the cognizant financial specialist, and the ASPOC shall sign the requisition.
  - The signed requisition shall be provided to the PNNL Contracts Specialist. Prior to issuance of the contract, this Contracts Specialist shall
    1. Review the requisition to ensure the flights requested are within the contract scope and adhere to any risk management prescriptions developed for the contract that will support the contract.
    2. Unless otherwise approved by the PNNL ASPOC, request the Contractor provide a report delineating the current status of all aircraft maintenance items and pilot flight history.
    3. All items on the aircraft maintenance report and the pilot flight history must be acceptable to the PNNL ASPOC before the Work Order is issued.

**j. Post-Award Audits**

When decided necessary by the PNNL Contracts Specialist and the PNNL ASPOC, a post-award audit of the contracted charter operator shall be conducted. Such audits will generally include a review of the Contractor's operations and verification of the FAA certifications of the Contractor, as well as the qualifications of the pilot and any other key personnel, and the maintenance and general condition of the aircraft.

**k. Reporting of All Aircraft-Related Near-Misses or Any Off-Normal Events**

PNNL staff members participating in a chartered or leased aircraft flight shall, within 72 hours, notify in writing the PNNL ASPOC, the cognizant Laboratory Safety representative, and the PNNL Contracts Specialist of any near-misses or other off-normal events that occur during any phase of flight. At a minimum, the notification will contain the following information:

- The name of the contractor providing the service and the PNNL contract number
- A summary of all pertinent facts relating to and describing the near-miss or off-normal event.

**l. Other Factors - Contract Requirements for Research Flight Operation**

TAs must be aware of the following items contained in contracts for research flights. By fully executing the contract, the charter service operator has agreed to abide by these terms. All TAs are also expected to abide by these terms.

- During the operation of the flights described here, the PIC of the aircraft shall have complete authority over all aircraft operations. PNNL staff members are not authorized to change the parameters of the flight in any way that would jeopardize the safety of the passengers and crew.
- Prior to the first flight under this contract, a safety meeting must be held that includes the TA, a Safety representative, the flight crew, and all PNNL and Contractor personnel associated with the flight, including ground personnel. In addition, prior to all subsequent flights under this contract, the TA, the flight crew, and all personnel associated with the flight, including ground personnel, shall hold a safety meeting and review all aspects of the flight mission.
- Emergency Responses: In case of an emergency involving a flight chartered by PNNL, the Contractor shall immediately contact the PNNL Emergency Phone Number at (509) 375-2400. At the earliest possible time thereafter, the Contractor should also notify the ASPOC.
- The TA will inform the Contract Specialist of the cognizant Line Manager who will be knowledgeable of all flights that occur under the contract (such as, when the TA has left for a flight, when they are due back). The Contract Specialist shall clearly identify in the contract file the Line Manager's name and telephone number. The Contract Specialist shall designate, in writing, this individual as the point of contact (POC) cognizant of all flights to occur under the contract.



### **3.1.4 PNNL Internal Self-Assessment**

At least annually, one or more line managers to whom the Director of Flight Operations, the Chief Pilot, and the Director of Maintenance report will conduct a self-assessment of PNNL aircraft operations using the checklist for research aircraft operations presented in Appendix A, page A.40. This checklist covers many aspects of research flight operations and maintenance and verifies compliance with the provisions of MA-530, applicable DOE Aviation Orders, and OSHA and FAA regulations. Similar checklists are used by the PNNL Aviation Safety Point of Contact and DOE Aviation Safety Official to audit providers of charter aircraft services (see Section 3.1.3.2). A signed and dated copy of the completed checklists will be retained by the Director of Flight Operations for a period of three years.

## **3.2 Safety Procedures/Policy**

The following figure illustrates the aviation safety drivers at PNNL. Responsibilities and accountabilities are shown next in the aviation safety table.

### **3.2.1 Safety Program Goals**

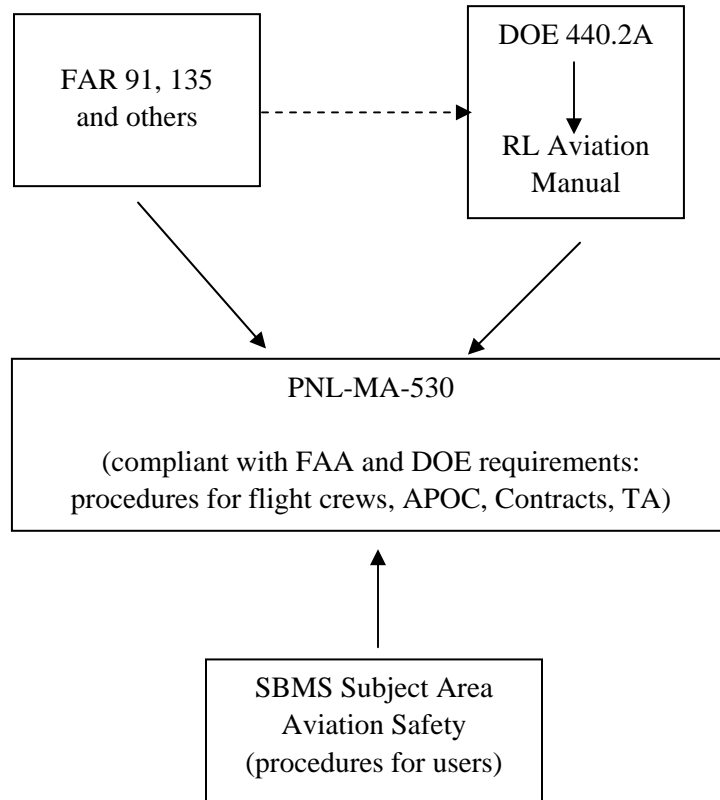
It is the responsibility of every PNNL employee involved with the G-1 aviation activities to understand and help achieve the following safety goals:

- Provide a safe and healthful working environment for all employees.
- Prevent aviation accidents.
- Minimize damage and severity of injury resulting from aviation mishaps.
- Incorporate safety aspects into flight and maintenance operations planning.
- Reduce operating costs and increase mission capability by protecting human and material assets.
- Eliminate hazardous conditions.

### **3.2.2 Aviation Safety Policy**

- PNNL supports all requirements of law regarding aircraft safety and intends to provide all employees with a safe and healthful working environment.
- Every attempt will be made to prevent accidents and reduce the effects of accidents that may occur.
- The Director of Flight Operations and the Director of Maintenance will establish and maintain a program that helps identify/manage risks and hazards.

# Aviation Safety Drivers



# Aviation Safety

Roles	Responsibilities/ Authorities	Accountabilities
Hawker Chief Pilot	Flight Operations	BMI
G-1 Chief Pilot		FSD
Technical Administrator/Project Manager	Project Management	Product Line Manager
Aviation Risk Management Committee Chairman of ARMC Aviation Safety Point of Contact Contracts Specialist Finance/Insurance ES&H Representative Legal Counsel Quality Engineer	Risk Management	Lab Director
Director of Flight Operations	Oversight	FSD Director

- The PNNL aircraft safety program will include all aspects of flight and maintenance safety.
- Responsibility for implementing the safety program rests with the Director of Flight Operations and the Director of Maintenance.
- The DOE/RL Aviation Safety Officer will be provided access to aviation activities and charter aircraft operations for assessments.

### **3.2.3 Accident Prevention Program**

The aviation safety program is composed of three elements. They are standardization, compliance, and hazards identification.

- Standardization is an ongoing responsibility of all personnel associated with aviation activities.
- Compliance with safety policies, procedures, and practices as spelled out in this manual, the FAR, and manufacturer's manuals is the responsibility of all aviation personnel. The Director of Flight Operations is responsible for annually inspecting the organization for compliance.
- The Hazard Identification System is both an informal and a formal reporting system. Aviation personnel are expected and encouraged to inform their manager of a hazard.

### **3.2.4 Safety Reporting System**

#### **3.2.4.1 Hazard Report**

- Personnel may fill out a PNNL Aviation Safety Hazard Report form (Appendix A, page A.21). All PNNL employees use this form to report any hazard in their work area. The completed form may also be used as an equipment deficiency report.
- This report is sent to the Director of Flight Operations and the sender can remain anonymous. The Director of Flight Operations assures the confidentiality of the Hazard Report.
- It is the responsibility of the Director of Flight Operations to respond to all Hazard Reports.
- Inspections regarding hazard elimination are also the responsibility of the Director of Flight Operations.

### **3.2.4.2 Aviation Safety Incident/Accident or Off-Normal Event Operations Checklist**

This checklist form is located in Appendix A, page A.22. The form is intended to provide crew members with an on-site checklist should they be involved in an incident. The Emergency Notification Chart is also located in Appendix A, page A.23.

The Director of Flight Operations is responsible for recording and tracking incidents, accidents, or off-normal events. The Emergency Notification Chart serves as a guide for the type of incidents that are tracked.

### **3.2.4.3 Incident/Accident or Off-Normal Event Forms**

The PNNL Aviation Safety Incident/Accident or Off-Normal Event Worksheet (Appendix A, page A.22) is intended to provide the basic information needed for an investigation of an incident, accident, or off-normal event. Additional information may be requested of flight and scientific crew if an investigation of the incident, accident, or off-normal event by PNNL, DOE, or the NTSB is required.

The Incident/Accident or Off-Normal Event Report is submitted to the Director of Flight Operations. After reviewing the recommendations, the Director and his staff will develop specific tasks to address certain recommendations.

### **3.2.4.4 Information Distribution System**

The Director of Flight Operations distributes general safety information on a continuing basis to all applicable PNNL employee groups.

## **3.2.5 Safety Education and Training**

Safety-related training for aviation employees is the joint responsibility of the Director of Flight Operations, Chief Pilot, and Director of Maintenance.

The priority for receiving safety training is:

1. Director of Flight Operations
2. Chief Pilot
3. Director of Maintenance
4. Flight crew members and other staff
5. Customers (passengers).

### **3.2.5.1 Hearing Conservation**

- Flight crew (pilots) are to wear noise-reduction headsets during flight operations.
- Scientific flight crew are to wear noise-reduction ear plugs and/or headsets whenever the engines of the G-1 are in operation.
- Ground support personnel are to wear noise-reduction ear plugs and/or muffs whenever within 100 feet of the G-1 aircraft with its engines running.
- PNNL flight operations and scientific support personnel will be enrolled in the Hearing Conservation Program.
- Minimum acceptable manufacturer's noise reduction rating for ear plugs is 31 db and 23 db for ear muffs.

### **3.2.6 Specialized Training**

#### **3.2.6.1 Flight Operations**

Training will be provided on a continuing basis on topics such as wind shear, air traffic control procedures, seasonal weather, survival equipment, hazardous materials handling (as needed), first aid, and medical aspects for aviators. The Director of Flight Operations will manage these elements of training.

#### **3.2.6.2 Maintenance**

Specialized maintenance training will be provided on a continuing basis on topics such as hazardous materials handling (as needed), special equipment operation, Occupational Safety and Health Administration (OSHA) requirements, first aid, and other relevant topics. The Director of Maintenance manages these elements of training. The Director of Flight Operations retains training oversight.

### **3.2.7 Accident Notification and Investigation**

#### **3.2.7.1 Incident/Accident or Off-Normal Event Notification**

The hierarchy of responsibility for notifying PNNL, DOE, the FAA, or the NTSB of an incident/accident or off-normal event is 1) the Captain/PIC, 2) the First Officer, 3) the Director of Flight Operations, and 4) the Scheduler. The Emergency Notification Chart in Appendix A, page A.23 shows which agencies must be notified for different types of incidents. Other than this notification, the flight crew will not make any statements until they have an opportunity to recover fully from shock, review the details of the event in a thoughtful manner, and seek competent legal counsel. The flight crew will not discuss the incident/accident or off-normal event with or make a statement to the media.

### **3.2.7.2 DOE and NTSB Accident Investigations**

The Director of Flight Operations will be the principal PNNL contact with DOE or NTSB investigators and will submit to external investigators and PNNL management a complete Incident/Accident or Off-Normal Event Report (Appendix A, page A.22). The report shall follow the International Civil Aviation Organization (ICAO) format as closely as possible and include:

- History
- Analysis
- Findings
- Recommendations and Actions.

### **3.2.7.3 PNNL Accident Investigations**

For an incident or accident or off-normal event for which no DOE or NTSB investigation is required, the Director of Flight Operations, with participation by the PNNL Laboratory Safety Department, will conduct a root cause analysis that:

- Uses an expert team with skills needed to thoroughly assess an event—depending on the significance (e.g., life threatening) of an incident/accident or off-normal event, to issue direction to secure the scene to allow accurate documentation of conditions associated with the event, and to allow an investigative team to observe those conditions. Whenever possible photograph the scene (with reference objects, e.g., pencil for dimensional perspective) and provide a written narrative describing conditions associated with an event.
- Defines the basic problem/effect that is to be prevented from recurring.
- Uses cause and effect process analysis to define the root cause and alternative solution(s).
- Assesses the risks with solution implementation.
- Incorporates root cause solutions through process improvement(s).
- Measures success of process performance/productivity improvement.

### **3.2.8 Drug Testing - Flight and Maintenance Crew Members (FAR 135.251, Part 121, Appendix I)**

Testing of PNNL staff for prohibited drugs will be done when the crew members receive their annual aviation medical, and paid for by PNNL. Test results are to be provided promptly by the crew member to the Director of Flight Operations.

### **3.2.8.1 Flight Crew Use of Non-Prescription Drugs**

Certain drugs and narcotics in common use sometimes have a marked effect on the nervous system and can be highly detrimental to flight crew members' ability to function properly. Even common cold remedies, nose sprays, antihistamines, sulfa, and streptomycin can have adverse side effects. Crew members should ask their doctors if a drug they have prescribed would have an effect on judgment or flying ability. Other than simple aspirin, all nonprescription drugs are suspect and should be evaluated before use.

### **3.2.9 Alcoholic Beverages (FAR 135.121)**

Consumption of alcoholic beverages by flight crew members on duty, or within the time period specified by the FAR prior to a scheduled flight, shall be cause for immediate dismissal. The greater the quantity of alcohol consumed, the longer the period of time required to eliminate its lingering effect. Personal discretion and good judgment shall be the primary considerations for flight crew personnel.

No flight crew member will partake of alcoholic beverages of any kind while on duty or within 12 hours of anticipated flight duty (FAR 91.17). Accepting flight duty when intoxicated or when suffering from the aftereffects of alcohol consumption will be grounds for immediate dismissal.

Except in an emergency, the pilot of a PNNL aircraft may not allow a person who appears to be intoxicated, or who shows physical indications of being under the influence of drugs (except a medical patient under proper care), to be carried in that aircraft.

On request of a law enforcement officer, a PNNL flight crew member must submit to a test for the alcohol percentage by weight in the blood, whenever the law enforcement officer is authorized under state or local law to conduct the test or to have the test conducted.

### **3.2.10 Smoking**

Smoking is prohibited on PNNL aircraft.

### **3.2.11 Blood Donations**

Flight crew members who have donated blood will not perform flight duties for at least 72 hours after that blood donation.

### **3.2.12 FAA Enforcement Actions**

Upon notification that an enforcement investigation has been initiated against a PNNL aviation staff member or contracted staff member, that staff member has 48 hours to report to the Director of Flight Operations the full facts surrounding the event that precipitated the enforcement action. The staff member named in the action may be removed from duty at the discretion of the Director of Flight Operations.

PNNL will investigate the violation to determine the facts associated with the event. Legal assistance will be provided to the staff member who acted in good faith and in the best interests of PNNL, its property, and passengers.

### **3.2.13 Flight and Maintenance Crew Duty/Rest Limits (FAR 135.267)**

Flight time and duty time limitations, as set forth in FAR Part 135, are based on experience factors accumulated by the FAA, safety studies, and the various air carriers. Duty time for the flight and maintenance crew starts when leaving their place of residence and ends at the return to their place of residence. Flight time begins with engine start and ends with engine stoppage. The safety of PNNL flight operations and the concentration necessary for the effective completion of aircraft operations requires pilots who are rested and alert. Pilots who have exceeded their flight and duty time limitations will not be scheduled for flight, except in an emergency or other extenuating circumstances.

A pilot shall not be assigned, nor will accept, any flight duty if that duty will cause the crew member's total flight time to exceed the following time limitations. During any consecutive 24 hours the following limitations apply. For single-pilot operations, the limits are 8 hours of flight time or 12 hours duty time; for two-pilot operations, 10 hours of flight time or 12 hours duty time. In addition, crew members must be provided with 10 consecutive hours of rest within the 24 hours preceding the completion of that flight duty. (Refer to Appendix F for charts defining these regulations.)

If a pilot anticipates exceeding flight time limitations while away from home base, the pilot will inform the Chief Pilot of his or her physical condition and request relief or an authorization to extend the limitation. In the event it is mutually agreed, the Chief Pilot may authorize the pilot to complete the flight.

A Maintenance Technician will work no more than 12 continuous hours in any 24-hour period. The minimum acceptable rest period following a duty period is 8 continuous hours. Each Maintenance Technician should be relieved from all duty for at least one period of 24 continuous hours during any 7 consecutive days.

### **3.2.14 Crisis Planning**

Notification to PNNL of an accident involving a PNNL aircraft in which a fatality or serious injury has occurred is normally made by the state or local police department in the area where the accident happened. The flight crew, if not incapacitated, must assume control of the accident site and, as soon as practical, call the PNNL emergency number 509-375-2400. When notified by any party, the Director of Flight Operations or the Scheduler will immediately report the accident to the PNNL Emergency Number. A call to the PNNL Emergency Number initiates the PNNL occurrence reporting/notification procedure that includes further notifications to DOE, NTSB, or FAA, as appropriate (see the PNNL Emergency Notification Chart in Appendix A, page A.23). That call also brings the resources of PNNL Public Relations, Insurance, Legal, and Human Resources departments to bear on addressing the ramifications of the accident on PNNL staff, their families, and other parties affected by it.



## **3.2.15 Security**

### **3.2.15.1 Planning**

The PIC must ensure that destination airports and surroundings for a planned flight do not present a threat to safety or security. This recommendation is particularly true of international flights to destinations that have a poor reputation for safety and security. PNNL security should be contacted prior to any international flight to check for unusual or hazardous situations that may impact the security of a planned flight.

### **3.2.15.2 Security Considerations**

In order to reduce the possibility of sabotage, extortion, and hijacking, certain operational procedures shall be strictly adhered to and shall be the equal responsibility of each crew member assigned to the aircraft. The PNNL Research Aircraft Preflight Security Checklist (Appendix A, page A.4) must be completed. For PNNL aircraft, cargo, and passengers to meet required security conditions, all of the following rules shall apply:

1. The destination and occupants of PNNL aircraft shall be considered need-to-know information. Therefore, your conversations shall not include whom you took and where.
2. Positive identification shall be obtained on all passengers. Luggage must be tagged with the name of its owner.
3. Unauthorized personnel shall not be allowed in the aircraft and shall be monitored when in the vicinity of any PNNL aircraft.
4. Avoid discussing your schedule or company affiliation with strangers.
5. Aircraft preflight inspection shall be performed to determine if clandestine explosive or incendiary devices have been secreted on board the aircraft. Such inspection shall be performed as part of the Security Checklist.
6. At intermediate stops, the main cabin and baggage doors will be closed and locked, if possible, whenever the aircraft is not under crew surveillance. At the final destination, the aircraft will be secured by placing covers in position, inserting appropriate pins, and locking the aircraft. When terminating at flight operations base, the pins, if applicable, will be inserted, and the door closed and locked.
7. Passengers and crew carrying classified material must receive courier training and receive periodic certification, as required by the originating agency directives, as applicable.

### **3.2.15.3 Rules Governing PNNL Aircraft Cargo**

1. Materials designated as hazardous or radiological cargo must meet the applicable federal or state regulations relating to the interstate or intrastate transport of such material.
2. Materials designated as controlled substances and covered by federal or state statutes must meet the applicable PNNL policy or federal or state regulations relating to such transport.
3. All packages and cargo received for transport shall bear the identity of the sender and the receiver. Such material shall be packaged to permit visual examination of the package exterior to determine if the package has been opened or tampering has occurred.
4. Non-PNNL passengers must meet the PNNL, DOE, or DoD requirements for transport of classified, hazardous, toxic, controlled, or radiological material.

### **3.2.15.4 Prohibition Against Carriage of Weapons (FAR 135.119)**

1. Firearms being transported shall be stored in the cargo area and must be unloaded. Ammunition shall be stored in containers approved for air transport of such materials. Possession of hand-held sidearms shall not be permitted, except for persons authorized by applicable federal or state license to carry such weapons.
2. While on board an aircraft being operated by PNNL, no person may carry a deadly or dangerous weapon, either concealed or unconcealed. This restriction does not apply to crew members and other persons authorized by PNNL to carry arms.
3. Sporting firearms will be allowed in the passenger cabin when unloaded and enclosed in a suitable case. Firearms will not be removed from the case while inside the aircraft.

### **3.2.15.5 Packages and Mail on PNNL Aircraft**

The following procedures must be followed in order for a package/mail requiring special handling to be accepted by the PIC:

1. Classified or Business Sensitive material shall be packaged and marked to meet the originating agency requirements for the appropriate classification level.
2. Contact the ASPOC and inform him an item will be delivered to the PIC and when.
3. Item must be hand carried to the aircraft and given to the PIC.
4. Person delivering and receiving the package must be a PNNL employee with PNNL identification.

5. Package must be clearly labeled and handling of package at the other end must be communicated to the PIC responsible for transporting the package.

### 3.3 Aircraft Scheduling Procedures

#### 3.3.1 Contact

**Applicability.** The section applies to all current and prospective PNNL staff members and clients. Research users of the PNNL research aircraft must follow the procedure presented in Section 3.3.2; non-research users follow the procedure given in Section 3.3.3.

**Requirement.** Requests for the use of the PNNL research aircraft by both PNNL and non-PNNL users are made in writing to the Scheduler.

**Responsibility.** Staff members requesting non-research use of PNNL aircraft must obtain their line manager's and Level I manager's written approval before submitting their request to the scheduler.

