

VOLUME 4 AIRCRAFT EQUIPMENT AND OPERATIONAL AUTHORIZATION**CHAPTER 1 AIRCRAFT NAVIGATION, COMMUNICATIONS, AND SURVEILLANCE****Section 5 Special Navigation Areas of Operation**

4-96 GENERAL. Special areas of operation are geographic areas having unique characteristics that require the use of special equipment, procedures, and/or techniques to safely conduct flight operations. These special areas also include operational situations when the application of standard criteria is not sufficient, and other-than-standard criteria are more appropriate and can be safely used. This section provides direction and guidance for the evaluation and approval or denial of an operator's/program manager's/Letter of Deviation Authority (LODA) holder's (operator's) request to conduct operations in these special areas of operation. Special areas of operation include the following:

- Areas requiring high levels of performance due to a reduction in separation standards;
- Areas where navigation by magnetic reference is unreliable and/or inappropriate;
- Areas where metric altitudes/flight levels (FL) are used (altitudes in meters);
- Areas where communication difficulties are frequently encountered;
- Areas where air traffic control (ATC) difficulties are frequently encountered;
- Areas where operations by U.S. operators have political or international sensitivity;
- Areas where aircraft with unique performance characteristics require special criteria; and
- Areas where dual long-range navigation systems (LRNS) are not normally required.

4-97 AREAS REQUIRING HIGH LEVELS OF PERFORMANCE. In special areas of operation, the ATC system supports a reduction in separation standards. This reduction in separation standards requires improved levels of performance. Significant increases in air traffic over certain busy routes, such as U.S. National Airspace, European Domestic Airspace, and the North Atlantic (NAT), can be accommodated efficiently if the ATC separation minimums are reduced to permit more aircraft to operate in the same airspace at the same time. However, this reduction in separation minimums can only be safely accomplished through significant improvements in ATC capabilities and the performance of all aircraft operating within that segment of airspace. The options currently available to permit reductions in ATC separation minimums include the use of the following:

- Independent surveillance (ATC radar),
- Automatic Dependent Surveillance (ADS) (data link of the aircraft's present position to the ATC system),
- Improved traffic flows through the use of time-based metering,
- Reduced lateral separation minimums,
- Reduced Vertical Separation Minimums (RVSM),
- Reduced longitudinal separation minimums, and
- Communication.

4-98 NAT/MINIMUM NAVIGATION PERFORMANCE SPECIFICATIONS (MNPS) AIRSPACE.

A. General. The NAT/MNPS, as implemented in the North Atlantic Region, is a demanding standard. Safety of flight in this airspace is critically dependent on each operator achieving and continuously maintaining a high level of navigation accuracy. The references are Title 14 of the Code of Federal Regulations (14 CFR) part 91 appendix C, and the current edition of Advisory Circular (AC) 91-70, Oceanic and International Operations. Part 91, § 91.705 requires each U.S. operator to acquire Federal Aviation Administration (FAA) approval before conducting any operation in MNPS airspace. The operator must obtain this approval for each airplane and navigation/system combination used for operations in this airspace. To obtain MNPS approval, the operator must show compliance with the following conditions:

- Each aircraft is suitably equipped and capable of meeting the MNPS standards.
- The operator has established operating procedures that ensure that MNPS standards are met.
- The flightcrews are trained and capable of operating to MNPS requirements.

B. Navigational Performance. The NAT/MNPS represents navigational performance (necessary to reduce the risk of collision) on an internationally established level. (See Figure 4-2, Illustration of NAT/MNPS Rectangular Separation.) While the NAT/MNPS airspace currently does not have a published Required Navigation Performance (RNP) value, it is anticipated that an RNP requirement will be implemented in the future. The NAT/MNPS predates the implementation of RNP, but is consistent with RNP principles. The MNPS establishes the following demanding criteria:

- 1) The average lateral deviation (for any cause) cannot be greater than 6.3 nautical miles (NM) from the centerline of the assigned route over any portion of the route.
- 2) Ninety-five percent of all of the lateral displacements (for any cause) from the centerline of the assigned route cannot be greater than 12.6 NM for all flights over any portion of that route.
- 3) Each operator cannot have more than 1 lateral deviation (for any cause) of 30 NM or more in 1,887 flights in the NAT/MNPS airspace. When errors of these magnitudes occur, the aircraft has failed to navigate to the degree of accuracy required for the control of air traffic.
- 4) Each operator cannot have more than 1 lateral deviation (for any cause) that is within ± 10 NM of a multiple of the separation minimums applied in 7,693 flights in the NAT/MNPS airspace. NAT/MNPS airspace routes are separated by 60 NM. If an error of 50-70 NM occurs, the aircraft has blundered into the airspace of an adjacent route. Errors of these magnitudes are extremely serious. The potential for a collision is high because the resulting flightpath can overlap the flightpath assigned to another aircraft (possibly coming from the opposite direction).

NOTE: Operational history in NAT/MNPS airspace clearly shows that most serious navigational errors are directly related to operator/pilot error. Equipment malfunction and equipment accuracy are usually not the primary cause for these

errors. Most errors are caused by the flightcrew navigating very precisely to the wrong place while believing that the aircraft is complying with the “currently effective” ATC clearance.