#### 3.3.2 Scheduling Research Flights

The required procedure for requesting and scheduling use of the PNNL research aircraft for research flights is as follows:

**Requesting Aircraft Support.** All potential research users of the PNNL research aircraft must submit an Initial Aircraft Support Request (Appendix A, page A.30) to the Scheduler at least 6 months prior to intended use. A more detailed Research Aircraft Deployment Document (Appendix A, page A.31) must be completed by the requester and submitted to the Scheduler no less than one month before scheduled use. Both forms are available in electronic form from the Scheduler. The more detailed deployment document solicits information in the following areas:

- Project Identification
- Research Sponsor
- Other Aviation Facilities
- Flight Operations
- Supplemental Information for Compliance with DOE 440.2
- Requested PNNL-Provided Scientific Payload

- User-Supplied Scientific Payload
- Ground Support Facilities.

**Evaluation of Request.** Because the Department of Energy funds the PNNL research aircraft, the request, as detailed on the form, is evaluated by an advisory panel of the DOE Research Aircraft Facility and by a team of PNNL safety and environmental compliance specialists. The advisory panel determines whether the requested flights constitute appropriate use of the DOE Research Aircraft Facility. The team of PNNL safety and environmental compliance specialists determines whether the risks associated with the requested flights are within the normal bounds of research flying. If either the advisory panel or PNNL team raise specific issues about the request, these issues are communicated to the requestor for clarification and resolution.

**Approval of Request.** After review by the advisory panel and PNNL safety and environmental compliance specialists, approval of the request is confirmed with return of a signed copy of the form to the user. The user can then work directly with the Scheduler and other staff of the Research Aircraft Facility to complete the plan for the flights. The PNNL ASPOC will notify the DOE/RL ASO of all approved research flights. Flight Operations that are outside of the parameters established in PNNL-MA-530 must be approved by the PNNL ARMC and the DOE/RL ASO.

**Scheduling Guidelines.** Research flights in support of DOE-funded projects have priority over other uses, except as authorized by the advisory panel. The Scheduler will attempt to accommodate all approved requests and will negotiate with users and the Director of Flight Operations a mutually satisfactory schedule for research flights. Changes in schedules that occur while the aircraft is away from the home station will be reported to the Scheduler by the assigned PIC. The Scheduler will then coordinate with all users a new schedule for the remaining flights.

**Method of Payment for Research Use of the PNNL Research Aircraft.** The advisory panel to the DOE Research Aircraft Facility determines whether a request is an appropriate use of the facility. If so, most of the financial cost of the use of the aircraft is borne by DOE and no fee is charged for use of the PNNL research aircraft. If the use is not appropriate, the user will be charged the hourly use rate established for the PNNL research aircraft when the plane is actually flown. Note that an appropriate contacting mechanism for billing the cost of the use of the PNNL research aircraft to the user must be in place before aircraft use can occur.

### 3.3.3 Scheduling Non-Research Flights

The required procedures for using the PNNL research aircraft for non-research business travel are described as follows:

**Making Air Transportation Arrangements.** The PNNL staff member requesting non-research air transportation on board the PNNL research aircraft completes the Requester portion of the PNNL Passenger Transport Request form (Appendix A, page A.2) and submits this form to the PNNL Aircraft

Scheduler. A copy of this form should be sent by the Requester to his/her line manager and Level I manager for approval.

The PNNL Passenger Transport Request form calls for the following information:

- Name and title
- Payroll number
- Organization code
- Phone number
- Travel funding (government or non-government) and account or work package number
- Travel dates
- Destination
- Ground transportation required
- Special information (such as catering, unusual baggage, medical concerns).

The Scheduler will:

- Arrange and confirm seat availability for PNNL staff on the PNNL research aircraft
- Request the Non-Research Passenger Transport Manifest for the PNNL research aircraft (Scheduling Form) (Appendix A, page A.3) be faxed to their attention, prior to confirming space if special approval is required

**Scheduling Guidelines.** Staff are scheduled on a first-come-first serve basis. A staff member may bump another staff member when the PNNL Lab Director or his/her designee approves such scheduling priority.

Staff should contact PNNL media relations and PNNL legal departments regarding regulations governing the carriage of elected officials and candidates on the PNNL research aircraft prior to scheduling such guests.

All flights shall originate and be scheduled through the Scheduler. All schedules will be coordinated with the Director of Flight Operations and Chief Pilot. Changes in schedules that occur while the aircraft is away from the home station will be reported to the Scheduler by the assigned PIC. It shall then become

the responsibility of the Scheduler to coordinate the remainder of that trip sequence for all passengers and crew.

The Scheduler shall furnish to the PIC the telephone number(s) where the passenger(s) may be reached, if a departure time will be outside of normal working hours.

The PNNL ASPOC will provide the DOE/RL ASO with a passenger manifest (Appendix A, page A.3) prior to all scheduled passenger flights on the PNNL research aircraft..

**Method of Payment for Use of the PNNL Research Aircraft.** The PNNL Accounting Office will charge the cost of air transportation at the customary commercial full coach fare, using a non-cash transfer process. Cost will be charged to the staff member's applicable work package number for which business travel is being funded.

Note: Staff must document on their travel expense report form that a PNNL research aircraft was used for transportation; however, they do not include the transportation cost processed by PNNL.

**Use of the PNNL Research Aircraft by Non-Employees.** Staff may request scheduling for PNNL clients on the aircraft. Advance approval of the PNNL Director or designee is required.

**Travel Restriction.** Use of the PNNL research aircraft for non-business purposes is prohibited.

### **3.3.4 Flight Schedules and Crew Assignments**

The Chief Pilot or designee schedules crews on a rotation basis. A crew member may make arrangements to switch with other qualified crew members. Approval is required from the Chief Pilot or his/her designee to ensure normal schedule continuity. Crew members requesting swaps may be required to work additional days in order to avoid increasing the schedule burden of non-requesting crew members.

The Chief Pilot will make the regular flight crew assignments. Also, the Chief Pilot must approve Contract Copilot assignments.

## 4.0 Standard Operational Procedures for PNNL Research Aircraft

All flights will be planned in detail and crew members will have a clear understanding of flight objectives and the desired results. Pilots and crew members will be on hand a minimum of one hour prior to a scheduled flight. It will be the responsibility of the designated PIC to ensure that each member of the crew fully understands the mission profile and is aware of any special requirements. The judicious use of checklists is a basic requirement of flight planning.

### 4.1 Documentation Required

Each aircraft used by PNNL will be registered with the FAA and with state or local agencies whenever required. A field operation of short duration will normally require little or no advance registration with local authorities. If it is expected that an aircraft will be required to operate out of a certain flight operations hangar for long periods, local regulations or registration could become a requirement and possibly affect the research operation. Registration is especially important if low-level operation is required.

In accordance with FAR 91.203, every civil aircraft will and must display a current airworthiness certificate and the owner's registration certificate in the aircraft where they are legible to the passengers or crew. As part of preflight duties, the assigned PIC will, as required by FAR 135.203(e),

1. Note the date and the aircraft tach time and compare them with the inspection due dates and times listed on the aircraft status sheet.
2. Determine whether the flight or series of flights can be completed without any required inspection being due before the aircraft returns to home base.
3. If the scheduled flight(s) cannot be completed without one of the previously mentioned inspections becoming overdue, the PIC will immediately contact the Director of Flight Operations for instructions. Under no conditions will a PIC begin a flight, if any required inspection time has been exceeded.
4. Concerning deferred and corrected mechanical irregularities, determine the aircraft has been certified as ready for return to service by an Airframe and Powerplant Mechanic (or by the Director of Maintenance). This certification will appear on the mechanical irregularity report (MIR) in the area of the form reserved for maintenance use.
5. If the FAA requires a waiver for any portion of a flight, a copy of such waiver will be carried in the aircraft. Also, a copy of the flight plan, showing all conditions of such waiver as will be exercised, must be filed with the FAA prior to the flight.

6. *Special Use Airspace* in the United States is defined as those areas that are Prohibited, Restricted, Warning, or Alert areas, and are so designated on aeronautical charts. Permission to operate in these areas can sometimes be obtained by a telephone call, but occasionally the controlling agency may require detailed descriptions of flight patterns before giving specific written authorization. A copy of such authorization will be carried on the aircraft when operating in the Special Use Airspace. Permission to operate in the area will be noted on the FAA flight plan.
7. An FAA-approved Aircraft Operating Manual with current revisions is required to be on board the aircraft at all times.
8. A copy of the PNNL Flight Operations Manual will be carried on board each aircraft operated by PNNL.
9. Current weight and balance data will be carried on board each aircraft operated by PNNL.
10. Material Safety Data Sheets for all chemicals carried on board the aircraft.
11. Pertinent VFR Aeronautical Charts, (WAC, SEC). IFR, Navigation, Enroute, and Let Down Charts.

#### **4.1.1 Checklists**

- Checklists shall be available in the cockpit and used for all phases of flight from preflight inspection to parking and securing of the aircraft, including the outlining of emergency and abnormal procedures. Checklists shall be based on the manufacturers' recommended operating instructions and checklist flow shall be as nearly standardized as possible for all PNNL aircraft.
- It shall be the responsibility of the PIC to ensure the appropriate checklist is used for all phases of flight, utilizing the challenge and response system indicated on the checklist.
- Deletions, additions, or alterations to any checklist must first be approved by the Director of Flight Operations and Chief Pilot.
- The Pilot Flying the aircraft makes all calls for checklists.
- Checklists are to be accomplished in the following priority:
  - Emergency procedures
  - Normal procedures
  - Abnormal procedures



## 4.1.2 Development of Aircraft Checklists

The following list of criteria and principles will be used in the development and use of aircraft checklists.

- Include as many required systems checks in the cockpit preflight as practical to preclude unnecessary distractions while taxiing.
- During critical phases of operation, such as runway lineup, in-range, and landing, checklist items should be limited to facilitate crew member attention and focus on flying activities.
- Checklists should be manageable in terms of physical dimensions and legibility.
- Procedures should enable delay of climb checks until clearing the airport traffic area.
- Checklists should be designed ergonomically. Flow patterns should direct the pilot through the cockpit in an efficient manner.
- Checklists are not a substitute for good pilot judgment.
- Checklists cannot contain all standard operating procedures and operating policies delineated by this manual and FAR.
- Checklists should facilitate good challenge and response procedures by cockpit crews.

## 4.2 Preparation for Research Flight

### 4.2.1 Cross Country Flights

Flight plans for all instrument flight rules (IFR) flights and all visual flight rules (VFR) cross-country flights will be filed with the FAA. Flight plans will be filed prior to takeoff, except in those cases where communications facilities are not available or are inoperative. In such cases, the PIC will file in flight, as soon as practical after takeoff. If VFR cross-country flights are to be conducted through areas served by radar, VFR flight following will be acceptable in lieu of a formal FAA flight plan (Airman's Information Manual [AIM] Part 1, Section II B.)

### 4.2.2 Project Flights

Due to the specialized and varying nature of research flight activities, it is not always practical to file a formal flight plan for VFR operations. However, when flight operations are conducted in areas served by radar or high-density traffic areas, the appropriate air traffic control (ATC) personnel will be contacted and advised of the type of operation and the pilot's intentions. This policy is applicable, whether the area is covered by radar or not (for example, terminal areas, airway intersections, or very high frequency

omnidirectional radio range or [VOR]). VFR flight following, when available, should be used during VFR flight operations. When extended offsite operations are planned in areas of high traffic density, the ATC facility should be visited, and the Chief of Operations should be advised of the operational details of the project.

### 4.2.3 Preflight Planning

The PIC will be responsible for all flight preparations and the submission of flight plans to the FAA (when required). Flight preparation will vary, depending on the operation to be conducted (for example, cross-country vs. project, IFR vs. VFR). However, the preparation will generally include the following:

1. The correct amounts of fuel and oxygen, plus the correct seating installation, equipment, and necessary supplies, will be verified. These preparations will start at the earliest practical time to ensure that all is ready at the proposed time for departure.
2. A detailed preflight weather briefing is essential to the preparation and use of a flight plan. These briefings may be obtained from FAA Flight Service Stations (FSS), a Combined Station/Tower (CS/T), or a National Weather Service Office (NWSO). For a detailed forecast and comprehensive briefing, the pilot should identify himself and give the number of the aircraft, route of flight, times, and any other information that may be pertinent to the flight. The pilot should obtain and record all weather advisories along the route of flight or in the intended area of operation, en route weather, destination and alternate destination weather, prognostic forecasts for later flights, and the winds aloft.
3. NOTAMS (Notices to Airmen) will be checked with the FSS to make sure that all en route facilities are operational and terminal information is accurate.
4. In planning the flight, the most direct route available is normally used, as long as it is consistent with the safety of the flight. It must comply with FAR, air traffic control instructions, terrain, weather conditions, availability of navigational aids, and other influencing factors. In the event it is necessary to conduct research flights below 2000 ft above ground level (AGL), the PIC shall maintain obstacle maps that are updated prior to each flight. The maps indicate the height above ground level of all existing obstacles to flight in the area of operations. If the use of a waiver or permission to operate in a Prohibited or Restricted Area is required, such will be noted in the *Remarks* section of the flight plan.
5. The PIC will file the flight plan with the FAA (when required), giving a proposed departure time as accurately as practical. In the event of a delay in departure of one hour or more, the PIC notifies the FSS of the new proposed time of departure or a new flight plan is filed.
6. The PIC and second in command (when required) will perform a preflight inspection of the aircraft using an approved Research Aircraft Preflight Security Checklist (Appendix A, page A.4). Close attention must be given to every item on the aircraft-approved preflight checklist to assure maximum safety in flight.

#### **4.2.4 Weather Requirements and Reporting (FAR 135.213)**

The PIC or First Officer shall obtain a weather briefing prior to every flight and shall use the U.S. National Weather Service or a source approved by the Weather Service. However, for operations under VFR, if such a report is not available, the Pilot in Command (PIC) may use weather information based on the pilot's own observations or on those of other persons competent to supply appropriate observations.

The PIC shall ensure that all required crew members have received a complete weather briefing prior to each flight. Such briefing should also include Notices to Airmen, the pilot reports, Significant Meteorological Information (SIGMETs), and Airman's Meteorological Information (AIRMETS).

#### **4.2.5 Weight and Balance [FAR 135.23(b)]**

##### **4.2.5.1 Weight and Balance Checks**

PNNL research flight operations frequently require that scientific research equipment be added, removed, or repositioned. Accordingly, the PIC will closely and continually check the aircraft weight and balance to ensure that it is properly computed and documented.

##### **4.2.5.2 Calculations**

The PIC will calculate the gross takeoff weight, gross landing weight (if the maximum allowable gross landing weight is less than the maximum allowable gross takeoff weight for this aircraft), and the actual center of gravity for the loaded weight. The PIC will determine that these calculated values fall within the manufacturer's allowable weight and balance limits for the aircraft. The PIC will make these calculations using the actual weights of the airplane, fuel, oil, crew, passengers, cargo, and baggage. Estimated or average weight figures are not permitted during research operations.

##### **4.2.5.3 Weight Determination**

The following weights are used when loading aircraft and when determining the loaded condition:

1. Actual weights of passengers and crewmembers will be used. In the event a scale is not available, the PIC will ask the person's weight and add to it the estimated weight of hand-carried articles or heavy clothing.
2. All baggage, cargo, or equipment loaded at the main base of operations will be weighed and the actual weight used in computations. When away from the main base, the PIC will judiciously estimate the weight of all articles and check loading of passengers and baggage.
3. The standard unit weights of fuel and oil will be used for determining quantity of fluids to be carried. If the weight and balance conditions for take-off and landing permit, all fuel tanks should be filled to capacity and oil tanks filled to optimum for all flights of more than one hour. If fuel supply is limited for the flight, the PIC will ensure the specified amount of fuel, as computed, is in each tank. If too

much fuel is on board, the PIC will have the aircraft de-fueled to the specified amount or will off-load cargo and baggage to accommodate the extra fuel weight. Sufficient fuel will be carried on all flights to meet the following minimum requirements:

- Visual Flight Rules (VFR)--Fuel to fly to the first point of intended landing and, assuming normal cruising fuel consumption, to fly thereafter for 30 minutes, if daytime, or for 45 minutes, if at night (FAR 91.151).
  - Instrument Flight Rules (IFR)--Fuel to fly to the point of intended landing, and thereafter to an alternate airport (if required), and then to fly for 45 minutes more at normal cruising fuel consumption (FAR 91.167).
4. When seats are used to hold cargo during a flight, the weight will be restricted to 170 pounds per seat and the cargo must be properly secured. Heavy cargo with locally concentrated weights or weight points must be secured so that the load is equally distributed on the floor. Good judgement will be used in the placement of all equipment or cargo. All securing will meet or exceed FAA approved requirements.
  5. Weight, airport elevation, temperature, wind, runway gradient, and runway conditions affect takeoff and landing performance of aircraft. The PIC will check the aircraft-approved flight manual to make sure the aircraft will be able to take off safely at the calculated gross weight and with the runway available, and then land at a safe and allowable weight (FAR 91.103).

#### **4.2.6 Airworthiness Release**

A PNNL PIC will not accept an aircraft for flight unless it has a current airworthiness release. While away from home base, the PIC is responsible for determining airworthiness, based on the initial release and subsequent events that may affect airworthiness.

The airworthiness release consists of a signed copy of the Post-Flight Checklist for the aircraft to be flown (see Appendix A). This sheet attests to the compliance with all FAR, the manufacturer's inspection program, and PNNL/DOE directives regarding airworthiness.

#### **4.2.7 Flight Locating Procedures [FAR 135.23(l)]**

PNNL has established the following procedures to be used if an FAA flight plan cannot be filed for a particular flight:

- The PIC will complete a flight plan (FAA form 7233-1) and leave a copy with research ground personnel at the point of departure. The PIC will complete the flight plan information as if it were being filed with the FAA. In addition, the PIC will give the research ground personnel the estimated time to expect a telephone call after completion of the flight.

- If the flight goes beyond the calculated search commence time (one hour after the contact time given by the PIC or the time calculated for fuel exhaustion, whichever is sooner), ground research personnel will immediately contact the appropriate FSS (identified in advance by the PIC). Ground personnel will give the FSS the particulars of the flight and request commencement of a search.

#### **4.2.8 Fueling/Refueling Procedures**

Although line service personnel have the technical responsibility for the actual fueling/refueling process, the PIC has the primary responsibility for ensuring correct procedures are followed. This responsibility of the PIC is especially acute when refueling is accomplished en route or at remote bases. In all cases, the safety of equipment and personnel is of prime concern.

During fueling/refueling the aircraft, PNNL personnel use the following procedures and precautions for detecting and preventing fuel contamination, protecting against fire, and supervising and protecting personnel. Before the refueling is started, the PIC should determine the grade and quantity of fuel.

- No aircraft will be fueled or de-fueled inside hangars or while engines are operating.
- No smoking, flames, or fires are permitted within 50 ft of an aircraft being fueled or de-fueled.
- The aircraft must be grounded to the dispensing unit before tank caps are removed.
- Aircraft batteries will not be installed or removed during fuel servicing.
- Battery chargers will not be physically connected, operated, or disconnected during fuel servicing.
- Aircraft ground power units should be located as far away as practical and neither connected nor disconnected during fuel servicing.
- No aircraft or research equipment electrical switch may be turned on or off while refueling is in progress.
- No aircraft will be refueled with personnel on board other than one crew member to monitor gages, if required.
- Fueling operations should not be conducted within 100 ft of energized airborne radar equipment or within 300 ft of energized ground radar equipment.
- Photo-flash should not be used within 50 ft of a refueling aircraft.
- Flashlights used should be of the type approved by the Underwriter's Laboratories for use in hazardous locations.

- No aircraft will be refueled during thunderstorms. Covers for fuel openings should be provided when refueling in rain, snow, or sleet.

The three most common sources of ramp fires are smoking, fuel spills, and engine starts. In the interest of maximum safety, smoking is not allowed within 50 ft of a refueling operation and the pilot will watch all personnel in the area to enforce the *no smoking* rule. Fuel spills require immediate attention, and if it is more than 6 ft in any dimension, the spill should be blanketed with foam. Every spill is considered very dangerous and a potential fire. A fire guard will be posted to keep unauthorized persons away, and the spill will be cleaned up as quickly as possible.

After the refueling operation is completed, and before the flight, the PIC will

- Take fuel samples from the tank and sump drains and verify these fuel samples are free from moisture and other contamination
- Verify the fuel and oil caps and associated access doors are secured.

#### **4.2.9 Passenger Briefings**

It is the responsibility of the PIC to ensure compliance with FAA regulations regarding the use of seat belts, smoking, oxygen, and emergency exits.

When applicable, reference to survival equipment is included in the briefing. On an aircraft with a Cabin Attendant, the briefing is normally accomplished while taxiing for takeoff. On aircraft with two pilots, immediately after boarding one of the pilots will give the briefing in the cabin, pointing out the exits, seat belts, oxygen masks, fire extinguishers, and survival gear location. The standard briefing for the PNNL aircraft is:

- Welcome on board PNNL's research aircraft. Before getting underway, I would like to review the important safety features of our aircraft. Please read the passenger briefing form.
- In the unlikely event that we should have to evacuate the aircraft on the ground, we can use (specify how many exits): (At this point, specify where the exits are located, how to operate them, and how to get out the exit.)
- Should there be a sudden or abnormal change in cabin pressure, oxygen masks can be found (show location). Place the mask over your nose and mouth and breathe normally.
- Should a cabin fire break out, fire extinguishers are located (show locations).
- In the event of an injury or incident, first aid kits and survival gear are located (show locations).

- Observe and comply with the *seat belt* and *no smoking* signs.
- A reminder, smoking is not permitted.

Whenever possible, the passengers should be briefed on destination weather, estimated time of arrival (ETA), route of flight, and alternate plans, if destination weather is marginal.

An announcement should be made any time turbulence is expected. It is recommended that passengers keep their seat belts loosely fastened, unless it is necessary for them to move about the cabin.

When possible, prior to descent below 10,000 ft, an announcement should be made with updated destination weather.

Note: The G-1 Passenger Briefing Form is shown in Appendix A, page A.1.

#### **4.2.10 Ground Handling**

In North America, operators are accustomed to the assistance of Airport Service Operations (ASO), normally known as Fixed Base Operator (FBO). However, with the exception of Western Europe, such assistance may not exist at overseas destinations. Most countries do not have enough general aviation traffic to support such specific services. Therefore, the assistance of a ground handling agent is often required to procure services.

Domestic, regional, or international airlines with operations at a specific airport, as well as affiliates of U.S.-based, flight planning companies, can provide many of the necessary services. Other services, such as help with Customs, immigration, and public health procedures, expediting shipment of spares, and aircraft maintenance, may also be arranged through such agents.

#### **4.2.11 Use of Auxiliary Power Unit**

On aircraft equipped with an Auxiliary Power Unit (APU), such equipment shall be used primarily to provide heating, cooling, and lighting for passengers and crew or for the warm-up of required equipment. To meet these requirements, an APU normally needs to be turned on 30 minutes before the scheduled departure.

When an APU is running, at least one crew member shall be available to monitor the unit in the event a malfunction occurs. If the APU is required to run an engine, at least one crew member shall be at a cockpit station to permit the use of aircraft brakes and the handling of a malfunction.

#### **4.2.12 Catering**

The PIC ensures all cabin supplies and catering are on board.

### **4.2.13 Noise Abatement Procedures**

Pilots must be considerate and sensitive to surrounding populations. At airports where specific procedures have been established, those procedures will be followed commensurate with safe operating practices.

At airports where specific procedures have not been established, profiles outlined in the Aircraft Flight Operations Manual will be followed.

Regarding noise abatement, safety of flight shall be the overriding factor in decisions.

## **4.3 In-Flight Operations**

Prior to any flight, the PIC shall become familiar with the route and the airports to be utilized by obtaining NOTAMS, Airport Traffic Information System (ATIS), and any pertinent data from the Jeppesen Manuals.

### **4.3.1 Departure**

#### **4.3.1.1 Takeoff and Landing Data**

- PNNL aircraft will have takeoff and landing airspeed designators. Crew members are expected to complete the Takeoff & Landing Data Cards (see Appendix A, page A.9).
- Airspeed designators will be set for critical engine failure recognition speed (V1), rotation speed (VR), and takeoff safety speed (V2) for takeoff. VREF will be designated for landing.

#### **4.3.1.2 Weather Briefing**

- The PIC or First Officer shall obtain a weather briefing prior to every flight.
- The briefing should include such information as required to plan the flight and complete the trip.
- The PIC shall ensure that all required crew members have received a complete weather briefing prior to each flight.

#### **4.3.1.3 Fuel Planning**

- It shall be the responsibility of the PIC to ascertain that fuel planning for any flight segment is correct, utilizing all of the pre-planning data available at that time.



- Special consideration shall be given to extra fuel used, contingent upon extended APU run, departure delays, use of anti-icing equipment, altitude blocks, more adverse wind or temperature than forecast, weather detours, ATC reroutes, or holds.

#### **4.3.1.4 Radio Equipment Checks**

- It shall be the responsibility of the PIC to determine that all required radio and navigation equipment is functioning normally prior to departure.
- VOR checks shall be accomplished in accordance with FAR 91.171 and noted in the Flight Logbook. A ground or in-flight check must be accomplished within each 30-day period and an error greater than  $\pm 4$  degrees noted for maintenance action.

#### **4.3.1.5 Departure Sequence**

No PNNL aircraft shall be moved from the chocks until the AFTER START checklist is completed. The time to call for a checklist is as follows:

- After Start (prior to taxi)
- Taxi (during taxi to runway)
- Line Up (prior to taking runway)
- Climb (out of 3000 ft AGL, leaving the airport traffic area).

#### **4.3.1.6 Takeoff Briefing**

The Pilot Flying will make the takeoff briefing. It is the responsibility of the PIC to ensure that a briefing has been accomplished.

The takeoff briefing will include power adjustments, compass checks, speeds to be called out, abort procedures (including which pilot will execute the abort), initial climb instructions, and emergency return procedures. A complete takeoff briefing will be given by the Pilot Flying for the first flight of the day for a particular crew combination. For subsequent multiple flights, the takeoff briefing may consist of the numbers, compass checks, the term *standard brief*, the pilot who will execute the abort, and initial climb instructions.

#### **4.3.1.7 Takeoff Procedures**

- Power shall be set in accordance with the Aircraft Flight Operations Manual.

- Power levers are to be advanced by the Pilot Flying. The PNF will confirm that minimum takeoff power has been obtained. The PNF shall make the call “Take-off Power Set” and monitor the engine instruments.
- Pilot Flying will take his hands off the power levers at V1.

#### **4.3.1.8 Abort Decision**

The decision to abort a takeoff will be made using the following criteria:

- Up to 80 kt - Call “ABORT” for:
  - a. Any system malfunction
  - b. Any yellow or red system warning lights
  - c. Any aural warnings.
- After 80 kt up to V1- Call “ABORT” for:
  - a. Engine power loss
  - b. Engine fire
  - c. Loss of directional control.
- Either pilot will call “ABORT.”
- Under all conditions, the Captain has the authority to execute an abort at any time.
- PNF will notify Tower of ABORT.

#### **4.3.1.9 Radar Altimeter**

Set for 400 ft for takeoff as a reminder of the minimum flap retraction altitude.

#### **4.3.1.10 Airspeed Callout**

- The airspeeds to be called out by the PNF are: 80 kt, V1, Rotate, V2.
- The 80-kt callout is for an airspeed cross check between the airspeed indicators.
- The Flying Pilot will acknowledge the 80-kt callout and call “My Yoke.”

#### **4.3.1.11 Climb**

- After the landing gear is retracted, the PNF will report “gear up and landing gear lights out.”
- After flap retraction, the PNF will report “flaps indicate up.”
- The climb checklist shall be called for by the Pilot Flying.

#### **4.3.1.12 Maximum Deck Angle**

For passenger comfort and safety, a maximum deck angle during a climb of 15 degrees should not be exceeded, except for specific noise abatement situations.

#### **4.3.1.13 Noise Abatement**

When applicable, follow recommended noise abatement procedures.

#### **4.3.1.14 Departure/Climb Airspeeds**

Climb schedules will be calculated for each flight using gross weight data.

### **4.3.2 Cruise/Route**

#### **4.3.2.1 Cockpit Duties**

During takeoff, climb, descent, and landing, both pilot crew members shall have their flight controls and seats in position to hand fly the aircraft.

During VFR conditions, it shall be the responsibility of the PIC to assign at least one crew member to watch for conflicting traffic.

#### **4.3.2.2 Altitude Callout**

Both pilots call out and acknowledge each altitude callout of 1000 ft, prior to the assigned altitude.

#### **4.3.2.3 Flight Level 180 Callout**

Both pilots call out the climb and descent altimeter settings for flight level (FL) 180 (18,000 ft).

#### **4.3.2.4 Weather Updating**

At least once during any flight of more than two hours, it shall be the responsibility of the PIC to obtain current weather and forecasts for the destination and alternate airports.

#### **4.3.2.5 Flight Crew Members at Stations**

A PNNL Captain shall occupy a pilot seat for takeoff and landing. Flight crew members shall be at their stations for all takeoffs, approaches, and landings. Pilot flight crew members shall be at their stations for all climbs and descents, except for urgent reasons.

Pilot flight crew members shall not leave their stations for reasons other than physiological needs, to perform duties in connection with the operation of the aircraft, or to attend to medical emergencies. Crew members shall keep their seat belts fastened while at their stations.

#### **4.3.2.6 Pilot Incapacitation**

Obvious incapacitation: Fly the aircraft and engage the auto pilot; restrain/remove incapacitated crew member.

Subtle incapacitation: Whenever a pilot does not respond to the second attempt at communication concerning any deviation from normal flight profiles, announce "I've got the airplane".

- Take control of the aircraft.
- Use auto pilot.
- Use cabin assistance to restrain/remove crew member.
- Declare an emergency and land.

#### **4.3.2.7 Paperwork En Route**

Other than logbook entries, brief notes, and flight plan entries, no paperwork shall be done in the cockpit while en route.

#### **4.3.2.8 Supplemental Oxygen (FAR 91.2110)**

Supplemental oxygen will be provided and used by all personnel on the flight, as prescribed by FAR 135.89. PNNL aircraft at flight altitudes above FL250 (25,000 ft) can operate only if a 10-minute supply of supplemental oxygen is available for each occupant of the aircraft in the event that a descent is necessitated by loss of cabin pressurization. If, for any reason at any time it is necessary for one pilot to leave the controls of the aircraft when operating above FL350 (35,000 ft), the remaining pilot at the controls shall use an oxygen mask until the other pilot has returned to that crew member's station.

During research flight operations, each pilot of an unpressurized aircraft shall use oxygen continuously at altitudes above 10,000 ft through 16,000 ft MSL for that part of the flight at those altitudes that is more than 30 minutes in duration.

#### **4.3.2.9 Icing Conditions**

No flight shall be operated in areas of known icing, unless the aircraft is equipped with functioning de-icing/anti-icing equipment that is suitable for the condition to be encountered. The recommended anti-ice procedures from the approved Aircraft Flight Operations Manual shall be used.

In no case, shall a PNNL aircraft be flown into a known forecast condition of heavy icing. In applying these restrictions, the following definitions shall apply.

- *Trace of ice* - an ice accumulation of no consequence that does not affect the performance characteristics of the aircraft.
- *Light ice* - de-icing/anti-icing equipment will manage the accumulation safely and permit the aircraft to be flown indefinitely.
- *Moderate ice* - de-icing/anti-icing equipment will still manage the accumulation safely, but it is an indication to the PIC to alter course or altitude to avoid this condition.
- *Heavy ice* - de-icing/anti-icing equipment cannot control the accumulation. The PIC shall change altitude or course immediately or locate the nearest suitable airport and land.
- All icing conditions shall be reported to ATC.

#### **4.3.2.10 Turbulence and Thunderstorms**

The following rules shall apply:

- Weather and storm scope will be on for all adverse weather operations.
- At altitudes greater than FL230 (23,000 ft), thunderstorm echoes shall be avoided by at least 20 miles.
- At altitudes less than FL230, echoes shall be avoided by at least 5 miles, if outside air temperature (OAT) is 0°C or higher, and by 10 miles if 0°C or lower. Double these distances, if radar indicates rapid increase in size or changes in echo shape, hooks, fingers, or scalloped edges associated with the cell(s).
- Deviate upwind when possible.
- Flying under a cumulonimbus overhang shall be avoided when possible.
- When turbulence is expected or encountered, air speed shall be reduced to the rough air penetration speed.

- Flights shall proceed with extreme caution through areas of forecast tornadoes. While flying through these areas, a listening watch shall be maintained on appropriate frequencies giving weather information and radar shall be monitored carefully to avoid sharply defined echoes.
- A deviation in routing shall be considered preferable to flying through areas of known or forecast tornadoes.

#### **4.3.2.11 Portable Electronic Devices**

Passengers are prohibited from using portable electronic devices while in flight, with the exception of:

- Portable voice recorders
- Electric shavers
- Hearing aids
- Mission research equipment
- Electric watches
- Heart pacemakers
- Laptop computers

Normally, none of the allowable communication devices will be used below 10,000 ft.

### **4.3.3 Arrival**

#### **4.3.3.1 Arrival Sequence**

Checklists will be called for as follows:

- Descent - Initial descent from altitude.
- In Range - Out of 10,000 ft AGL (approximately 30 miles out).
- Approach - After completion of the In Range check and prior to reaching the Initial Approach Fix (IAF) for the approach to be flown.

- Landing - Landing checklist is to be completed before the final approach fix inbound or three miles out on a visual approach.
- After Landing - No items are to be completed until the aircraft has cleared the runway, or called for by the PIC.
- Shut Down - In the chocks.

#### **4.3.3.2 Descents and Descent Altitude Callout**

- Descents shall be initiated so the aircraft is at approximately 10,000 ft, approximately 30 miles from destination.
- The descent checklist is requested upon initiation of descent.
- When using a profile descent procedure, the Pilot Flying the aircraft will retain the descent plate and fly the appropriate procedure.
- The callout for descent altitude is 18,000 ft for altimeters and 10,000 ft for the 250-kt speed reduction.
- The In-Range checklist will be called for at either 10,000 ft AGL or 30 miles from destination.

#### **4.3.3.3 Approach Briefing**

Upon receiving the appropriate approach information and verifying that both altimeters are correctly set, the Pilot Not Flying (PNF) will pull the approach plate for review by the Pilot Flying.

The approach briefing will include the following items:

- Minimum Safe Altitude (MSA)
- Type of approach
- Runway of intended landing and length
- Visual aids
- Initial approach altitude
- Minimum Descent Altitude (MDA), Decision Height (DH), or Visual Director Visual Descent Point (VDP)

- Landing approach speed. Time to the missed approach or the missed approach point. Missed approach procedure
- VREF speed.

Visual Approach Briefings may be abbreviated to the following items:

- Airport MSA
- Pattern Altitude
- Runway Being Used
- VREF Speed.

The approach plate will be retained by the PNF for monitoring purposes.

#### **4.3.3.4 First Officer Approach and Landing**

- Normally, the First Officer may make approaches and landings at the discretion of the PIC.
- A First Officer shall not make an approach and landing when the Captain has less than 100 hours of PIC time in the assigned equipment.
- It is the prerogative of the PIC to make the approach and landing during inclement weather or adverse runway conditions.

#### **4.3.3.5 Arrival Message**

An arrival message shall be transmitted to the Fixed Base Operator (FBO) at the intended point of landing for the purpose of coordinating and expediting the ground handling of the aircraft and passengers.

#### **4.3.3.6 Landing/Taxi/Pulse Lights**

Landing lights should be turned on anytime a PNNL aircraft is in a Class B airspace or near an active airport. Landing lights have been proven to diminish bird strikes, so PNNL aircraft will use them at anytime flight is performed below 1000 ft AGL or when exercising the provisions of low-level waivers.

During flight under day VFR conditions, pilots should use the anti-collision and position lights available in the aircraft they are flying. These lights include rotating beacons, strobes, and navigation lights. This procedure is consistent with the FAA *see and avoid* concept for in-flight safety.



#### **4.3.3.7 NAVAID Tuning/Radar Altimeter**

When cleared for the approach or receiving radar vectors, the PNF will tune and identify the appropriate NAVAIDS. When necessary, the radios of the PNF will be left on the NAVAIDS required for orientation or intersections.

Prior to intercept, the PNF will leave his radios tuned to the appropriate NAVAIDS for the approach for monitoring and redundancy, unless required for other approach fixes.

The radar altimeter will be set either for the MSL or DH for an instrument approach, or to 500 ft for a visual approach, as a minimum altitude reminder.

#### **4.3.3.8 Approach Speeds**

PNNL aircraft will fly an approach at  $V_{REF} + 10$  kt with full flaps.

It is recommended the gust velocity be added to the  $V_{REF} + 10$  speed for approaches in gusting conditions. No more than  $V_{REF} + 20$  is recommended.

Nonstandard aircraft configurations will be flown at the recommended speed without a 10-kt addition, except for gust factors.

#### **4.3.3.9 Monitoring of Approach and Callout**

Any callout outside normal parameters requires a response from the Pilot Flying.

During final approach, the PNF shall follow through on the flight controls for the purpose of assuming immediate control of the aircraft in the event the other pilot becomes suddenly incapacitated.

#### **4.3.3.10 Instrument Approaches**

The PNF the aircraft shall also monitor airspeed, altitude, and basic instrument approach references. Each following callout is mandatory:

1. Airspeed callout is made upon any deviation below  $V_{REF} + 10$  or above  $V_{REF} + 20$ .
2. Altitude callout on all aircraft is 500 ft above minimums, 100 ft above minimums, and at minimums. Callout is made to back up audible advisory systems.

The 500-ft callout is acknowledged by the Pilot Flying.

Altitude callout is made until the Pilot Flying states "I am visual." Then the visual approach callout applies.

3. Deviations are called out any time more than one dot displacement or  $\pm 5^\circ$  of bearing deviation occurs.
4. Sink rate is called out anytime it exceeds 1000 ft per minute on final approach.
5. Upon reaching minimums, the PNF will call out one of the three below. The Pilot Flying will then fly the procedure associated with the callout.
  - a. "MISSED APPROACH" - The Pilot Flying will then execute the missed approach procedure.
  - b. "APPROACH LIGHTS IN SIGHT, STAY ON INSTRUMENTS" - The Pilot Flying will continue flying the approach, until the PNF calls either "Runway in sight" or "missed approach."
  - c. "RUNWAY IN SIGHT, GO VISUAL" - The Pilot Flying will then go to visual approach. Call out "I am visual" and land the aircraft. The PNF will monitor the instruments and give the standard, mandatory callout.

#### **4.3.3.11 Visual Approaches**

If available, an electronic guide slope shall be tuned, identified, and utilized while making a visual approach.

The PNF shall monitor airspeed, altitude, and other aircraft. Each callout following is mandatory:

1. Airspeed callout is made upon any deviation below VREF + 10 or above VREF + 20.
2. Sink rate is to be called out anytime it exceeds 1000 ft per minute on final approach.
3. Altitude is called out at 500 ft AGL. This callout will be acknowledged by the Pilot Flying.

#### **4.3.3.12 Stabilized Approaches**

Flight crews are expected to fly stabilized approaches during visual and instrument approaches.

Approaches are considered stabilized when the aircraft is fully configured for landing, and is on the glide slope or on a 3-degree visual glide slope. On an Instrument Landing System (ILS) equipped runway, or no less than three miles out on a visual runway, approaches are considered stabilized when the landing checklist is completed by the outer marker.

At times, the ATC may request speeds to the outer marker or some other fix that precludes final flap settings. It is the responsibility of the PIC to ensure the approach can be safely executed and the checklist and final flap setting can be completed as close as possible to the 3-mile out point.

Under no circumstance will an approach continue from a point 500 ft above MDA/DH or 500 ft AGL on a visual approach, unless the aircraft is fully configured for landing, airspeed on target, and the landing checklist is complete.

#### **4.3.3.13 Required Runway**

Except in an emergency, PNNL aircraft shall not operate from a runway less than 5000 ft long and 75 ft wide. Under no circumstance shall a PNNL aircraft take off or land on runways shorter than that required by the Aircraft Flight Operations Manual.

Landing distance factors due to abnormal aircraft equipment operations shall be computed using the Aircraft Flight Operations Manual.

### **4.3.4 Navigation Procedures**

The PNF will normally program navigation information and monitor flight progress.

#### **4.3.4.1 VOR Only Navigation**

The PNF will normally tune and identify radio frequencies. On NAVS he will set the intercept radial on the Pilot Flying side and any cross radials on his. On legs between stations, he will set the outbound radial on #2 course deviation indicator (CDI) as reference to be used by the Pilot Flying on the next leg. After station passage, the #2 NAV information will be transferred to the #1 NAV and the #2 NAV then tuned to the next station with the inbound radial set in.

#### **4.3.4.2 Global Positioning System Navigation**

The PIC is responsible for determining the accuracy of the Global Positioning System (GPS) signal in accordance with the procedures set forth in the appropriate operator's manual. During en route operations, GPS and VOR navigation information shall be routinely cross-checked and updated as required. The following procedures shall be followed when navigating by reference to GPS:

1. Both navigation radios shall be tuned to the VORs to monitor navigational progress.
2. Failure of the GPS navigation system shall be reported to the controlling ATC facility as soon as practicable.

### **4.3.5 Interruption of Flight Due to Passenger Medical Problems**

Passengers experiencing distress or a life-threatening emergency should be immediately attended by the PIC, unless the event occurs in the takeoff, landing, or initial climb or descent phases. If the event occurs during these phases of flight, a decision will be made whether to expedite the arrival or return to the departure airport. If the event occurs during some other phase of flight, and the PIC feels that further

action is needed, the PIC will administer first aid when appropriate and instruct the SIC to find and head toward a suitable airport.

The PIC shall make the decision whether to request priority handling by ATC or to declare an emergency, depending on the severity of the situation.

The PIC will make a report of the incident to the Director of Flight Operations, as soon as practicable.

#### **4.3.6 Manipulation of Flight Controls by Non-Employee Pilots (FAR 135.115)**

Only the PIC and SIC may manipulate the flight controls of an aircraft during flight. No other person may manipulate the flight controls during flight, unless that person has the permission of the PIC and is an authorized safety representative of the FAA administrator or is a pilot employed by PNNL and qualified in the aircraft.

#### **4.3.7 Admission to Cockpit**

When below 10,000 ft, admission to the aircraft flight deck is restricted to:

- Crew members
- Factory or Instructor Pilot
- Aviation Maintenance Technician
- Approved jump seat passengers.

When operating above 10,000 ft, passengers may be admitted to the flight deck at the discretion of the PIC.

Below 10,000 ft, passengers may be allowed in the jump seat at the discretion of the PIC. This practice is not to be encouraged and invitations to occupy the jump seat can only be extended by the PIC.

#### **4.3.8 Operations Using Visual Flight Rules**

PNNL aircraft shall not fly a VFR flight segment, unless the weather is currently and forecasted to have a ceiling of at least 5000 ft AGL and 5 miles visibility, and is forecasted to remain so until at least one hour after estimated time of arrival (ETA) at destination.

ATC communication should be maintained throughout the flight. An IFR or VFR flight plan must be filed for all flights.

- *VFR Fuel Supply (FAR 135.209)* - No PNNL pilot may begin a flight operation in a PNNL aircraft under VFR unless, considering wind and forecast weather conditions, the aircraft has enough fuel to fly to the first point of intended landing and, assuming normal cruising fuel consumption
  - a. During the day, to fly after that point for at least 30 minutes or
  - b. At night, to fly for at least another 45 minutes.

#### **4.3.9 Operations Using Instrument Flight Rules**

PNNL aircraft are normally required to operate on IFR flight plans. An IFR flight plan shall be filed and a clearance received for each flight segment of every passenger transport aircraft flight.

- *VFR Over-the-Top Carrying Passengers: Operating Limitations (FAR 135.211)* - No PNNL pilot may operate a PNNL aircraft carrying passengers under VFR over-the-top unless
  - a. Weather reports or forecasts, or any combination of them, indicate the weather at the intended point of termination of over-the-top flight
    - Allows descent to beneath the ceiling under VFR and is forecast to remain so until at least 1 hour after the ETA at that point or
    - Allows an IFR approach and landing with flight clear of the clouds until reaching the prescribed initial approach altitude over the final approach facility, unless the approach is made with the use of radar under FAR 91.175(i).
  - b. It is operated under conditions allowing
    - A multi-engine aircraft to descend or continue the flight under VFR, if an engine fails.
- *IFR Operating Limitations (FAR 135.215)* - No PNNL pilot may operate a PNNL aircraft under IFR outside of controlled airspace or at any airport that does not have an approved standard instrument approach procedure, except when it is necessary to
  1. Conduct an instrument approach to an airport for which a current approved standard or special instrument approach procedure is in use or
  2. Climb into controlled airspace during an approved missed approach procedure or
  3. Make an IFR departure from an airport having an approved instrument approach procedure.
- *IFR Takeoff Limitations (FAR 135.217)* - No PNNL pilot may take off a PNNL aircraft under IFR from an airport where weather conditions are at or above takeoff minimums, but are below authorized

IFR landing minimums. The exception is unless an alternate airport is within 1 hour flying time (at normal cruising speed, in still air) of the airport of departure.

- *Destination Airport Weather Minimums (FAR 135.219)* - No PNNL pilot may take off a PNNL aircraft under IFR or begin an IFR or over-the-top operation, depending on the weather, unless the latest weather reports or forecasts, or any combination of them, indicate that weather conditions at the ETA at the next airport of intended landing will be at or above authorized IFR landing minimums.
- *IFR Alternate Airport Weather Minimums (FAR 135.221)* - No PNNL pilot may designate an alternate airport, unless the latest weather reports or forecasts, or any combination of them, indicate that weather conditions will be at or above authorized IFR landing minimums for that airport at the ETA.
- *IFR Alternate Airport Weather and Fuel Requirements (FAR 135.223)* - No PNNL pilot may operate a PNNL aircraft in IFR conditions, unless it carries enough fuel (considering weather reports or forecasts or any combination of them) to
  - a. Complete the flight to the first airport of intended landing
  - b. Fly from that airport to the alternate airport
  - c. After that time, fly for 45 minutes at normal cruising speed.
- *IFR Takeoff, Approach, and Landing Minimums (FAR 135.225)* - No pilot of a PNNL aircraft may begin an instrument approach procedure to an airport unless
  1. That airport has a weather reporting facility operated by the U.S. National Weather Service, a source of weather information approved by the U.S. National Weather Service or
  2. The latest weather report issued by that weather reporting facility indicates that weather conditions are at or above the authorized IFR landing minimums for that airport.

No pilot of a PNNL aircraft may begin the final approach segment of an instrument approach procedure to an airport, unless the latest approved weather report indicates that weather conditions for that airport are at or above the authorized IFR landing minimums for that procedure.

If a pilot has begun the final segment of an instrument approach to an airport, and a later weather report, indicating below minimum conditions is received after the aircraft is

- a. On an ILS final approach and has passed the final approach fix, or
- b. On an Airport Surveillance Radar (ASR) or Precision Approach Radar (PAR) final approach and has been turned over to the final approach controller, or

- c. On a final approach using a VOR, non-directional beacon (NDB), or comparable approach procedure, and the aircraft has passed the appropriate facility or final approach fix, or where a final approach fix is not specified

And, if the pilot has completed the procedure turn and is inbound toward the airport on the final approach course within the distance prescribed in the procedure; then the approach may be continued and landing made if the pilot finds, upon reaching the authorized MDA or DH, that actual weather conditions are at least equal to the minimums prescribed for the procedure.

Each PNNL pilot making an IFR takeoff or approach and landing at a military or foreign airport shall comply with applicable instrument approach procedures and weather minimums prescribed by the authority having jurisdiction over that airport. In addition, at that airport no PNNL pilot may

- a. Take off under IFR when the visibility is less than 1 mile or
- b. Make an instrument approach when the visibility is less than half a mile.

#### **4.3.9.1 Alternate Airport Requirements**

- A destination alternate airport shall be included in the IFR flight plan when the ceiling at the destination is forecast to be below 2000 ft and 3 miles visibility from 1 hour prior to scheduled arrival time to 1 hour after scheduled arrival.
- The weather forecast at the selected destination alternate shall meet the published air carrier alternate airport weather requirements on the back of the first approach plate for the alternate airport.
- An alternate airport shall also be selected when the destination airport is reporting one of the following:
  - Forecast thunderstorms or low level wind shear
  - One operational runway
  - Ice, slush, or snow on the runway.
- When visibility at the departure airport is reported as less than that required for an approach, an emergency alternate airport within 100 nautical miles of the departure airport shall be entered in the IFR flight plan.
- For aircraft with two engines, the emergency alternate shall be within a half hour of flying time with one engine inoperative.

- The weather forecast at the selected emergency alternate shall meet the published air carrier alternate weather requirements on the back of the first approach plate for the alternate airport.

#### **4.3.9.2 Limitations on the Use of Auto Pilot - Minimum Altitudes for Use (FAR 135.93)**

- No PNNL PIC may use an auto pilot at an altitude above the terrain that is less than 500 ft or less than twice the maximum altitude loss, specified in the approved Aircraft Flight Operations Manual or equivalent, for a malfunction of the auto pilot, whichever is higher.
- When using an instrument approach facility other than ILS, no PNNL pilot may use an auto pilot at an altitude AGL that is
  - less than 50 ft below the approved minimum descent altitude for that procedure
  - or less than twice the maximum altitude loss, specified in the approved Aircraft Flight Operations Manual (or equivalent), for a malfunction of the auto pilot, whichever is higher.
- For ILS approaches, when reported weather conditions are less than the basic weather conditions defined in FAR 91.155, no PNNL pilot may use an auto pilot
  - with an approach coupler at an altitude that is less than 50 ft AGL
  - or the maximum altitude loss, specified in the approved Aircraft Flight Operations Manual or equivalent, for a malfunction of the auto pilot with approach coupler, whichever is higher.

#### **4.3.9.3 Wind Restrictions**

The PIC shall consider runway conditions and demonstrated crosswind components stated in the Aircraft Flight Operations Manual or this manual (whichever is most restrictive).

- PNNL aircraft will not depart or land when wind velocities exceed the following:
  - 55 kt headwind component
  - 30 kt crosswind component
  - 10 kt tailwind component.

#### **4.3.9.4 Runway Requirements and Conditions**

- The PIC shall be responsible for calculating the Gross Weight/Takeoff and Landing Performance Requirements for airports of intended use, as outlined in the Aircraft Flight Operations Manual.



- The PIC shall be responsible for meeting FAR 121.189 and FAR 121.195 Transport Category Turbine Engine Powered Airplanes Takeoff and Landing Limitations.
- PNNL aircraft shall not operate when braking action is reported as poor or nil.
- PNNL aircraft shall not depart when standing water, slush, or wet snow greater than a half inch in depth covers an appreciable part of the runway.
- PNNL aircraft shall not depart when dry snow greater than 4 inches in depth covers an appreciable part of the runway.
- When takeoffs or landings are made on wet, slush-, or snow-covered runways and braking action reports are available, the following guideline shall be used:
  - Wet runways add 15% to the runway length required in this section.
  - Pilots are encouraged to consider a more conservative approach when operating on wet or slippery runways.

#### **4.3.9.5 Clearance Readbacks**

All flight plan clearances, ATC instructions, taxi instructions, ATC clearances, and instructions regarding active runways will be read back, including the aircraft registration number.

#### **4.3.9.6 Jeppesen Revisions**

It is the responsibility of both pilots assigned to ensure the aircraft's Jeppesen Revisions have been completed.

### **4.4 Post Flight Operations**

#### **4.4.1 Maintenance/Flight Forms and Records (Maintenance Status and Problem Notification)**

All aircraft discrepancies discovered during flight will be substantiated by the PNF, using a complete and legible entry in the Aircraft Discrepancies form (see Appendix A, page A.12). Although verbal descriptions of the fault are helpful and should be provided to maintenance personnel performing the repair, these descriptions will not substitute for a written discrepancy report.

#### **4.4.2 Post Flight Inspection**

It is the responsibility of the PIC to ensure that a thorough post flight inspection of the aircraft is conducted.

### **4.4.3 Securing Aircraft**

It shall be the responsibility of the PIC to park and secure the aircraft in a manner that is as free as possible from the hazards of weather, intrusion, or collision with service vehicles, or aircraft under tow/ taxiing. If doubts exist about the security of the aircraft, the PIC with the concurrence of the Director of Flight Operations or Chief Pilot shall be responsible for taking the steps necessary to ensure aircraft security. Some examples of these steps are taxiing to a better location, obtaining hangar space, obtaining guard, or flying the aircraft out of the hazard area. It shall be the responsibility of the PIC to determine the aircraft has been properly secured with chocks, pins, and covers.

Prior to deplaning, crew members shall empty all ashtrays, service the lavatory (if required), and remove all perishables and refuse. In subfreezing temperatures, it may be necessary to drain/remove items that freeze.

## **4.5 Adverse Weather Operations**

Weather is the single most influential factor in the planning and execution of a flight operation. When conducting a flight operation away from the PNNL home base, it is the responsibility of the flight crew to monitor the FSS for severe weather warnings or forecasts. If severe weather (thunderstorms with large hail, strong winds over 50 kt, tornadoes, hurricanes, or any phenomenon that would endanger a PNNL aircraft left outside on the ramp) is forecast, the airplane must be moved. The flight crew is responsible for placing the aircraft in a hangar or repositioning it to a safe area until the danger has passed.

All pilots have their own limitations and know better than anyone what they should, or should not, do. A pilot must never allow external pressures influence a decision to permit a flight, if any doubt whatsoever is present concerning the safe outcome. A pilot must never push his or her limitations or exceed the limitations of the aircraft. After evaluating every practical source of weather information, it is the prerogative and responsibility of the PIC to make the *go/no go* decision for any flight. The provisions of this manual are to be used as aids to the pilot in making these decisions.

### **4.5.1 Cold Weather (FAR 135.227)**

No PNNL PIC may take off an aircraft that has frost, ice, or snow adhering to any windshield, wing, stabilizing or control surface, to a power plant installation or to an airspeed, altimeter, rate of climb, or flight attitude instrument system. See Aircraft Flight Operations Manual for details on cold weather operations.

### **4.5.2 Hot Weather/Density Altitude Advisories**

At airports with elevations of 2000 ft and higher, control towers and the FSS will broadcast the advisory "Check Density Altitude" when the temperature reaches a predetermined level. These advisories

will be broadcast on appropriate tower frequencies or, where available, ATIS. FSS will broadcast these advisories as a part of Local Airport Advisory and on a Transcribed Weather Broadcast (TWEB).

These advisories are provided by air traffic facilities, as a reminder to pilots that high temperatures and high field elevations will cause significant changes in aircraft performance characteristics. During these conditions, the PNNL PIC retains the responsibility to compute density altitude, as a part of preflight duties.

### **4.5.3 Clear Air Turbulence**

Clear air turbulence (CAT) is a very serious operational factor for flight operations at all levels and especially to jet traffic flying over 15,000 ft. The best available information on CAT comes from pilots via the Pilot Reporting system (PIREP). All pilots encountering CAT conditions are urgently requested to report *time, location, and intensity* (light, moderate, severe, or extreme) of the turbulence to the FAA facility with which they are maintaining radio contact. If time and conditions permit, turbulence should be reported according to the standards for other PIREP and position reports. When operating PNNL aircraft above 15,000 ft, it is the responsibility of the PNNL PIC to monitor for CAT and give PIREP.

### **4.5.4 Turbulent Air Penetration**

PNNL pilots will not intentionally fly through areas of reported severe turbulence and will give careful consideration to flying into areas of forecast moderate turbulence. If any turbulence is encountered in flight, a report of its duration and position should be given to the nearest FAA facility. The following terminology is to be used for reporting the degree of turbulence:

1. *Light* refers to a condition where occupants may be required to use seat belts, but objects in the aircraft remain at rest.
2. *Moderate* refers to a condition where the occupants require seat belts and are occasionally thrown against the belt. Unsecured objects in the aircraft may move about.
3. *Severe* refers to a condition where the aircraft may be momentarily thrown out of control. Occupants are thrown violently against the seat belt and objects not secured are tossed about.
4. *Chop* refers to a light or moderate condition of washboard-type fluctuations occurring at rapid and frequent intervals.

### **4.5.5 Wind Shear Conditions**

- Whenever a cold front moving at 30 kt or more is going to arrive at the airport at the same time you are, expect significant wind shear as you fly through the frontal surface.
- A warm front with a temperature difference of 10°F or more may be a potential wind shear problem.

- Any time you are fighting a headwind or strong tailwind en route and the surface wind is reported calm, wind shear exists between your altitude and the ground.
- Expect serious wind shear encounters anytime a thunderstorm is in the immediate environs of the airport.
- VFR: If wind shear conditions exist, plan to fly down the final approach a little faster and a little higher than normal (if airspeed starts to bleed off, add power immediately). Watch out for overshoot!
- IFR: If the approach speed is 120 kt to make a 3-degree glide slope without wind, you will descend about 600 ft per minute (FPM). If it requires only 400 FPM to stay on the glide slope, a headwind of about 40 kt is present. If the surface wind is 10 kt, during descent you will lose 30 kt and need to get power on and scramble to keep from getting too low.

If the necessary descent rate to stay on glide slope is near 800 FPM, a 40-kt tailwind is indicated, and it will be a scramble not to overshoot. The formula for descent rates vs. ground speed is half the ground speed times 10 equals the descent rate.

*Example:* If you are coming down the glide slope at 900 FPM, divide that by 10 to get 90; multiply by 2 to get 180, which is the ground speed. If the normal air speed is 120 kt, you have a 60-kt tailwind!

These numbers are true airspeed at sea level.

#### 4.5.6 Thunderstorms

Flights will not be planned into areas where tornadoes or heavy thunderstorms are reported. It is permissible to conduct flights into areas of scattered thunderstorms where detours may be made around storms or heavy rain areas. Even under these conditions, the pilot should monitor available weather broadcasts to be aware of trends toward increased activity. When detouring around thunderstorms, the flight path should avoid the overhang of a cumulonimbus because it would be possible, even though flying in the clear, to encounter a hail shaft from the overhang.

#### 4.5.7 Lightning and Static Discharges

Static discharges occur frequently in shower-type clouds at levels where the air temperature is close to freezing. Lightning and static discharges are usually preceded by sharp increases in radio static, especially in the low frequency range. The pilot should make the following checks for visible or functional indications of damage:

1. A check of the magnetic compass on as many cardinal headings as practical, using other cockpit indicators, such as heading indicator, radio magnetic indicator (RMI), and radios for known headings as references.

2. Operational checks of communications and navigation equipment for erratic or sluggish operations.
3. Upon landing, a visual check of the exterior of the aircraft should be made for possible structural or skin damage, with particular attention to trailing edges, control hinge points, visible bonding and wiring, and fuel tank vents and access ports.

#### 4.5.8 Radar/Storm Scope Requirements

1. At altitudes less than FL230, echoes shall be avoided by at least: 5 miles if OAT is 0°C or higher, 10 miles if 0°C or lower. These distances are doubled, if radar indicates rapid increase in size or shape of hooks, fingers, or scalloped edges associated with the cell(s). (See subsection 4.3.1.10 for other requirements.)
2. Flights shall proceed with extreme caution through areas of forecast tornadoes. When flying through these areas, a listening watch shall be maintained on appropriate frequencies giving weather information. Radar shall be monitored carefully to avoid sharply defined echoes. (See subsection 4.3.1.9 for other requirements.)

#### 4.5.9 Icing and Freezing Precipitation

When ice accumulation is encountered, an increase in power is required to maintain altitude or airspeed. If large increases in power are required, action should be taken immediately to change altitude or otherwise avoid the icing conditions that may abnormally tax the de-icing or anti-icing capability of the aircraft (FAR 91.209). All icing conditions will be reported to the FAA, using the following terminology:

1. Degree of Intensity
  - a. *Light ice* is an accumulation of little or no consequence and does not affect the performance of the aircraft, but should be reported for meteorological reasons. Such accumulations can be handled safely by the normal de-icing or anti-icing equipment. The aircraft can be flown indefinitely in such conditions with use of this equipment.
  - b. *Moderate ice* is a serious condition, one the aircraft de-icing or anti-icing equipment can handle, but it is a signal to the pilot to alter the flight to avoid further operation in that condition.
  - c. *Severe ice* is an adverse and dangerous condition the aircraft de-icing or anti-icing systems cannot handle. Freezing rain is considered a severe icing condition, and immediate action should be taken to change the altitude or course of the plane or to take whatever action is required to ensure the safety of all passengers and crew members. If the icing condition continues, the pilot should land at the nearest suitable airport and wait for a weather change.
2. Types of Ice
  - a. *Rime ice* is hard, porous, white, opaque ice consisting of small grains, air space, and frost-like crystals.

b. *Clear ice* is hard, clear, solid ice that is very heavy.

c. *Mixed ice* is a combination of rime and clear ice.

#### **4.5.10 Flight Restrictions Due to Actual or Forecast Weather Conditions**

PNNL aircraft do not operate under the following conditions:

- Take off or land in moderate or heavy freezing rain or sleet.
- Take off with frost, snow, or ice adhering to any windshield, power plant installation, airspeed, altimeter, rate-of-climb or flight-altitude instrument system.
- Take off with frost, snow, or ice adhering to any airfoil or control surface.
- Take off into known or forecast icing conditions that exceed the anti-icing or de-icing limitation of the aircraft.
- Take off into known or forecast conditions of severe turbulence or severe clear air turbulence.
- Take off into known areas where thunderstorms of moderate intensity or greater exist, unless the thunderstorms can be avoided using visual or radar guidance.
- Take off or land with a thunderstorm adjacent to or over the airport.

#### **4.6 Security Procedures**

In order to provide assurance the aircraft, cargo, and passengers meet the required security conditions, the following regulations shall apply:

- Passengers and crew carrying classified material must receive courier training and receive periodic certification, as required by originating agency directives, as applicable.
- Material designated as hazardous or radiological cargo must meet the applicable federal or state regulations relating to the interstate or intrastate transport of such material.
- Transport of materials designated as controlled substances and covered by federal or state statutes must comply with applicable PNNL policies, DOE or DoD policy or federal or state regulations relating to such transport.

- Non-PNNL, as well as PNNL, passengers must comply with PNNL, DOE, and DoD requirements for transport of classified, hazardous, toxic, or radiological material.
- Classified or Business Sensitive material shall be packaged and marked to meet the originating agency requirements for the appropriate classification level.
- All packages and cargo received for transport shall bear the identity of the sender and the receiver. Such material shall be packaged to permit visual examination of the package exterior to determine if the package has been opened or tampering has occurred.
- Firearms being transported shall be stored in the cargo area and must be unloaded. Ammunition shall be stored in containers approved for air transport. Possession of handheld firearms shall be excluded, except for persons authorized by applicable federal or state license to carry such weapons.
- Aircraft preflight inspection shall be performed to determine if clandestine explosive or incendiary devices have been secreted on board the aircraft. Such inspection shall be performed as part of the Research Aircraft Preflight Security Checklist (see Section 3 and Appendix A, page A.4).
- The Corporate Aircraft Preflight Security Checklist must be completed for each applicable package.

## **4.7 Accident Notification Procedures and Responsibilities**

For detailed information on the notification/reporting of aircraft incidents/accidents or off-normal events and overdue aircraft, and the preservation of aircraft wreckage, mail, cargo and records, refer to Appendix E.

## **4.8 Incident/Accident or Off-Normal Event on Scene Procedures**

### **4.8.1 Crew Member Responsibilities**

In the event of an incident/accident or off-normal event involving an aircraft operated by an aviation staff member, the Senior Crew Member not incapacitated will coordinate the following procedures:

1. Remove all passengers to a safe distance, if fire or explosion is imminent.
2. Request medical assistance and initiate first aid as necessary. Arrange for medical examination of all passengers whether injured or not and secure a doctor's report on each one.
3. Secure the scene to allow accurate documentation of conditions associated with the event, and to allow an investigative team to observe those conditions.
4. Call the PNNL Emergency Number (509-375-2400) and notify the proper agencies and personnel as listed in the Emergency Notification Chart (Appendix A, page A.23).

5. All accidents involving Hanford associated aircraft shall be reported promptly to the PNNL ASPOC, RL Manager/Aviation Manager/ASO, the HQ Senior Aviation Management Official, the NTSB, and the FAA, as required. See Appendix D for names and telephone numbers.
6. Make no statements regarding the accident to anyone other than the FAA, the NTSB, the local police, and the FBI.

If requested by an authorized representative of the FAA, NTSB, airport police, or other state or local police to issue a statement, REMEMBER: You are not required to say anything that might tend to incriminate you and you are entitled to legal counsel. You have these rights whether or not the person asking for the statement advises you of them. If you choose to assert your rights, you should affirmatively state them, or they may be considered as having been waived.

Attempt to satisfy all such requests by referring the requesting party to the Director of Flight Operations/Chief Pilot, or PNNL Media Relations. Information for the general public, press, radio, TV, and company employees concerning accidents, emergencies, or bomb hoaxes is developed and released only by PNNL Media Relations.

7. Complete the Aviation Safety Incident/Accident or Off-Normal Event Operations Checklist (Appendix A, page A.22) after making a survey of the wreckage to determine and record factors that may have contributed to the cause of same; making sure not to enter, touch or disturb the aircraft, its controls, or parts.
8. After a doctor has examined them, assist the uninjured persons toward their destination, as necessary.

#### **4.8.2 Emergency First Aid**

First aid kits and survival equipment, as required, will be readily available for emergency uses, and each person on board must be briefed on its location and use. No person may operate a PNNL aircraft having a passenger seating configuration more than 19 (excluding any pilot seat), unless it is equipped with the following emergency materials:

- One approved first aid kit that meets the following requirements for treatment of injuries likely to occur in flight or in a minor accident:
  - Must be dust and moisture proof, and contain only materials that either meet the Federal Specifications GGK-319a, as revised, or approved by the FAA Administrator.
  - Must be readily available to the cabin flight attendants.
  - Gloves may be placed in the first aid kit or in a location readily accessible to crew members.
  - The contents of the kit must be checked prior to each deployment.



- A crash axe carried so as to be accessible to the crew, but inaccessible to the crew during normal operations.
- Unless otherwise indicated, the kit must contain at least the following items.

<b>Contents</b>	<b>Quantity</b>
Adhesive bandage compressors, 1 in.	16
Antiseptic swabs	20
Ammonia inhalants	10
Bandage compressors, 4 in.	8
Triangular bandage compressors, 40 in.	5
Arm splint, non-inflatable	1
Leg splint, non-inflatable	1
Roller bandage, 4 in.	4
Adhesive tape, 1-in. standard roll	2
Bandage scissors	1
Pair of protective latex gloves or equivalent	1

### **4.8.3 Incident/Accident or Off-Normal Event Operations Checklist**

This checklist is found in Appendix A, page A.22.

## **4.9 Medical Emergencies**

### **4.9.1 General**

Medical aid shall be secured immediately for all injured persons. Notify the PNNL Emergency Number 509-375-2400 as soon as possible and, in the event of fatalities, also notify the coroner. Notification of relatives should be handled through PNNL Media Relations.

Physicians examining injured persons should be requested to submit a medical report covering each such person.

The full names and addresses of each injured person should be obtained, and also the names and addresses of the owners of damaged property.

### **4.9.2 Injury or Illness**

The PIC should quickly obtain as complete and detailed a report as possible from the flight crew, then, after examining the person, decide whether the seriousness of his/her condition warrants the

quickest possible medical attention. If a physician is on board the plane, request his advice as to the necessity of securing immediate additional medical attention. If the decision is made to land, the PIC shall:

- Divert to the nearest suitable airport consistent with safe conduct of the flight, including return to point of origin.
- Announce the decision to land and radio a request that an emergency medical response team meet the aircraft.

Note: The PIC should use his judgment as to whether only an ambulance should be summoned, rather than a physician as well. With doctors in short supply, and with the possibility of critical time being lost waiting for the doctor to arrive, the best possible medical service might be obtained by calling only for the ambulance service.

### **4.9.3 Loss of Consciousness or Death in Flight**

When a person loses consciousness, or breathing, or heart action appears weak or stopped, and the administration of ammonia, oxygen, or other unusual measures fail to bring about improvement, it is the responsibility of the PNNL flight crew to land the aircraft at a suitable airport and place the person in the care of a physician as quickly as possible. Request, through control tower or other agency, for public authorities (police, airport officials, coroner, and another doctor) to come to the airport, as a person on board has a life threatening condition or appears to be dead.

### **4.9.4 Radioactive Materials Involvement**

In incidents involving aircraft transporting radiological materials and there is a fire, fight the fire from upwind, keeping out of any smoke, fumes, or dust arising from the accident. Do not handle suspected material until it has been released by monitoring personnel. Segregate clothing and tools used at the fire until radiological teams have checked them.

With as little contact as possible, remove injured persons from accident area. Take any measures necessary to save life, but perform only essential first-aid and surgical procedures until help is obtained from physicians familiar with radiation medicine. Segregate and detain those who have had possible contact with radioactive material until they can be examined further.

Do not eat, drink, or smoke in the area. Do not ingest food or drinking water that may have been in contact with material from the accident.

## 4.10 Aircraft Emergencies

Aircraft emergencies can be generally classified as either

- Planned - PIC has sufficient time to tell the crew of the nature of the emergency and what they should do.
- Unplanned - Happens unexpectedly, often during taxi, takeoff or landing, giving the PIC no time to coordinate a course of action with the crew. About 80 percent of emergency landings are unplanned.

Emergency procedures described in this manual were included only after repeated testing and thorough investigation. They represent the best known available facts about the subject. Pilots should follow these procedures as long as they fit the emergency. However, if they are at any time not adequate or not applicable, then the best judgment of the PIC should prevail. Only the flight crew operating the aircraft at the time the emergency occurs can evaluate the situation sufficiently to make the proper decision. Crew members should assume the worst in abnormal situations and emergencies and act accordingly. The procedures are essentially the same as those contained in the FAA-approved aircraft flight manual.

Although not all emergencies or malfunctions can be addressed, generally the PIC will make all landings whenever any problem with the aircraft arises unless, in his judgment, it would be safer for the First Officer to land the aircraft.

All crew members should be thoroughly familiar with emergency procedures and the location and use of emergency equipment. Any flight crew member should be equipped to handle the emergency duties of any other crew member.

All crew members must realize the PIC is in complete charge of the aircraft, and his orders are to be obeyed, even though they may be in variance with written instructions. Any potential or actual emergency situation should be immediately called to the attention of the PIC. Only the PIC shall initiate emergency procedures such as engine shutdown or fire extinguisher discharge. (If the PIC is absent from the cockpit, the First Officer is in command.)

Emergency checklists are used in the same challenge and response method as the normal checklists with one additional step: the pilot reading the checklist should read aloud BOTH the challenge and the response. Then, no doubt will exist in any flight crew member's mind as to the correct course of action. The pilot responding has the same responsibility for checking or accomplishing the item, and responding to the challenge, as if it were not being read aloud.

1. The PIC is to call out all memory items for completion by the First Officer.
2. Engine identification is accomplished by the Pilot Flying the aircraft and confirmed by the Non-Flying Pilot, prior to complying with emergency procedures.

Fires are obviously in the category of most urgent emergency and require the immediate action in the earliest stages for proper control. Any warning of fire must be treated as an actual fire and fire-fighting procedures initiated. Procedures may be terminated, if it can be definitely determined that no fire exists.

### **4.10.1 Engine Failure**

In the event of an engine failure, the aircraft will be landed at the nearest practical airport in point of time. Request crash/fire-fighting equipment. See the Emergency Notification Chart in Appendix A, page A.23.

When an engine fails on an over-water flight and the aircraft is more than 100 miles from point of departure, destination, or other suitable landing area, the PIC should immediately notify ATC in the routine manner. ATC will then be responsible for alerting Search and Rescue.

### **4.10.2 Emergency Landings – Crew Duties**

#### **4.10.2.1 Captain/PIC Duties**

The PIC must first determine the extent of the emergency. Next, he must notify ground station of emergency.

The PIC must also advise the Flight Deck Crew and issue necessary orders.

Other tasks regarding an emergency landing include:

- Warning passengers just prior to landing with public address system, or other prearranged signal.
- Position all switches and controls, as appropriate, just prior to touchdown.
- If possible, avoid landing until (a) emergency equipment and crews are standing by; (b) passengers are instructed in evacuation procedures; (c) aircraft emergency exits are ready for use.

#### **4.10.2.2 First Officer Duties**

The major duties of the First Officer during an emergency landing are to:

- Perform initial duties as directed by the PIC.
- Depressurize aircraft when directed.
- Secure all loose equipment in cockpit.
- Help prepare passengers, emergency exits, and equipment, if possible.

- Actuate all switches and controls, as appropriate, just prior to touchdown.
- Give pregnant women extra padding material to place between their knees and face when in brace position. Have pregnant women fasten seat belts tightly and as low as possible across their hips.
- Give passengers duties (able-buddy system):
  - How to open exits
  - Who goes out first, second, third, and so forth
  - Assist injured passengers
  - Secure main cabin door curtain OPEN.
- Make sure all passengers know how to unfasten their seat belts and give them the following instructions
  - In front-facing seats, to put their heads in their laps and firmly hold their arms under their knees just before touchdown.
  - In rear-facing seats, to clasp their hands firmly behind their heads and lean back in the seat just before touchdown.
  - If it is a wheels-up landing, two impacts will occur; the second one is more severe.
  - To remain seated in brace position until the aircraft stops all movement.
- Give passengers blankets, pillows, and coats for impact protection, if available.
- Instruct passengers to assume their proper brace position upon prearranged signal.

#### **4.10.2.3 Emergency Ground Equipment Request**

If the PIC wishes emergency equipment alerted for a landing, he will normally request this through ATC or the control tower at the airport of intended landing.

Before making a landing when emergency equipment has been requested, give the following information to the ATC, tower, or approach control:

1. Description of problem.
2. Whether the landing will be long, short, or normal.

3. Number of passengers on board.
4. Handicapped passengers and their locations on aircraft.
5. Type of cargo, if unusual.
6. Amount of fuel on board (in minutes).

When an emergency condition is reported to any FAA facility, the emergency equipment at the airport will be standing by. If there is the slightest doubt that the gear is not fully locked down, that a hydraulic failure or engine malfunction exists, or that any condition exists that might make the landing anything but normal, do not hesitate to request the tower to have emergency vehicles standing by.

#### **4.10.3 Emergency Passenger Evacuation Procedures - Crew**

Availability of various exits will differ from one situation to another. Crew members on the scene must make the decision as to which exit would be most preferable to use under the prevailing circumstances.

Bearing in mind that not all situations can be described, the following basic procedures best cover most incidents requiring the evacuation of an aircraft.

In Stage 1, securing the aircraft and initiating the evacuation, the Pilot Flying

- Stops the aircraft
- Makes the public address announcement
- Secures cockpit and engines as appropriate.

In this stage, the First Officer is responsible for

- Calling for assistance over radio
- Opening main door.

During Stage 2, the First Officer, after opening forward door, will proceed to mid-cabin to assist in evacuation of passengers.

The PIC will assist in passenger evacuation. After cockpit is secure, he will proceed to mid-cabin for a final check to see that everyone is out; then exit.

After evacuation, the PIC is responsible for determining all crew and passengers are accounted for.

#### 4.10.4 Ditching

Ditching, a landing in water, can be divided into two categories, planned (time available for preparation) and unplanned (unexpected crash into water). Exact procedures and crew duties, as well as explanations, are outlined in the Aircraft Flight Operations Manual. These procedures and duties should be followed to the extent possible.

The following list is a general guide for flight crew duties in a planned ditching:

1. Communicate: The international distress frequencies are: 500 kHz, 2182 kHz, 8364 kHz, and 121.5 MHz.
2. Set transponder to Code 7700. Note: You may not be in radar contact.
3. Determine options. Communicate intentions and position to ATC and any nearby vessels.
4. Plan water landing. Evaluate sea and wind conditions, then determine best ditching heading.
5. Prepare cabin and passengers by accomplishing the following tasks:
  - Brief the flight crew
  - Stow and secure loose items
  - Locate rafts and survival equipment
  - Turn lights up to maximum intensity
  - Brief passengers
  - Pass out life vests.
6. Prepare yourself and the Flight Deck Crew by
  - Securing cockpit items
  - Donning life vest
  - Securing seat belt and shoulder harness
  - Securing flashlight nearby

- Turning on emergency exit lights
- Discussing duties and exit routes with crew.

7. Included in the preparation of the aircraft for ditching:

- Dump fuel, if possible
- Depressurize below 10,000 feet
- Set heading bug to ditch heading
- Turn on all lights
- Silence gear warning system
- Make final position check
- Communicate new position and intentions again.

8. The PIC ditching procedure follows.

- Set flaps to recommended setting
- Hold minimum speed for wind conditions
- Touch down slightly tail low
- Maintain control as long as possible
- Secure flight deck and start evacuation.

9. Evacuation:

- Each crew member will carry out planned duties
- Assure all crew members can evacuate
- Do not open any exits below water level
- Account for all passengers and crew.



In the event of an unplanned ditching, all crew members will assist in the evacuation procedures to the extent possible. Life vests should be handed out and every attempt made to position rafts and survival equipment for use. Do not attempt to open any exits below the water level.

#### **4.10.5 Aircraft Decompression**

Aircraft decompression can be divided into three categories: 1) slow decompression, 2) rapid decompression, 3) explosive decompression.

Exact procedures and crew duties, as well as explanations for each category, are outlined in the Aircraft Flight Operations Manual. These procedures and duties should be followed to the extent possible.

Slow decompression normally provides adequate time to cope with the problem and the resulting situation. Rapid or explosive decompression may require immediate action on the part of the PIC and Flight Deck Crew. The following list is presented as a general guide to this immediate action:

- Don oxygen mask and user oxygen.
- Establish cockpit communications.
- Initiate emergency descent.
- Contact ATC to advise of situation.
- Assure passenger oxygen is turned on.
- Make public address announcement to use your oxygen masks, fasten your seat belts, and no smoking.
- Level off aircraft at completion of descent.
- Assist any passengers with decompression problems.

#### **4.10.6 Static Discharge on Aircraft**

When an aircraft is subjected to static discharge, immediately check the airplane for any visible or functional indication of damage. If evidence of damage makes the airworthiness of the airplane questionable and the Captain/PIC deems it advisable, land at the nearest suitable airport.

If no damage to the airplane is apparent in flight and in the judgment of the PIC no hazard is involved, continue to the next scheduled stop and check:

1. Magnetic compass for accuracy - check against other cockpit indicators with gear up and gear down (nose gear magnetism cannot be readily detected by ground crews).
2. Communication and navigation equipment - check for normal operation.
3. Electrical instruments - monitor for erratic or sluggish operation.

Enter all available information in the aircraft logbook and, upon landing at the next scheduled stop, notify the Director of Maintenance of detailed information that may have a bearing on possible damage.

#### **4.10.7 Special Precautions in Research Flying**

When a PNNL pilot encounters a meteorological condition or any irregularity in a ground or navigational facility that may affect the safety of other flights, the pilot will provide a report to the appropriate ground stations, as soon as practical.

When research test functions are in progress and the pilot is required to concentrate on aircraft placement or has other additional duties, a second pilot or competent observer shall be in the cockpit to look for other aircraft or obstructions to flight. Maximum cockpit vigilance is especially important when maneuvering at low altitude.

The cabin seat belt sign will be lit whenever the aircraft is in motion on the ground, whenever the aircraft takes off or lands, and whenever the pilot suspects turbulent air conditions. Crew members will have their seat belts fastened at all times, except when moving from one station to another. When cabin signs are not operational, the pilot will ensure that passengers and crew know when they should have their seat belts fastened.

Without the permission of the PIC, passengers and crew members will not operate electronic devices (such as radios, computers, or scientific apparatus). These devices are never operated in IFR conditions, unless the PIC has determined the devices will not cause interference with the communication or navigation systems of the aircraft.

Due to the nature of research flying, single-pilot IFR operations are generally not recommended. However, instances may occur during single-pilot operations where it is safer or more practical to operate under IFR. The decision whether to operate under VFR or IFR (the FAR notwithstanding) is left to the discretion of the PIC. Single-pilot IFR operations during cross-country or non-research flights are permissible.

#### **4.10.8 Other Precautionary Measures**

When mechanical failure, such as gear or flap, occurs that may require alerting ground fire protection equipment, the PIC shall follow the same procedure as outlined in Section 4.10.2, giving the reason for the request.

## 4.11 Hijacking, Sabotage, or Bomb Threat

In the event of hijacking, hostage or bomb threat, the following philosophy will serve as a guide:

- An offender of this sort shall be considered dangerous, desperate, or unbalanced.
- The safety of the passengers shall be considered paramount.
- A calm attitude, coupled with good judgment, will do much toward calming the situation and attaining a safe outcome.
- If a landing site is considered unsafe, too short, or not surfaced, explain the facts to the hijacker.
- The aircraft shall be considered expendable, but every effort shall be made to safeguard the passengers and crew.

### 4.11.1 Hijacking

In the event of a hijacking on a PNNL aircraft, the following procedures should be executed to the extent possible.

No special effort should be made to notify the Laboratory directly when such action would antagonize the hijacker(s) or jeopardize the safety of the flight. Normally, if the hijacking starts in airspace controlled in the U.S. or its agencies, information to the Laboratory will be provided by the appropriate ATC facility as a result of your normal ATC communications, which will include response to the hijacking Code 7500 or the emergency code 7700.

#### 4.11.1.1 Voice Communications

Should voice communications be permissible, the following procedures should be established:

1. If both pilots were already on headsets, attempt to establish a discrete communications system. Do not antagonize or alert the hijacker by donning headsets in his presence.
2. Assure the PIC's speaker is off.
3. Turn the #2 receiver to Corporate or Aeronautical Radio, Inc. (ARINC) for domestic operation and to 121.5 for overseas operation.
4. The First Officer is to monitor the #1 receiver for ATC with use of headphones at their discretion; the First Officer's speakers, when available, must be on at all times to maintain the impression for the hijacker(s) that he is in receipt of all radio communications. The intent is to allow the PIC to receive messages unmonitored by the hijacker(s).

Note: If verbal communications are possible, follow the outline under subsection 4.11.1.4.

#### **4.11.1.2 Pilot/Controller/Transponder Code/Set Up**

1. Pilot Message: "I AM BEING HIJACKED."

Pilot Signal: Set transponder to Code 7500. When unable to change the transponder setting or when not under radar control, transmit a radio message which includes the phrase, "(AIRCRAFT CALL SIGN) TRANSPONDER SEVEN FIVE ZERO ZERO."

Controller Signal: Acknowledge receipt of Beacon Code 7500 by transmitting "(AIRCRAFT CALL SIGN) (NAME OF FACILITY) YOU ARE SQUAWKING 7500. IS THIS INTENTIONAL?" An affirmative reply from the pilot indicates confirmation and proper authorities will be notified.

When an in-the-clear radio transmission of a hijacking is received, controllers shall assign Code 7500 to the aircraft. This announcement does not preclude a subsequent change to Code 7700 by the pilot, if necessary.

2. Pilot Message: "SITUATION APPEARS DESPERATE. WANT ARMED INTERVENTION."

Pilot Signal: After using Code 7500, change the transponder to Code 7700. When unable to change the transponder setting or when not under radar control, transmit "(AIRCRAFT CALL SIGN) TRANSPONDER SEVEN SEVEN ZERO ZERO." Pilots who change from Code 7500 to Code 7700 should remain on 7500 for at least 3 minutes or until a confirmation of Code 7500 has been received from the Controller, whichever is sooner, before changing to Code 7700.

Controller Signal: Acknowledge receipt of Code 7700 by transmitting "(AIRCRAFT CALL SIGN) (NAME OF FACILITY) NOW READING YOU ON TRANSPONDER SEVEN SEVEN ZERO ZERO."

An aircraft squawking Code 7700 and not in radio contact with the ground will be considered by ATC to have an in-flight emergency (in addition to hijacking) and the appropriate emergency procedures designated shall be followed. In these cases, notification of concerned authorities shall indicate the aircraft displayed Code 7500, as well as Code 7700.

#### **4.11.1.3 Pilot/Controller/Use of Flaps**

1. Pilot Message: "SITUATION STILL DESPERATE, WANT ARMED INTERVENTION AND AIRCRAFT IMMOBILIZED."

Pilot Signal: Leave full flaps down while landing or lower full flaps after on the ground.

2. Pilot Message: "LEAVE ALONE - DO INTERVENE."

Pilot Signal: Retract flaps after landing.

Note: Pilot who retracts flaps after squawking Code 7700 should return to Code 7500 for the next leg of the scheduled flight, unless the situation changes again. The pilot may transmit “(AIRCRAFT CALL SIGN) BACK ON SEVEN FIVE ZERO ZERO” to emphasize the fact that intervention is no longer desired.

#### 4.11.1.4 Hijacking in Foreign Airspace

**By Transponder** - In the event the PIC decides not to verbally report the hijacking or diversion, and he is in an area where transponder decoding equipment may be available, use transponder Code 7500, which means hijacking. ATC facilities receiving this code will not question the pilot, but will immediately be responsive to his requests. Switching from Code 7500 to Code 7700 will indicate the “situation appears desperate, need all possible assistance.” This message will be interpreted to mean that intervention from armed ground personnel or other appropriate emergency action is desired.

**Verbal Communication** - Should verbal communications be possible, the following procedures and information should be transmitted:

1. If circumstances permit, Distress or Urgency Radiotelephone procedures apply.
2. If conditions do not permit use of prescribed Distress or Urgency procedures, the message to be sent by the aircraft should be on the air/ground frequency in use at the time. It should also consist of as many as possible of the following elements spoken distinctly and, if possible, in the following order:
  - a. Name of station addressed (time and circumstances permitting).
  - b. Identification of the aircraft.
  - c. Nature of the special emergency condition (circumstances permitting).
  - d. If unable to provide *c*, use, if possible, code words for the indicated meaning as follows:
    - Spoken: “TRANSPONDER SEVEN FIVE ZERO ZERO.” (Transponder beacon Code 7500 should be activated.)
    - Meaning I have been forced to divert to new destination. No immediate assistance required.
    - Spoken: “TRANSPONDER SEVEN SEVEN ZERO ZERO.” (Transponder beacon Code 7700 should be activated.)
    - Meaning I am under extremely serious threatening constraint and require maximum assistance.

- e. Indicate the intention of the PIC (circumstances permitting).
- f. Present position, level (flight level or altitude, as appropriate) and heading (circumstances permitting).
- g. Any other possibly useful information.

#### **4.11.1.5 Special Procedures**

Recommended procedures for PNNL aircraft hijacked to the People's Republic of China, to Vietnam, and North Korea follow.

If it is possible to do so without jeopardizing the safety of the flight, the pilot of a PNNL aircraft, after departing from the cleared route over which the aircraft was operating, will attempt one or more of the following actions, insofar as circumstances may permit:

1. Maintain a true airspeed of no more than 400 kt, and preferably an altitude of between 10,000 and 25,000 ft.
2. Fly a course toward the destination the hijacker has announced.
3. Transmit the international distress signal, MAYDAY, on any of the international distress frequencies available (121.5 MHz, 2182 kHz).

If these procedures result in either radio contact or air intercept, the pilot will attempt to comply with any instructions received that may direct him to an appropriate landing field. Additionally, if the aircraft is equipped with an operational transponder, the pilot may use transponder Code 7500 to indicate his aircraft has been hijacked or Code 7700 to indicate his aircraft is in distress. (See preceding "Spoken" and "Meaning" lists.)

#### **4.11.2 Sabotage or Bomb Threat**

Any aviation employee receiving a sabotage or bomb threat should use the Bomb Threat Checklist located near the phones and throughout the ground facility (see Appendix A, page A.5). Also, see the Emergency Notification Chart (Appendix A, page A.23).

When a sabotage or bomb threat is received, the Scheduler will immediately notify the flight crew involved. If the aircraft is in the air, Scheduler will contact ATC and advise them of the location of the aircraft and the nature of the situation. If the aircraft is on the ground, contact will be made through the FBO or ground handler.

Aviation personnel will call authorities and will not search for a device upon receipt of a threat. If a device is found, DO NOT TOUCH IT!

#### **4.11.2.1 Sabotage/Bomb Threat Received on Ground**

The following procedures reflect our policy of treating every threat as though it is real. Use of these procedures is recommended, but the judgment of the PIC shall be overriding in any specific instance.

If parked:

1. Notify the flight crew to evacuate passengers.
2. Notify ground control.
3. Maintain electrical power. Shut down engines.
4. Assist in evacuation.

If taxiing:

1. Do not return to terminal.
2. Proceed to designated or nearest safe area for evacuation.
3. Follow applicable flight or operations manual evacuation procedures.
4. Notify tower of intentions, and request them to keep vehicles away from doors/slides.
5. Notify the flight crew of evacuation plans. Keep the flight crew advised of any change in evacuation plan.
6. Make an announcement to the effect that “We have received a message that a sabotage threat has been made against one of our aircraft. We intend to take all possible precautions. Therefore, we are parking the aircraft and asking everyone to get off promptly. Do not take any personal belongings. Follow the flight crew’s instructions.”
7. Evacuate down the stairs. If no stairs, plan an evacuation utilizing doors. Use window exits only if necessary.

#### **4.11.2.2 Bomb Threat Received in Flight**

1. The flight crew should prepare for landing at the nearest suitable airport. When possible, advise ATC of estimated time of arrival.
2. Declare emergency - Transponder Code 7700. Request emergency equipment to stand by at intended airport.

3. Request ATC notify FBI/local law authorities at intended airport.
4. Notify ATC - Bomb on board. Request ATC to contact FAA bomb expert.
5. Move passengers away from the bomb and to a minimum hazard area.
6. Coordinate with FAA bomb expert. Follow his instructions on neutralizing the bomb.
7. Notify PNNL Flight Operations, if possible.
8. Turn No Smoking and Seat Belt signs - ON.
9. Airspeed - decrease to lessen stresses on aircraft.
10. Landing Gear - LOWER. Reduces possibility of damage.
11. Cabin Pressure Altitude - Maintain at existing cabin altitude. Minimizes possibility of detonating an altitude-sensitive device.
12. Descend - To same altitude as cabin. Maintain cabin altitude while decreasing aircraft altitude to establish a zero differential. This process will minimize blast effect.
13. Make an announcement to the effect: "We have discovered an explosive device on board and are taking all possible precautions. We will be landing at \_\_\_\_\_ airport in approximately \_\_\_\_\_ minutes. After landing, we will evacuate the aircraft. Listen carefully to the flight crew's instructions."
14. Have the flight crew brief passengers on planned emergency landing.
15. About 250 feet, announce: "Assume the braced position."
16. After landing, proceed to designated or nearest safe area for evacuation.

#### **4.11.2.3 Bomb Threat Procedure Closeout**

1. Qualified personnel must search and clear the aircraft and PNNL Flight Operations must be notified of the finding, prior to conducting any further flights.
2. Information requested by anyone other than the authorities immediately concerned must be cleared through the Director of Flight Operations or Chief Pilot.



## **4.12 Training Operations: Flight Crew and Maintenance Technicians**

Initial and recurrent training for all aviation personnel is an essential element. Safety and efficiency depend on the proper training of all personnel.

Pilots will attend approved refresher training annually. This training will incorporate both simulator and academic training. Where possible, the PIC will simultaneously receive an FAA PIC proficiency check, as necessary. If possible, PNNL pilots will train together to fully develop their Cockpit Resource Management (CRM) skills. New-hire pilots will receive First Officer initial training, prior to flying in PNNL aircraft.

### **4.12.1 Flight Crew Training**

All aviation personnel will receive the following training every 2 years:

- First aid, including cardiopulmonary resuscitation (CPR) and blood-borne pathogens
- Fire fighting
- Aircraft emergency evacuation techniques.

#### **4.12.1.1 Documentation of Training**

The Chief Pilot and the Director of Maintenance will maintain complete training records for all their assigned personnel. The Director of Flight Operations will keep the training records for all other personnel.

#### **4.12.1.2 Pilot Initial Training**

The initial training of pilots will be

- Accomplished prior to assignment as crew member.
- Conducted in accordance with FAR 61 standards. A typical syllabus includes aircraft systems, performance, simulator training, or flight training.
- Conducted by either Simuflite International or FlightSafety International (FSI).

### **4.12.1.3 Pilot Recurrent Training**

Recurrent training for pilots will be

- Accomplished at Simuflite or FSI, as directed by the Director of Flight Operations.
- At 6-month intervals, optimally; however, because of scheduling requirements, refresher training may at times be at intervals exceeding 6 months. Under no circumstances will intervals between refresher training exceed 12 months for any pilot.
- Conducted in the simulator, including proficiency checks, by an approved facility according to FAR Part 61 standards and monitored by the Chief Pilot.
- Required to satisfactorily complete every 12 months the FAR 61 24-month proficiency check in each type aircraft he/she is assigned (Captains and Type-Rated First Officers only).
- Required to complete every 12 months the FAR 61.55 pilot proficiency check from the right seat in each aircraft he/she is assigned (Non-Rated First Officers only).
- Provided by the Chief Pilot on an on-going basis.

## **4.12.2 Maintenance Technician Training**

### **4.12.2.1 Initial Training**

Aviation Maintenance Technicians shall possess a current FAA Airline & Power Plant (A&P) certificate and have a minimum of 2 years of practical experience working on aircraft, power plants, or accessories. In addition, each technician shall have a minimum of 1 year of experience working on turbine-powered aircraft or turbine engines.

Within 6 months of the date of hire, technicians will receive airframe and engine initial training in assigned aircraft from an approved training organization.

### **4.12.2.2 Recurrent Training**

Technicians assigned to work on PNNL aircraft will receive recurrent training in each assigned aircraft once every 2 years. Manufacturer and vendor workshops will be attended on an as-needed basis to be determined by the Director of Maintenance.

## **4.13 Maintenance Operations**

### **4.13.1 Inspection/Maintenance Program (FAR 91.409f(3))**

PNNL aircraft shall be maintained in accordance with the FAA-approved manufacturer's recommended maintenance inspection program.

### **4.13.2 Maintenance and Inspection Documentation**

#### **4.13.2.1 Applicable FAR**

Maintenance, inspection, modification, or any other work performed on PNNL aircraft will always be performed in strict accordance with applicable FAR. In the interest of safety, continuous airworthiness inspections will be performed in compliance with the appropriate FAR and PNNL inspection program(s).

#### **4.13.2.2 Reporting and Recording of Mechanical Irregularities [FAR 135.23(f)]**

Whenever a pilot detects a mechanical irregularity before flight, the pilot will not allow the aircraft to take off until the Director of Maintenance (or designee) is contacted and a determination made as to the safety of flight with the inoperative piece of equipment. Whenever a pilot detects a mechanical irregularity during or after flight, he or she will record the pertinent information on the PNNL Aircraft Discrepancies report (see Appendix A, page A.12). All mechanical irregularities discovered during a flight will be brought to the attention of the Director of Maintenance after the flight, whether or not the Director of Maintenance was notified previously.

#### **4.13.2.3 Previously Deferred and Corrected Mechanical Irregularities [FAR 135.23(g)]**

As part of preflight duties, the assigned PIC will review the previous PNNL Aircraft Discrepancies report in the aircraft to determine whether any write-ups have been deferred or corrected. If the PIC finds a mechanical irregularity that has not been either corrected or properly deferred, the pilot will not take off, but will contact the Director of Maintenance or, in his absence, the Director of Flight Operations for instructions.

#### **4.13.2.4 Obtaining Maintenance Away from Home Base [FAR 135.23(h)]**

If an aircraft sustains structural damage, malfunctions, or defects that affect the airworthiness of the aircraft while away from the main base of operation, the designated PIC will contact the Director of Maintenance or, in his absence, the Director of Flight Operations as soon as possible to inform them of the problem and obtain whatever help is required. Each pilot will carry a telephone list of current flight operations personnel, as provided by the Chief Pilot. If the maintenance work needed involves instruments, avionics, or other aircraft equipment that is not required for continuation of a flight (except under special conditions such as IFR, VFR, over-the-top, or night flying), the flight may proceed under VFR day conditions only. In this case, the faulty equipment must be isolated from the other systems, so as not

to be a hazard to the aircraft or occupants. If an appropriately rated, FAA-approved repair station is available at the research site, or at an en route waypoint, the PIC may be instructed to get time and cost estimates for repair. (These estimates will be considered in deciding whether to contract the repair work or to return to the base of operation for repairs.) The primary deciding factor is related to the type of malfunction and repair requirement. Should the decision be to contract the work, the PIC will determine whether or not the mechanic or repair station is properly certified and is competent to perform the required repairs. The PIC will use discretion in selecting the most qualified and competent maintenance facility available to do the work.

#### **4.13.2.5 Logbook Entries**

After maintenance work is completed, the PIC will review the logbook. The PIC is responsible for checking the recorded entry to ensure the mechanic has given a description of the work, the date and place where the work was done, and that a signature and certificate number were obtained from the person who did the work.

Any maintenance work performed by anyone other than PNNL contract maintenance personnel will be inspected by qualified personnel as soon as the aircraft returns to its base of operations.

#### **4.13.2.6 Vendor Selection**

**Approval Process** - The PIC may authorize maintenance while attempting to contact the approval authority.

**Major Work** - Request for Proposals: The Director of Maintenance, in association with the Director of Flight Operations, shall solicit proposals from qualified vendors. Vendors shall be approved FAA repair stations, factory-trained technicians, or factory-authorized service centers.

**Evaluation of Proposals** - The Director of Maintenance, in association with the Director of Flight Operations, will evaluate all proposals and make vendor selection.

### **4.13.3 Mechanical Irregularities**

#### **4.13.3.1 Defects Reported from Previous Flight**

It is the responsibility of the PIC to check the discrepancy sheet prior to each flight departing from the flight operations base.

- In addition to systems and components listed in the Limitations Section of the Aircraft Flight Operations Manual and those components/items required by FAR, the Minimum Equipment List (MEL) is the guide that PNNL aviation personnel use to determine the airworthiness of PNNL aircraft.
- The MEL is located in the aircraft.

#### **4.13.3.2 Defects Detected During Current Operations**

- Any malfunction, failure, or discrepancy is to be recorded by the flight crew on the Aircraft Discrepancies sheet located at Flight Operations (Appendix A, page A.12). The PIC shall initial these discrepancies in the Noted By Column on the sheet.
- Maintenance problems that may affect the continuation of the trip should be coordinated with the Scheduler and the Director of Maintenance.

#### **4.13.4 Aircraft Maintenance Records**

PNNL currently operates a Gulfstream 159, a multi-engine aircraft. PNNL has an FAA-approved Maintenance and Inspection Program in accordance with FAR 91.409(f)(3). This current inspection program is the one recommended by the manufacturer.

All maintenance performed will meet or exceed the requirements of FAR Part 91 and, with few exceptions, will comply with the more stringent requirements of FAR Parts 121 and 135 for air-carrier aircraft. This maintenance philosophy is based on sound operating practices, experience, and the safety requirements defined by PNNL Flight Operations.

**Responsibility** - It shall be the responsibility of the Director of Maintenance to ensure that all aircraft log entries are accurate and current.

**Record Entries** - It shall be the responsibility of the FAA repair station, factory-trained technician, or factory-authorized service center, as appropriate, to record all log entries as required by the FAA, aircraft manufacturer, or PNNL company policy.

**Computerized Tracking System** - A Computerized Aircraft Maintenance Program (CAMP) will be maintained on each PNNL aircraft in order to assist the Director of Maintenance in tracking aircraft maintenance status.

#### **4.13.5 Aircraft Maintenance Materials**

**Ordering** - All maintenance materials, when ordered from home base, will be ordered by the Director of Maintenance or his designee (the maintenance technician).

**Receiving** - All maintenance materials shall be checked for condition and quantity, upon arrival at home base, by the Director of Maintenance.

**Inspection** - All maintenance materials will be inspected and accepted for use by the Director of Maintenance, upon arrival at home base.

**Inventory Control** - All maintenance materials rotate on a first-in-first-out-basis to ensure the timely usage of parts supplies.

### **4.13.6 Maintenance Test Flights**

Certain maintenance actions are considered critical enough to warrant a test flight, prior to carrying passengers. These flights will be specifically authorized by the PNNL Chief Pilot and conducted during VFR weather conditions, preferably during daylight hours. Only necessary and authorized personnel will be carried on any test flight.

### **4.14 Appearance and Conduct**

All full-time PNNL flight crew shall forego all outside interests or work that would interfere with availability for flight assignments or be in conflict with the best interests of PNNL. All flight crew members shall maintain a neat, well-groomed appearance while on duty. Uniforms are not required. However, if equipment is to be removed or installed, crew members will wear appropriate safety equipment.

Laxity in the cockpit, inattention to duty in any manner, or other unprofessional conduct cannot be tolerated. In the interest of safety, and efficient operation, pilots must observe proper cockpit vigilance and discipline at all times.

Flight crew members should remember they are representatives not only of PNNL and DOE, but also of our sponsors and the aviation community, as well. Accordingly, crew members should display the highest degree of professional conduct at all times. They shall rate high in personal habits, character, and deportment.

### **4.15 Punctuality**

Domestic duty time for the flight crew is understood to commence 1 hour prior to scheduled takeoff and terminate a half hour after final shutdown.

International duty time is defined as commencing 1-1/2 hours prior to scheduled takeoff and terminating a half hour after final shutdown for flights that originate or terminate outside the continental United States or Canada.

### **4.16 Aircraft Modifications**

PNNL aircraft are extensively modified to accommodate scientific measurement and research equipment. In order to retain a current airworthiness certificate (whether normal, special, restricted, or experimental) on this aircraft, all modifications are made in compliance with Parts 21 and 43.

Part 43 of FAA Form 337 covers major repair and alteration modifications (that is, antennas, internal non-frame changes, air samplers, camera windows) that can be approved by a local FAA field office. Sign-off for these modifications can be performed by an A&P mechanic who holds an FAA Inspection Authorization (IA) certificate.

Part 21.113, Supplemental Type Certificate (STC) covers major changes that affect the airframe requiring aeronautical engineering design and FAA regional office approval; it also includes modifications and installations that may be performed by a licensed A&P mechanic. However, FAA-certified engineering consultants must approve the required designs; the certified engineer and the FAA regional office perform the final inspection.

## 5.0 Training Curriculum

PNNL training for pilots and the Director of Maintenance, with one exception, is contracted to FlightSafety International (FSI). The exception is the ASPOC training that will be provided by DOE as described in Section 5.6. The following curriculum is an example of the PNNL and FSI basic introduction, emergency, aircraft-ground, and aircraft flight training.

### 5.1 Ground Training

This section includes:

- A. FAR Part 1 - Definitions and Abbreviations
- B. FAR Part 61 - Certification: Pilots and Flight Instructors
- C. FAR Part 91 - General Operating and Flight Rules
  - 1. Responsibility and authority of the Pilot in Command (PIC) (FAR 91.3)
  - 2. Fuel requirements for flight in Instrument Flight Rules (IFR) conditions (FAR 91.167)
  - 3. VOR equipment check for IFR operations (FAR 91.117)
  - 4. Powered civil aircraft with standard category U.S. airworthiness certificates, and instrument and equipment requirements (FAR 91.203 through 205)
  - 5. Right-of-way rules (FAR 91.113)
  - 6. Aircraft lights (FAR 91.209)
  - 7. Compliance with Air Traffic Controller (ATC) clearances and instruments (FAR 91.123)
  - 8. Minimum safe altitudes, general (FAR 91.119)
  - 9. Basic Visual Flight Rules (VFR) weather minimums (FAR 91.155)
  - 10. Special VFR weather minimums (FAR 91.157)
  - 11. Takeoff and landing under IFR, general (FAR 91.175)
  - 12. Minimum altitudes for IFR operations (FAR 91.177)
  - 13. IFR radio communications (FAR 91.183)



14. Inspections (FAR 91.409)

15. Maintenance records (FAR 91.417)

D. FAR Part 135 - Air Taxi and Commercial Operations

1. Rules applicable to operations subject to this part (FAR 135.1 and 135.3)
2. Emergency operations (FAR 135.19)
3. Record keeping requirements (FAR 135.63)
4. Reporting mechanical irregularities (FAR 135.65)
5. Airworthiness check (FAR 135.71)
6. Operating information required (FAR 135.83)
7. Carriage of persons without compliance with the passenger-carrying provisions of FAR Part 135 (FAR 135.85)
8. Pilot requirements: use of oxygen (FAR 135.89)
9. Auto Pilot: minimum altitudes for use (FAR 135.93)
10. Second-in-command required in IFR conditions (FAR 135.101)
11. Exception to second-in-command requirements: IFR operations (FAR 135.103)
12. Exception to second-in-command requirement: approval for use of Auto Pilot system (FAR 135.105)
13. Briefing of passengers before flight (FAR 135.117)
14. Prohibition against carriage of weapons (FAR 135.119)
15. Equipment requirements: general (FAR 135.149)
16. Fire extinguisher: passenger-carrying aircraft (FAR 135.155)
17. Oxygen equipment requirements (FAR 135.157)
18. Equipment requirements: carrying passengers under VFR at night or under VFR over-the-top conditions (FAR 135.159)

19. Radio and navigational equipment: carrying passengers under VFR at night or under VFR over-the-top (FAR 135.161)
20. Equipment requirements: airplanes carrying passengers under IFR (FAR 135.163)
21. Radio and navigational equipment: extended over water or IFR operations (FAR 135.165)
22. Emergency equipment: extended over water operations (FAR 135.167)
23. Shoulder harness installation at flight crew member stations (FAR 135.171)
24. Inoperable instruments and equipment for multi-engine aircraft (FAR 135.179)
25. Performance requirements: aircraft operated over-the-top or in IFR conditions (FAR 135.181)
26. Empty weight and center of gravity: currency requirement (FAR 135.185)
27. VFR: minimum altitudes (FAR 135.203)
28. VFR: visibility requirements (FAR 135.205)
29. VFR: fuel supply (FAR 135.209)
30. VFR: over-the-top carrying passengers: operating limitations (FAR 135.211)
31. Weather reports and forecasts (FAR 135.213)
32. IFR: operating limitations (FAR 135.215)
33. IFR: takeoff limitations (FAR 135.217)
34. IFR: destination airport weather minimums (FAR 135.219)
35. IFR: alternate airport weather minimums (FAR 135.221)
36. IFR: alternate airport requirements (FAR 135.223)
37. IFR: takeoff, approach and landing minimums (FAR 135.225)
38. Icing conditions: operating limitations (FAR 135.227)
39. Airport requirements (FAR 135.229)
40. Flight crew member requirements (FAR 135, Subpart E)

41. Flight crew member flight and duty time limitations (FAR 135, Subpart F)

42. Crew member testing requirements (FAR 135, Subpart G)

43. Training (FAR 135, Subpart H)

E. Operations Specifications

1. Authorized area of operations

2. Manual requirements

3. Company policies, forms, records, and procedures

4. Training and testing requirements

5. Route and airport qualifications procedure

6. Weight and balance and loading procedure: computations, compliance, and limitations for takeoff, landing, and en route operation

a. Aircraft owner's manual

b. FAA-approved flight manual

c. Weight and balance charts, graphs, and computers

7. Copilot requirement

8. Refueling procedures

9. Flight locating procedures

10. Cargo restraint

11. Landing distance limitations

12. Required inspection procedures

13. En route maintenance procedures

14. Emergency procedures

15. Accident notification procedures

16. Communication procedures

17. Passenger safety and comfort procedures

18. IFR takeoff minimums - lower-than-standard IFR takeoff minimums

- a. Equivalent to the lowest straight-in landing minimums authorized at the particular departure airport
- b. No lower than 1800 ft runway visual range (RVR) or ½ mile

19. IFR takeoff minimums - additional lower than standard

Pilots qualified under FAR 135.297 and 135.343 while operating multi-engine aircraft that meet the performance requirements of FAR 135.181 must have the following training:

- a. ½ mile or RVR 1600 ft
- b. RVR 1200 ft with RVR 1000 ft on rollout
- c. RVR 700 ft with mid-RVR 700 ft (if operative) and RVR 600 ft on rollout
- d. Review of IFR takeoff limitations in operations specifications

20. Area Navigation Equipment (RNAV) Procedures

- a. Limitations
- b. Emergency procedures: detection of malfunctions
- c. Normal procedures
- d. System description: theory of operation

F. Navigation and ATC Procedures

1. General, air traffic control systems, procedures, and phraseology
2. IFR takeoff minimums (lower than standard IFR takeoff minimums)
3. Use of navigational aids, including RNAV
4. Instrument approach procedures

5. Area procedures, including normal and emergency communication procedures
6. Visual cues before and during descent below DH or MDA
7. Source of study
  - a. Airman's Information Manual
  - b. Instrument Flight Manual
  - c. En route, approach, area, standard instrument departure (SID), standard airport arrival procedure (STAR), world aeronautical chart (WAC), and sectional charts

#### G. Route and Airport Qualification

1. Weather characteristics
2. Terrain and obstruction hazards
3. Minimum safe flight levels
4. Congested areas, obstructions and physical layout of airports of frequent use

#### H. Adverse Weather Operations and Meteorology

1. General meteorology, appropriate to area of operation
  - a. Instrument flight manual
  - b. Aviation weather manual
    - 1) Frontal systems
    - 2) Icing
    - 3) Fog
    - 4) Thunderstorms
    - 5) Windshear
    - 6) High-altitude weather
2. Weather analysis and dispatch considerations

3. Procedures for avoiding operations in thunderstorms, hail, ice, turbulent air, and wake turbulence
4. Operating in turbulent air or icing conditions
  - a. Weather analysis
  - b. Use of airborne weather radar/thunderstorm detection equipment and its interpretation
  - c. Proper use of stabilizer trim and autopilot
  - d. Flying qualities of each make and model of aircraft (appropriate to each pilot) in turbulence
  - e. Altitude control
  - f. Flying in the vicinity of thunderstorms
  - g. Use of proper airspeed and best altitudes for turbulence penetration
    - 1) Penetration altitude for each make and model
    - 2) Power settings for each make and model
  - h. Wake turbulence
  - i. Clear-air turbulence
  - j. Low-altitude windshear
  - k. Blocked or frozen pilot systems
  - l. Icing
- I. Special Conditions
  1. Extreme cold weather operations
  2. Frost or ice on aircraft
  3. Operating in slush or snow
  4. Wet runways: hydroplaning and aquaplaning
  5. Unreliable airspeed indications

6. Unwanted door opening
  7. Mechanical failures
- J. Hazardous Materials
1. Definitions - HMR Part 175, Appendix
  2. Warning labels
- K. Use of Oxygen
1. Non-pressurized aircraft
  2. Pressurized aircraft
  3. FAR 135.89
- L. Use of Auto Pilot
1. Normal use
  2. In place of second-in-command
  3. Minimum altitudes for use, maximum altitude loss, and FAR 135.93.
- M. Cockpit vigilance, altitude and airspeed awareness, crew coordination, and activity during critical flight phases (FAR 135.100)
- N. Company Aircraft (to be completed for each type of aircraft to be flown)
1. Source of study
    - a. Aircraft owner's manual
    - b. FAA-approved flight manual
    - c. Maintenance inspection air traffic delays (ATD)
  2. General Description
  3. Airframe
    - a. Airframe locations

- 1) Regular and emergency exits
  - 2) First-aid kit
  - 3) Fire extinguisher
- b. Flight controls
- 1) Ailerons
  - 2) Rudder
  - 3) Elevator
  - 4) Trim
- c. Fuel System
- 1) Grade and servicing
  - 2) Tanks and sumps
  - 3) Systems of supply
  - 4) Boost pumps
- d. Oil
- 1) Grade, weight, and servicing
  - 2) Tanks and drains
  - 3) System of supply
  - 4) Feathering
  - 5) Oil cooling system
- e. Electrical System
- 1) Alternators or generators
  - 2) Gear indicator, warning lights, and selector



- 3) Cabin, cockpit, and miscellaneous lights
  - 4) Circuit protection
  - 5) Anti-icing system
  - 6) Fuel pumps
  - 7) Landing and taxi lights
  - 8) Navigation and anti-collision lights
  - 9) Starter motors
  - 10) Landing gear system
  - 11) Flap system
  - 12) Windshield wipers
- f. Hydraulic System
- 1) Reservoir and system
  - 2) Brake system
  - 3) Servicing of system
- g. Avionics
- 1) General radio system
  - 2) Transponder
  - 3) Radar
- h. Heating, Air Conditioning, and Ventilation
- 1) Heating tubes
  - 2) Mixing valves
  - 3) Distribution

- 4) Air conditioner unit
- i. Vacuum System
  - 1) Pump and separator
  - 2) Suction and regulating valve
  - 3) Operation and components
- j. Gyro System
  - 1) Types of gyros
  - 2) Vacuum or electrically driven
- k. Pressurized Cabin
  - 1) Normal operations/cabin pressure altitude
  - 2) Limitations
  - 3) Emergency operations/failure of system
  - 4) Oxygen use
  - 5) Smoke removal
- l. Limitations
  - 1) Airspeeds (gear, flap maneuvers, etc.)
  - 2) Weight limitations
    - Gross weight
    - Maximum takeoff weight
    - Maximum landing weight
    - Maximum zero fuel weight
  - 3) Center of gravity (balance)

- 4) Placards and markings appropriate to the aircraft
  - 5) Miscellaneous limitations imposed by aircraft manufacturer
- m. Performance/Handling
- 1) Preflight/flight planning
  - 2) Runway length limitations for takeoff and landing
  - 3) Airspeeds
  - 4) Starting
  - 5) Taxiing
  - 6) Before takeoff
  - 7) Takeoff
  - 8) After takeoff
  - 9) Cruise
  - 10) In-flight emergencies
  - 11) Before landing
  - 12) Landing
  - 13) After landing and shutdown
  - 14) Emergency procedures
4. Engines/Power Plants
- a) Engines and propellers
    - 1) Make and model
    - 2) Time before overhaul (TBO)
    - 3) Horsepower

- 4) Fuel consumption and cruise control
  - 5) Propeller governor operation
- b) Controls
- 1) Throttles
  - 2) Propeller and systems
  - 3) Mixtures
  - 4) Turbocharger/supercharger operations
  - 5) Oil pressure/temperature
  - 6) Cylinder head temperature
  - 7) Cowl flap system
  - 8) Carburetor heat
  - 9) Alternator air
- c) Ignition
- 1) Magnetos
  - 2) Distributor
  - 3) Impulse systems
  - 4) Spark plugs
  - 5) Ignitions
- d) Engine handling
- 1) Warm up
  - 2) Power settings
  - 3) Power descents to maintain proper operating temperature

- 4) Smoke and fire detection
- 5) Cold weather operation

## 5.2 Flight Training

Safe operations will be emphasized during the entire flight-training phase. Each maneuver and procedure shall be performed with good judgment, with safety in mind and at a safe operations altitude. Flight training will include flight operations and maneuvers necessary to demonstrate the standards in practical skills and techniques set forth in FAR Part 61. In addition, flight training will address the appropriate related advisory circular for the pilot certificate held, and for the category, class, and type of aircraft the pilot will operate. The pilot will be required to demonstrate competent performance by operating the aircraft in a manner that indicates obvious mastery of the aircraft, and with no doubt as to the successful outcome of each procedure.

### A. Aircraft Familiarization

1. Weight and balance and center of gravity
2. V speeds
3. Navigation and communications equipment
4. Research power system

### B. Basic Piloting Techniques/Contact Maneuvers

Training flight will include normal, abnormal, and emergency maneuvers, procedures, and functions to allow the pilot to satisfactorily demonstrate acceptable standards to meet the testing requirements of FAR 135.293 and 135.299.

1. Checklist: Proper use of the checklist, with emphasis on accomplishing both normal and emergency procedures. All items on the checklist will be explained in detail.
2. Preflight Checks: A visual inspection of the interior, cockpit, and exterior of the aircraft, including engines, oil, fuel tanks, propellers, wings, fuselage, landing gear, control surfaces, validity of required certificates, and preparation for starting engines.
3. Starting Engines: Proper starting procedures, with emphasis on possible damage to equipment caused by improper procedures.
4. Taxiing: Acceptable taxi methods, smooth use of power levels, taxiing speed, correct use of controls when taxiing up, down, or crosswind, knowledge of wind effect in taxiing, and smooth and minimum use of brakes.

5. Pre-Takeoff Check: Recommended procedures to be followed in determining proper operations of the engines, propellers, and accessories, with emphasis on a complete check of the pitch trim system and set up of avionics equipment for departure and en route operations.
6. Takeoff and Climb: Instructions in normal, short field, soft field, and crosswind takeoffs, with emphasis on proper power settings, airspeed control, and aircraft configuration. Airspeed controls should include maintaining best rate of climb, or angle of climb speed, as appropriate.
7. Cruise Procedures: Use of power charts and proper power settings.
8. Steep Turns: Turns of 360 degrees with up to a 45-degree bank, emphasizing altitude, bank, and airspeed control.
9. Slow Flight Maneuvering: Slow flight will be practiced at minimum controllable speeds in turns and in straight and level flight with varying aircraft flight configurations.
10. Stalls:
  - a. Power-on stalls. Straight ahead and in turns of 20 degrees bank in both takeoff and cruise configurations.
  - b. Power-off stalls. Straight ahead and in turns of 30 degrees bank in both cruise and landing configurations.
  - c. Emphasis on proper recovery techniques, including use of power.
11. Pitch Control: Emphasis will be given to the proper use of trim systems, the effects of power application at various airspeeds, flap extension and retraction effects at various airspeeds, and emergency procedures, as follows:
  - a. Loss of trim system: An approach to landing using proper power and flap management will be executed. Go-around in this configuration will emphasize the use of airspeed, power, and flaps to reduce control forces.
  - b. Non-programmed pitch trim (run-away trim): Instructor pilot will simulate this situation by applying pressure to the control wheel. Emphasis will be placed on the student's immediately response to the change in control pressure by actuating the emergency release switch.
12. Engine Shutdown and Re-Start in Flight (Multi-Engine Aircraft): An engine will be shut down at an altitude to simulate engine failure in cruise flight. The student will practice dead-engine identification, power application with an engine out, checklist procedures for securing the dead engine, and checklist air start procedures. Emphasis will be placed on maintaining heading, altitude, and a safe airspeed while performing these procedures.

13. Engine-Out Maneuvering (Multi-Engine Aircraft): Maneuvering on one engine with emphasis on maintaining altitude, airspeed, and heading. Minimum control speed with the critical engine inoperative ( $V_{MC}$ ) will be demonstrated and practiced with proper recovery techniques.
14. Approach and Landing:
  - a. Instruction in procedures and techniques recommended for normal, crosswind, short field, and soft field landings.
  - b. Go-around from approach configuration with flaps and gear down; in multi-engine aircraft will be demonstrated normally and with simulated failure of one engine.
  - c. Landings with flaps up.
15. Takeoff and Landing with Simulated Engine Failure (Multi-Engine Aircraft):
  - a. One engine will be throttled to simulate failure after takeoff, when a safe airspeed has been reached and when practicable before reaching 300 ft. Importance of maintaining proper airspeeds and directional control will be emphasized. At least one entire traffic pattern, including climb-out, approach, and landing, will be accomplished with the engine throttled to zero thrust.
  - b. One engine will be throttled to simulate failure before reaching minimum controllable airspeed ( $V_{MC}$ ). Importance of immediately aborting takeoff, maintaining directional control, and proper use of brakes will be emphasized.
16. Pressurized Cabin:
  - a. Normal operations/cabin pressure altitude
  - b. Limitations
  - c. Emergency operations/failure of system
  - d. Oxygen use
  - e. Smoke removal.
17. Emergency Procedures (Operation of Systems): During flight training, the following emergency procedures, in addition to previous emergency procedures, will be reviewed or simulated in flight when possible:
  - a. Engine fire in flight
  - b. Fuselage fire

- c. Failure of electrical system
- d. Emergency gear extension
- e. Gear-up landing
- f. Rejected takeoff in single engine aircraft
- g. Balked landings: Recommended and appropriate go-around procedures will be utilized. Emphasis will be placed on proper use of power, appropriate air speeds, and gear and flap retraction procedures.

### C. Instrument Procedures/Maneuvers

Flights will be conducted in simulated or actual instrument training conditions. Training flights will include normal, abnormal, and emergency maneuvers, procedures, and functions to enable the pilot to satisfactorily demonstrate acceptable standards for the instrument proficiency check required by FAR 135.297 and 135.299. Flights will include take-off, departure, en route, approach, missed approach, and landing procedures. Emphasis will be placed on proper use of equipment installed in the aircraft. Use of pertinent takeoff, climb, cruise, and landing charts and graphs will be emphasized. Approach procedures will be conducted to the published minimums for each procedure.

1. Instrument Takeoff and Climb Procedures: Normal emphasis on  $V_{MC}$ , appropriate rotation speed, and subsequent climb speeds simulated lower than standard IFR takeoff minimums.
2. Area Departure: Compliance with departure instructions and adherence to ATC clearance is expected. Proper use of radio equipment will be stressed. When applicable, proper use of transition procedures described on SID charts will be utilized.
3. En Route and Holding Procedures: Continued compliance with ATC clearances, use of cruise power charts, appropriate holding airspeeds, and proper entry into and maintenance of holding patterns will be emphasized.
4. Area Arrivals: Arrivals will be accomplished in accordance with ATC instructions and proper use of transition procedures described on STAR, profile descent, and approach charts, when applicable.
5. Instrument Approach Procedures and Landings:
  - a. Approach procedures for each instrument approach and compliance with ATC instructions will be stressed. Runway conditions and braking action will be evaluated prior to landing.
  - b. Visual and Contact Approach: Use of correct approach speeds, minimum altitudes, compliance with approach procedures, and landing techniques will be stressed.



- c. Instrument Landing System (ILS) Approach: A landing or missed approach out of a straight-in ILS approach will be accomplished. Remaining on the glide slope, localizer path, and subsequent landing will be emphasized.
  - d. VOR and Non-directional Beacon (NDB) Approaches: These approaches must include straight-in, circling, and missed approach procedures.
  - e. Other Instrument Approaches: Very high frequency omnidirectional radio range/distance-measuring equipment (VOR/DME), localizer (LOC) of instrument landing system, LOC-BC (back course), and airport surveillance radar (ASR) approach procedures will be practiced.
  - f. Circling and Missed Approaches: Minimum altitudes, proper airspeeds, and correct procedures will be emphasized.
  - g. Multi-Engine ILS Approach: During at least one ILS approach, one simulated engine failure will be demonstrated throughout the approach and subsequent climb during the missed approach.
6. In-Flight Simulated Instrument Maneuvers: The following maneuvers shall be practiced, with the addition of simulated instrument conditions:
- a. Slow-flight maneuvering
  - b. Stalls
  - c. Steep turns
  - d. Power plant failure.
7. Instrument Emergency Procedures:
- a. Loss of Radios - communication and navigation: Appropriate radio-out procedures will be used in compliance with FAR Part 91; FAR 91.127 discusses two-way radio communications failure in IFR operations. Use of one navigation receiver will be accomplished in such a way as to comply with ATC instructions. If necessary, the ATC will be requested to amend the clearance as appropriate to available equipment.
  - b. Loss of Gyroscopic Indicator: Operation of the aircraft by partial panel will emphasize the need for proper techniques and interpretation of altimeter, air speed, vertical velocity, turn, bank (or turn coordinator), and magnetic compass instruments.
8. In-Flight Auto Pilot Procedures. Normal use of the auto pilot system will be demonstrated. The auto pilot will be used to maneuver the aircraft about its three axes during normal instrument approach procedures. The auto pilot will be used to the minimum altitudes permitted by FAR 135.93. The pilot will demonstrate the ability (without a First Officer), with and without using the auto pilot, to

- a. Conduct instrument operations competently
  - b. Properly conduct air-ground communications and comply with complex air traffic control instructions, as proficiently as if a second-in-command were present
  - c. Handle simulated auto pilot malfunction during approach conditions.
9. Flight Training for Additional Lower-Than-Standard Takeoffs to 700-ft RVR: The additional lower-than-standard takeoffs require a two-pilot crew, so training emphasis will be placed on the coordination of pilot and copilot responsibilities.
- a. Pilot responsibilities
  - b. Copilot responsibilities
  - c. Restrictions in operations specifications pertaining to additional lower-than-standard takeoffs
  - d. Simulated lower-than-standard takeoffs with pilot and copilot, practicing crew coordination.
10. RNAV Procedures:
- a. Limitations
  - b. Emergency procedures: detection of malfunctioning systems
  - c. Normal procedures
  - d. System description: theory of operations

### **5.3 Crew Member Emergency Training**

- A. Emergency training will be provided for each aircraft type, model, and configuration as appropriate for each crew member and each kind of operation conducted.
- B. Emergency training will include at least the following:
  - 1. Instruction in emergency assignments and procedures, including coordination among crew members.
  - 2. Individual instruction in the location, function, and operation of emergency equipment, including:
    - a. Equipment used in ditching and evacuation
    - b. First aid equipment and its proper use

- c. Portable extinguisher, emphasizing the type of extinguisher to be used on different classes of fires
  3. Instruction in the handling of emergency situations, including
    - a. Rapid decompression, if applicable
    - b. Fire in flight or on the surface, and smoke control procedures with emphasis on electrical equipment and location of related circuit breakers
    - c. Ditching and evacuation
    - d. Illness, injury, or other abnormal situations involving passengers or crew members
    - e. Hijacking and other unusual situations.
  4. Review of any previous aircraft accidents, incidents, or actual emergency situations experienced by PNNL Research Aircraft.
- C. Each crew member must perform or be able to satisfactorily demonstrate the following emergency drills using the proper emergency equipment and procedures:
  1. Ditching - if applicable
  2. Emergency evacuation
  3. Fire extinguishing and smoke control
  4. Operation and use of emergency exits
  5. Use of crew and passenger oxygen
  6. Removal of life rafts from the aircraft, inflation of the life rafts, use of lifelines, and boarding of passengers and crew, if applicable
  7. Donning and inflation of life vests and the use of other individual flotation devices, if applicable.
- D. Crew members who serve in operations above 25,000 ft MSL will receive instruction in the following:
  1. Respiration
  2. Hypoxia

3. Duration of consciousness without supplemental oxygen at altitude
4. Gas expansion
5. Gas bubble formation
6. Physical phenomena and incidents of decompression.

Each crew member will be knowledgeable of the section of the company manual that discusses emergencies, emergency evacuation duties, and emergency reporting procedures, as well as FAR 135.19, 135.123, 135.167, and other pertinent FAR and demonstrate good judgment at all times.

## **5.4 Check Airmen and Flight Instructor Qualifications**

For each particular aircraft type in the PNNL operation, all flight instructors and check airmen will

1. Hold appropriate certificates and ratings to serve as a PIC on operations under FAR Part 135
2. Have satisfactorily completed the appropriate training phases for the aircraft, including required to serve as a PIC in operations under FAR Part 135
3. Have satisfactorily completed the appropriate proficiency or competency checks required to serve as PIC in operations under FAR Part 135. All flight instructors and check airmen will have satisfactorily completed the training requirements of FAR 135.339; hold a Class I or Class II medical certificate; and, in the case of a check airman, have been approved by the Director of Flight Operations for the airman duties involved. All initial, transition, upgrade, differences, and recurrent ground and flight training will be administered by FAA-certified flight or ground instructors. The Chief Pilot is responsible for designating such instructors (who satisfactorily meet the appropriate requirements) to perform the required training.

## **5.5 Check Airmen and Flight Instructor Training**

- A. The initial and transition ground training for pilot check airmen must include the following:
  1. Pilot check airman duties, functions, and responsibilities
  2. Applicable provisions of FAR Part 135 and PNNL policies and procedures as outlined in the Operations Manual and training programs
  3. Appropriate methods, procedures, and techniques for conducting the required checks

4. Proper evaluation of pilot performance, including the detection of
    - a. Improper and insufficient training
    - b. Personal characteristics that could adversely affect safety.
  5. Appropriate corrective action for unsatisfactory checks
  6. Approved methods, procedures, and limitations for performing the required normal, abnormal, and emergency procedures and maneuvers in the aircraft as outlined in the Operations Manual and training programs.
- B. Pilot flight instructors must be valid certified flight instructors.
- C. Initial and transitional flight training for pilot check airmen and pilot flight instructors will include the following:
1. Enough in-flight training and practice in conducting flight checks from the left and right pilot seats in the required normal, abnormal, and emergency maneuvers to ensure competence to conduct the pilot flight checks and flight training under FAR Part 135, Subpart H, Training.
  2. Appropriate safety measures to be taken from either pilot seat for emergency situations that are likely to develop in training.
  3. Potential results of improper or untimely safety measures during training.

## **5.6 Aviation Safety Point of Contact Training**

This section describes the recommended standards for the establishment and maintenance of a training program for the ASPOC at PNNL. Staff members cannot serve in this capacity unless they have successfully completed the initial or recurrent training phase appropriate to the type of aviation operation they will serve. Refer to Section 5.7 for the definitions of the three types of training for this position (initial assignment, recurrent, and requalification training).

At the conclusion of any of the three categories of training curriculum, the individual involved should be able to successfully demonstrate his knowledge of the regulations, policies, and procedures. The objective of this curriculum is to develop the necessary knowledge and skill to perform the duties and responsibilities of the assigned position to the desired standards. The following table shows the breakdown by number of hours for each segment of initial/requalification training.

### **Initial and Requalification Aviation Safety Point of Contact Training**

<b>Segment</b>	<b>Subject</b>	<b>Hours</b>
1	Overview – DOE Aviation Community	1
2	Applicable Policies/Orders	1
3	Applicable Property Regulations/Reporting Requirements	3
4	Applicable Federal Aviation Regulations	1
5	Accident/Incident Scenarios	2
6	Typical Aviation Organizational Structures/Manuals/Operating Policies	1
7	Charter Operations – Types and Evaluation Techniques	2
8	Implementation Plan – Specific Training	2
9	Mission/Aircraft – Specific Training (as applicable)	2
10	Follow-up Instruction (optional)	4
	<b>Total</b>	<b>19</b>

The next table summarizes the ASPOC recurrent training program.

### **Recurrent Aviation Safety Point of Contact Training**

<b>Segment</b>	<b>Subject</b>	<b>Hours</b>
1	Changes/Updates Applicable to DOE and PNNL Policies/Orders/Regulations Reporting Requirements	1
2	Changes/Updates in Non-PNNL Regulations Applicable to PNNL Aviation Operations	1
3	Accident Prevention Review	1
4	Previous Year Lessons-Learned Forum	1
5	To Be Determined (Alternate Training Subjects Annually)	4
	<b>Total</b>	<b>8</b>

## **5.7 Definitions**

### **A. Initial Training**

Initial training is the training required for crew members who have not qualified and served in the same capacity on an aircraft.

Initial training is for newly hired personnel who have not had previous experience or who have not previously held the position of ASPOC with PNNL. Initial assignment training includes basic indoctrination and specific duty position training.

## B. Recurrent Training

Recurrent training is provided for PNNL aviation staff to remain adequately trained and currently proficient for each aircraft position and type of operation in which the member serves.

Each crew member will receive recurrent training appropriate to the type of operation in which the crew member is to serve, to ensure the crew member can meet the same standards as required by the initial training. No crew member will perform duties as a crew member unless recurrent training has been received within a period since the beginning of the 12th calendar month before that service. Emergency training will be emphasized.

Recurrent ground training for crew members will include, at least

1. A quiz or other review to determine the crew member's knowledge of the aircraft and crew member position involved
2. Instruction as necessary to review appropriate subjects required for initial ground training, as outlined in this training program, including emergency ground training.

Recurrent training for the ASPOC is required annually. If recurrent training is not completed within 18 months of the last training period of the ASPOC, that individual must complete requalification training to maintain qualification status.

Recurrent flight training for pilots will include, at least, flight training review in the maneuvers and procedures outlined in this training program. Satisfactory completion of the check required by FAR 135.293 within the preceding 12 calendar months may be substituted for recurrent flight training.

## C. Requalification Training

This category of training is for personnel who have been trained and qualified by PNNL, but have become unqualified to serve in a particular duty position, due to no recurrent training or competency check within an 18-month period. In the case of the ASPOC training, this type of training curriculum is identical to the initial assignment training.

## D. Transition Training

Transition training is the training required for crew members who have qualified and served in the same capacity on another aircraft. Each flight crew member will complete a ground training course appropriate to each type aircraft before beginning transition flight training.

## E. Upgrade Training

Upgrade training is the training required for crew members who have qualified and served as First Officers on a particular aircraft type, before they serve as PIC on that aircraft.

#### F. Differences Training

Differences training is the training required for crew members who have qualified and served on a particular type aircraft. When the FAA finds differences, training is necessary before a crew member serves in the same capacity on a particular variation of that aircraft.

#### G. Aircraft Manufacturer's Training

Successful completion of the aircraft manufacturer's training program conducted at the manufacturer's training school facilities will be considered satisfactory completion of flight and ground training appropriate to each type of aircraft in which training was given.

#### H. Service Training of Maintenance Personnel

Training of maintenance personnel will be conducted in accordance with the aircraft manufacturer's applicable training program. The Director of Maintenance will determine the quantity and frequency of maintenance personnel participation, based on each individual's qualifications and experience.

#### I. Other Than Crew Member Training

Ground crew personnel shall be familiar with the aircraft they will be servicing and loading. The Director of Maintenance will be responsible for the training of ground crew personnel in the fueling and checking of aircraft. Location of fuel and oil fill caps and the proper grades of oil used will be emphasized. Ground crew should also be familiar with tow limits of the nose gear and the location of proper grounding points.

The Director of Maintenance shall determine if any other subject areas must be covered in this training and shall conduct all such training.



## 6.0 Hazardous Materials

### 6.1 General

Two kinds of programs apply to the transport of hazardous materials by the Gulfstream-159 (G-1) aircraft. The first of these programs is concerned with transportation of hazardous materials in air commerce (Section 6.1.1). The second program applies when the G-1 is transporting hazardous materials when doing business for the U.S. government (Section 6.1.2).

#### 6.1.1 Commercial Transport of Hazardous Materials

This annually reviewed hazardous materials program will be adhered to by all Pacific Northwest National Laboratory (PNNL) employees or agents acting for PNNL when they are involved in the acceptance, handling, storage, and transportation of hazardous materials in air commerce. Such hazardous materials are defined in the most recently published Title 49, Code of Federal Regulations (49 CFR), Parts 171 through 175 for domestic transport by air. For international transport by air, hazardous materials are defined under the provisions of the International Civil Aviation Organization (ICAO) Technical Instructions for the Safe Transport of Dangerous Goods by Air.

This program is intended to ensure that no employees or agents of PNNL perform any assigned duties or have responsibilities involving the acceptance, handling, storage, or transporting of hazardous materials, unless they have satisfactorily completed the PNNL FAA-approved initial or recurrent hazardous materials training program.

A current copy of this program and of the pertinent regulations shall be available at each PNNL office where hazardous materials are accepted, stored, or otherwise prepared for air transportation. PNNL will ensure that hazardous material information warning signs are posted at appropriate locations where the company conducts flight operations or accepts cargo. These signs will advise shippers of the potential hazards and penalties associated with the offering for carriage of such materials aboard an aircraft, if the shipper fails to comply with the appropriate regulations. PNNL will ensure the proper shipping authorities are immediately advised of any incidents or discrepancies that are discovered per 49 CFR Part 175.

#### “175.5 Applicability

- (a) This part applies to the acceptance for transportation, loading and transportation of hazardous materials in any aircraft in the United States and in aircraft of United States registry anywhere in air commerce. This part does not apply to:

...

- (2) Aircraft which are not owned by a government nor engaged in carrying persons or property for commercial purposes but which are under the exclusive direction and control of a government for a period of not less than 90 days as specified in a written contract or lease. An aircraft is under the exclusive direction and control of a government when the government exercises responsibility for:
  - (i) Approving crewmembers and determining that they are qualified to operate the aircraft.
  - (ii) Determining the airworthiness and directing maintenance of the aircraft; and
  - ...

With regard to the airworthiness of the G-1, refer to Appendix A, page A.25. This appendix includes the forms used by the FAA to certify the airworthiness of the aircraft.

### **6.1.2 Hazardous Material Transport Exception Allowed for Government Business**

The G-1 aircraft operates in the public aircraft mode when doing business for the U.S. government per the Hazardous Materials section of FAR 175.10. Under the restricted category the aircraft is allowed to carry hazardous materials in the operation of government atmospheric research as follows:

“175.10 Exceptions

(a) This subchapter does not apply to:

...

- (2) Hazardous materials required aboard an aircraft in accordance with the applicable airworthiness requirements and operating regulations. Unless otherwise approved by the Associate Administrator for Hazardous Materials Safety, items of replacement for such hazardous materials must be transported in accordance with this subchapter except that:
  - (i) In place of the required packagings, packagings specially designed for the transport of aircraft spares and supplies may be used, provided such packagings provide at least an equivalent level of protection to those that would be required by this subchapter;
  - (ii) Aircraft batteries are not subject to quantity limitations such as those provided in §172.101 or §175.75(a) of this subchapter; and,
  - (iii) A tire assembly with a serviceable tire is not subject to the provisions of this subchapter provided the tire is not inflated to a gauge pressure exceeding the maximum rated pressure for that tire.

...”

With regard to work for others, or for non-government-funded projects, the G-1 operates under the restricted category certificate for atmospheric research. Because of the restricted category exceptions, the G-1 is allowed to carry hazardous materials under FAR 175.10.

## 6.2 Staff Responsibilities

No employee or agent of PNNL (unless trained and tested in this function) may accept hazardous material for shipment unless the material is

- properly described on the shipping papers
- required certifications are on the shipping papers
- authorized package is marked and labeled, as required
- shipment is authorized for transportation by air.

If the shipment is offered in accordance with the ICAO regulations, the accepting employee or agent must assure the shipper has complied with all applicable U.S. variations to the ICAO regulations.

No employee or agent of PNNL (unless trained and tested in this function) may load or transport aboard this company's aircraft any hazardous material unless the

- shipment has met acceptance requirements and package integrity immediately prior to the loading procedures
- pilot in command (PIC) has received complete materials safety data sheets for each material along with a statement on the quantity of material and procedure for on-board use or storage
- shipment is stored and loaded in accordance with the applicable regulations and the stated procedures of PNNL.

No employee or agent of PNNL, unless trained and tested in this function, may prepare hazardous material for shipment [including company material (COMAT)]. Prior to loading hazardous materials onboard a PNNL aircraft, the required compatibility and separation distances relative to other cargo will be determined for the material. This information will be obtained from 49 CFR Part 175.

## 6.3 Training Requirements for Carriage of Hazardous Cargo

PNNL utilizes the research aircraft on a limited basis for the carriage of hazardous material in support of Lab research programs. The training program is, therefore, limited to those portions of the PNNL policy on transport of hazardous material that relate to the specific materials that are carried in the company aircraft. The Hazardous Material Transportation Officer, PNNL Laboratory Safety Department, is responsible for the initial training and retraining of staff members involved in the transport of hazardous material.

Prior to transport of a specific hazardous material, training shall be given to staff members in the requirements of 49 CFR and, for international shipments, the requirements of the ICAO and the IATA Dangerous Goods Regulations. The training will be of sufficient scope and depth to ensure that personnel who successfully complete this course of training will be able to perform their duties in relation to hazardous materials in a safe and efficient manner.

The lesson plan outlining the specific requirements for the material to be transported will include, as applicable, the following:

1. Applicable regulations
2. General transportation requirements
3. Use of 49 CFR, ICAO, and International Air Transport Association (IATA) regulations
4. Definitions used in air transport of hazardous materials
5. Hazardous material classification and definition
6. Purpose and use of the HMT
7. Shipping paper requirements, including
  - a. Description of hazardous material
  - b. Shipper's certification
  - c. Types of documents required.
8. Marking and labeling requirements
9. Pilot notification
10. Specific packaging for the material to be transported
11. Acceptance procedures and requirements for the material
12. Storage and replacement of hazardous material labels
13. Quantity limitations of the material on the aircraft
14. Stowage compatibility
15. Orientation, securing, and location of packages

16. Damaged shipments
17. Special requirements:
  - a. Poisons, etiologic agents, asbestos
  - b. Radioactive materials.
18. Hazardous materials discrepancy/incident reporting
19. Emergency regulations and notifications
20. Enforcement
21. Compliance orders (DOE Order 440.2)
22. Use of preflight checklists.

## **6.4 Acceptance of Hazardous Materials**

Any package containing hazardous materials that is damaged or leaking will be refused without further processing. If the package integrity is satisfactory, the acceptance process may continue.

Domestic shipments may be offered/accepted under either 49 CFR or ICAO regulations. Whichever regulation is chosen, it must be complied with in its entirety. All international shipments must comply with ICAO requirements and the pertinent U.S. variations. Note: ICAO requires a compliance checklist.

PNNL shall maintain a supply of labels at each facility where hazardous materials are accepted, stored, or otherwise prepared for transportation by air. Only an employee or agent of PNNL who is trained and tested in the acceptance procedures may replace a lost or detached label and only in accordance with the information presented by the shipper on the shipping papers. If, for any reason, the acceptance checklist cannot be completed at the time (for instance, a qualified/trained agent is not available or the volume of work prevents immediate acceptance), the uncompleted checklist must be attached to the shipment. The shipment must be placed in an area designated for conditional acceptance until the checklist is completed. When all the items have been checked off and the person who completed the inspection has signed the checklist, the shipment may be moved to the cargo staging area.

The Hazardous Material Transportation Officer, Laboratory Safety Department at PNNL, resolves any questions regarding the handling or acceptance of cargo consigned to PNNL.

## **6.5 Assistance to Shippers**

Whenever possible, PNNL may assist its customers to ensure their shipment is prepared in accordance with 49 CFR or ICAO. Such support may consist of informing the shipper of information

stated in the regulations and by providing the shipper with the required forms, such as shippers declaration, labels, and airway bills. PNNL may assist the shipper with regard to the order in which the information is required on the packages and forms. This task can be accomplished orally or by showing the customer an example of a properly completed form. Such assistance shall in no way relieve the shipper of responsibility. Before any action to assist the customer can be taken, the person who has been delegated this responsibility by PNNL must give final approval.

## **6.6 Exemptions**

When PNNL accepts or transports a hazardous material under the authority of an exemption granted by the Associate Director, Office of Hazardous Materials Regulation, U.S. Department of Transportation (DOT), all provisions of that exemption shall be complied with. For more information, refer to 49 CFR Part 107, Subpart B.

## **6.7 Records**

- a. When PNNL is the originating carrier, a copy of the hazardous material shipping papers will be retained for a period of 90 days after the date of completion of the shipment.
- b. A copy of the PNNL Hazardous Material Training and Testing Records for an employee will be retained for 90 days after the employee's date of termination of employment.
- c. A copy of all documents relating to a shipment of hazardous materials on PNNL aircraft will be retained for 90 days after the completion of the shipment. These records will be maintained at the PNNL Flight Operations Office and will be made available to the FAA.

## **6.8 Acceptance**

### **6.8.1 Shipping Papers**

Per 49 CFR Part 172, ensure the following:

1. The shipping name listed on the shipping paper is one authorized by Column 2 of the Hazardous Materials Table (HMT) (49 CFR 172.101).
2. The hazard class listed on the shipping paper is the same as shown in Column 3 of the HMT for the entry.
3. The identification number shown on the shipping paper is the same as that shown in Column 3A of the HMT for the entry and is in proper sequence.
4. The list includes the total quantity, by weight or volume, of the material covered by the description.

5. The additional entry requirements follow the same basic description.
6. The certification is affixed and signed.
7. Per ICAO, three sequences are required.
  - a. The first sequence is the basic description [proper shipping name, hazard class, and identification (ID) number] as listed in Columns 1, 2, 3, and (if applicable) 4 of the ICAO Dangerous Goods List (DGL).
  - b. The second sequence designates the quantity and type of packing.
  - c. The third sequence indicates the packing instructions used and is taken from DGL Columns 9 or 11 and 8. Additional entry requirements follow the appropriate sequence.
8. Two copies of the shipping papers must be offered with the shipment. One copy must accompany each shipment, and the originating operator must retain a copy on file for 90 days.

### **6.8.2 Marking**

Per 49 CFR Part 172, ensure the following.

1. The proper shipping name and identification numbers that appear on the shipping paper are also marked on the outside of the package, outside container, or overpack.
2. The name and address of either the consignee or consignor must also be marked on each package.
3. Orientation arrows must be marked on two vertical sides, if the package has inside packaging containing liquid hazardous materials.
4. Any additional marking requirements specified in 49 CFR for the package or material being shipped (such as specification package marking or overpack marking) must be met.

### **6.8.3 Labeling**

Per 49 CFR Part 172, verify the following.

1. The outside of the package is labeled with the appropriate label(s) from Column 4 of the HMT.
2. Additional labels are in place when required and ascertainable by inspection of the shipping paper.
3. The *Cargo Aircraft Only* label is attached for those packages containing a quantity of hazardous materials that may be shipped only on cargo aircraft. This label also applies to packages that are

forbidden for carriage on a passenger aircraft, but are permitted for carriage on cargo-only aircraft per Columns 6a and 6b of the HMT.

Per ICAO Column 5, the requirements are basically the same as for 49 CFR. Major differences are as follows.

1. The United Nations (UN) class number (and in some cases division numbers) must be entered in the lower corner of the label for primary risk labels.
2. Subsidiary risk labels must not display the UN class or division numbers.
3. Requirements for infectious substances and poisonous materials (packing Group III) labels differ from those in 49 CFR.
4. Orientation labels are required for liquid dangerous goods; labels on two opposite vertical sides are required for any package with liquid hazardous materials.

Replacement Labels: lost or destroyed labels must be replaced in accordance with information provided on the shipping papers.

#### **6.8.4 Placard Placement**

Unit load device (ULD) and freight containers over 640 cubic ft that contains hazardous materials must carry placards. ULD and freight containers less than 640 cubic ft capacity, containing hazardous material, must carry either a placard or a label. This rule is a carrier requirement when packages are consolidated for easier handling. Shippers may not offer a carrier hazardous materials in a freight container without proper identification.

#### **6.8.5 Storage/Handling/Loading Procedures**

Packages, outside containers, or overpacks containing hazardous materials shall be stored or loaded aboard the aircraft in accordance with the table contained in 49 CFR Part 175.

1. *Poisons*. Packages bearing the poison or etiological agent/infectious substance label may not be carried in the same compartment of an aircraft as material known to be foodstuffs, feed, or any other edible material intended for consumption by humans or animals, with one exception. Such packages may be carried, if loaded in separate ULDs that are not adjacent to each other.
2. *Radioactive Materials (RAM)*. While in storage, no more than 50.0 Transport Index (TI) of RAM may be stored in any one group of packages. Any group of packages containing 50.0 TI must be separated by 20 ft from any other package or group of packages containing RAM. No such package (or group of packages) may be in a position continuously occupied by people (or animals or undeveloped film) that is closer than the distances on the charts in 49 CFR Part 175.



### **6.8.6 Pre-Board Inspection**

No PNNL employee or agent may load any package, outside container, or overpack containing hazardous material (HM) aboard an aircraft or into a freight container or onto a pallet prior to loading it aboard an aircraft unless it has been inspected. Immediately prior to loading, the PNNL employee or agent must inspect the exterior of the packages, outside container, or overpack and determine that it has no holes, leakage, or other obvious indications that integrity has been compromised.

The pre-loading inspection is not required for shipments of dry ice (carbon dioxide solid), magnetized materials, or freight containers of ORM-D-Air materials packaged by and offered by a single shipper. A ULD may not be loaded until it has been inspected and found to be free from any evidence of leakage or of damage to any package containing hazardous materials.

### **6.8.7 Passenger Carrier Quantity Limitations**

Except for radioactive material, irritating materials, etiologic agents, and Poison B liquids and solids not bearing a flammable liquid or flammable solid label, a PNNL passenger-carrying aircraft has weight limitations on certain materials. No more than 50 pounds net weight of hazardous materials, or 150 pounds of nonflammable compressed gas that is acceptable for carriage on passenger-carrying aircraft, may be carried in the following locations:

- Each inaccessible cargo compartment
- Each freight container within an accessible cargo compartment
- An inaccessible position, within an accessible cargo compartment on a cargo-only aircraft.

Amounts exceeding 50 pounds net weight of hazardous materials or 150 pounds of nonflammable compressed gas, acceptable for carriage on passenger-carrying aircraft, must be carried in a location that is accessible to a crew member during flight.

### **6.8.8 Passenger Carrier Radioactive Materials Limitations**

On a passenger-carrying aircraft when separation distances can be satisfied, up to 50.0 TI total may be carried. For cargo-only aircraft, this 50.0-TI limit usually will apply also. However, when the size of the aircraft permits groups of packages, per 49 CFR Part 175, up to 200.0 TI may be carried, if separation distances are satisfied.

Radioactive Materials: Each package containing labeled RAM must be inspected to ensure the security seal is not broken. This requirement does not apply to packages of RAM that are in overpacks.

- a. Passenger Aircraft: In addition to any other requirement, packages requiring a radioactive yellow II or III label must meet the following loading requirements.

- The radioactive material must be intended for use in (or incident to) research or medical diagnosis or treatment, as indicated by the shipper's certification.
- No single package carried on a passenger-carrying aircraft may exceed the TI indicated for the category of label listed:

Radioactive Yellow II Label: 1.0 TI

Radioactive Yellow III Label: 3.0 TI

- Each package must be carried on the floor of the cargo compartment.
- Each package must be loaded and carried on the aircraft in accordance with the separation distance specified on the tables in 49 CFR Part 175 and each must be suitably safeguarded and secured so as to prevent its becoming a hazard by shifting or moving.

b. Cargo-Only Aircraft: In addition to any other requirement, packages requiring a radioactive yellow II or III label must meet the following loading requirements:

- No single package carried on a cargo-only aircraft may exceed the TI indicated for the category of label listed:

Radioactive Yellow II: 1.0 TI

Radioactive Yellow III: 10.0 TI

- The total TI of all of the packages loaded on the aircraft must not exceed 50.0. Each package must be loaded on the aircraft in accordance with the separation distance or pre-designated area, as noted in 49 CFR Part 175. Each package must be suitably safeguarded and secured, so as to prevent its becoming a hazard by shifting or movement.
- If the total TI for all of the packages exceeds 50.0, and the size of the aircraft permits use of groups of packages, the following criteria must be met:
  - The separation distance between the surfaces of the RAM packages and the surfaces bounding the space occupied by persons or animals is at least 30 ft.
  - The TI for any group of packages does not exceed 50.0 and each group is separated by at least 20 ft from any other (as measured from the outer surface of each group).
  - For purposes of this paragraph, the term *group of packages* means packages that are separated from each other in an aircraft by a distance of 20 ft or less.
  - The total TI for all packages containing fissile RAM does not exceed 50.0.

- c. Aircraft used routinely for the carriage of radioactive materials shall be periodically checked for radioactive contamination. If contamination equals or exceeds 0.5 millirem per hour, the aircraft must be taken out of service until it is decontaminated.

### **6.8.9 Pilot Notification**

- a. After the aircraft is loaded and prior to departure, the PIC must be given written notification advising the basic description, additional description, total packages, and quantity of each hazardous material location aboard the aircraft and the confirmation that no damaged or leaking packages have been loaded. For radioactive material, the number of packages, category, and transport index must also be given.
- b. If the PIC loads the aircraft, the pre-loading inspection is a required duty. If someone other than the PIC loads the aircraft and conducts the inspection, that person shall furnish the PIC with the written pilot notification.
- c. A copy of the PIC notification must be readily available to the PIC during flight.

### **6.8.10 Offloading Shipments**

Packages, overpacks, and ULDs containing hazardous materials must be inspected for damage or leakage after being unloaded from an aircraft. Any evidence of leakage or damage requires further inspection of aircraft where material was stored and of the abutting packages.

### **6.8.11 Special Flights**

- a. The transportation of flammable liquid fuel in small passenger-carrying aircraft is authorized only when the provisions of 49 CFR are met.
- b. Air transportation of hazardous materials is authorized when cargo-only aircraft is the only means of transportation available. In addition, compliance with all other conditions of 49 CFR 175.320 is required.
- c. Flights made under the provisions of a DOT exemption must comply with the conditions specified in the exemption.

### **6.8.12 Required Reports**

- a. Incident Reporting
  - 1. In the event any of the following incidents occur as a direct result of transporting a hazardous material, the appointed PNNL employee will make a telephone report containing the required information to the FAA Civil Aviation Security Office (the PNNL Emergency number should also be contacted; see Appendix D) as soon as possible:

- A person is killed.
  - A person receives injuries requiring hospitalization.
  - Property damage is estimated at \$50,000 or more.
  - Fire, breakage, spillage, or suspected contamination is present from a shipment of RAM or etiologic agents.
2. Radioactive Materials: In addition to the notification to FAA, the shipper of any RAM involved in an incident must be notified by telephone.
  3. Etiologic Agents: In addition to the notification to the FAA, the Centers for Disease Control in Atlanta and the shipper are notified of any etiologic materials involved in an incident.
  4. The Chemtrek information number is available for help/advice on spills.
  5. Incident reports made by telephone shall contain the following information:
    - Name of employee or agent making report
    - Company name and address of flight operations
    - Phone number where person making the report can be reached
    - Date, time, and location of incident, accident, or discharge
    - The extent of injuries, if any
    - The proper shipping name, hazard class, DOT ID number, and quantity of the material involved in the incident
    - Whether or not a continuing danger to life exists at the scene, if the information can be reasonably ascertained.
  6. Written Reports (DOT Form 5800-1)
    - A written report will be submitted in duplicate on a DOT Form 5800.1 to the Materials Transportation Bureau with a copy forwarded to the FAA Civil Aviation Security Office within 15 days following the discovery of

- i. an incident requiring an immediate telephonic notification
- ii. an unintentional release of any amount of a regulated material from a package.

(It is the responsibility of the employee or agent at the scene of the incident, accident, or discharge to complete the DOT Form 5800.1 as soon as practicable.)

- b. Report of Discrepancies: Each person who discovers a discrepancy relative to the shipment of an hazardous material, following its acceptance for transportation aboard an aircraft shall, as soon as practicable, notify the FAA Civil Aviation Security Office by telephone, and provide the following information:
  - Name and telephone number of the person reporting the discrepancy
  - Name of the aircraft operator
  - Specific location of the shipment concerned
  - Name of the shipper
  - Nature of the discrepancy.

### **6.8.13 Orientation and Securing of Hazardous Material (HM) Packages**

As required by 49 CFR Part 175, a package containing HM marked or labeled to indicate proper orientation will be loaded and secured in accordance with such marking or labels. Liquid HM without such markings will be loaded and secured with closures up. Hazardous material packages will be secured to prevent any movement in flight that would result in damage to or change in orientation of the package.

## **6.9 Emergency (Damaged Shipments or Incidents)**

The PIC, or other persons designated and trained by PNNL, shall remove from the aircraft any package or hazardous material that appears to be damaged or leaking. These packages shall be placed in the designated isolation area and the shipper notified. PNNL emergency notification procedures shall be followed. (Note: See Section 6.11.)

The designated PNNL employee shall make required notification of incidents and subsequent reports in compliance with 49 CFR Parts 171 and 175. This notice does not preempt any other required notification. The PNNL Laboratory Safety Department will identify the appropriate action and provide forms.

## 6.10 Emergency Notification

The contact numbers are as follows:

All emergencies and unusual conditions (509) 375-2400  
PNNL Single-Point Contact

U.S. Department of Transportation (800) 424-8802

Emergencies involving etiologic agents; (800) 232-0124  
Centers for Disease Control

Notice involving shipments transported by aircraft must be given to the nearest FAA Civil Aviation Security Office by telephone at the earliest practical moment after an incident. See also the incident/accident/off-normal event operations checklist on pages A.22 and A.23 of Appendix A.