C. RVSM. RVSM is implemented at various FLs within the MNPS. Operations at these FLs have demanding vertical heightkeeping performance requirements in addition to the NAT/MNPS navigation requirements. See the following for specific RVSM guidelines and requirements:

- Section 91.706 and part 91 appendix G;
- The documents in the Web-based Operations Safety System (WebOPSS) guidance subsystem in association with operations specification (OpSpec) B046; and
- The RVSM section of the FAA Web site (http://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/enroute/rvsm).

D. Initial NAT/MNPS Approvals. Each operator, and each aircraft and navigation system combination, must be approved before operating in NAT/MNPS airspace. Each operator must demonstrate (validate) that it can meet MNPS standards before receiving approval.

1) Validation flights must be conducted through NAT/MNPS airspace. See Volume 4, Chapter 1, Section 2 for guidance on validation flights. Next Generation (NextGen) oceanic specialists must be consulted prior to proving/validation flights.

2) Inspectors must ensure that requirements of the applicable AC(s) and/or other FAA official documentation for LORAN-C, Global Positioning System (GPS), or multisensors (or equivalent) are fully met by the operator using those systems before approving any operation in this airspace. All NAT/MNPS approvals are granted by issuing OpSpec B039, and by adding that area of en route operation to the standard OpSpec B050.

3) All operations using GPS in NAT/MNPS airspace must be approved. The FAA NextGen oceanic specialists will provide guidance on processes and procedures for confirming the operator’s capability to meet the requirements of § 91.705. The operator is not required to collect navigation performance data for GPS in NAT/MNPS airspace to apply to pass/fail graphs.

E. Maintaining NAT/MNPS Authorization. In addition to initially meeting MNPS criteria, each operator must continuously maintain the required level of navigational performance. Each gross navigational error (GNE) (errors of 25 NM or more) has a significant impact on flight safety in this airspace and must be fully investigated in a timely manner. The cause of each error must be identified and effective action must be taken to prevent reoccurrence of similar errors. GNEs are detected by ATC and reported to one of the regional monitoring agencies of the world. The regional monitoring agency then provides the notification of the GNE to not only the operator that made the GNE, but also to the NextGen oceanic specialists in the Flight Technologies and Procedures Division (AFS-400) at headquarters (HQ). The NextGen oceanic specialists, in turn, review the GNE and contact the appropriate Flight Standards Service (AFS) office. When an inspector learns of a GNE by one of his or her operators, the inspector

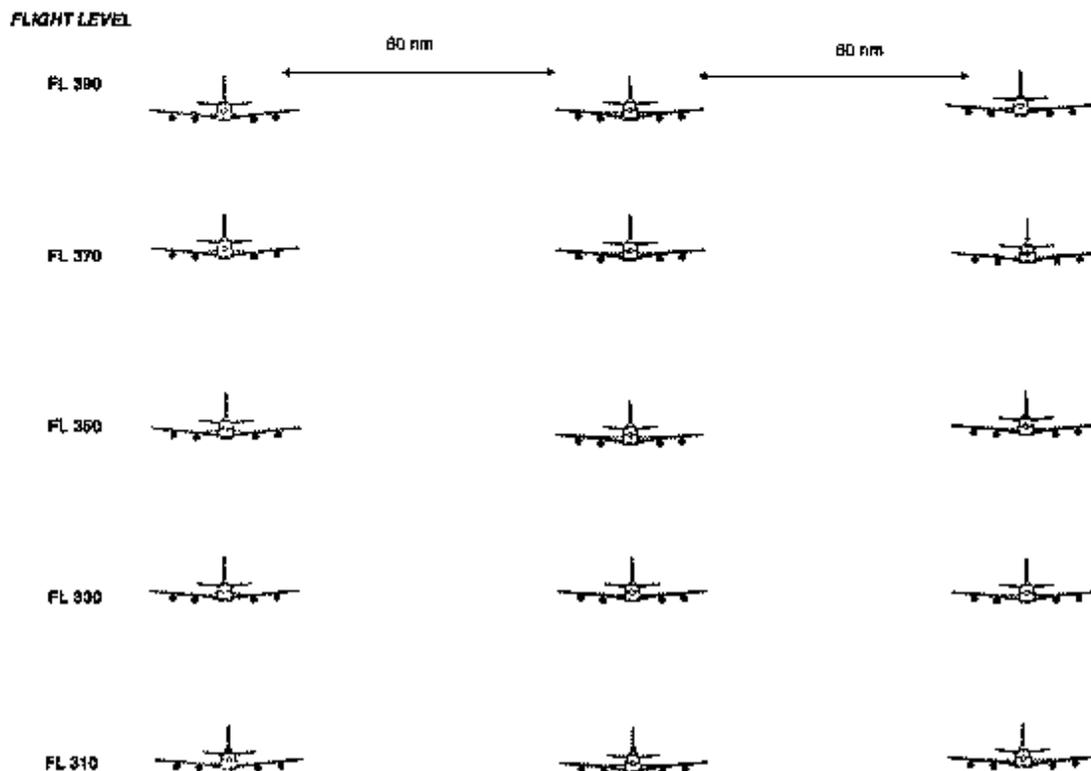
must immediately contact the operator and advise that the GNE will be investigated. The inspector must ensure that the operator takes timely corrective action. After this notification, inspectors must determine the effectiveness of the operator's actions as follows:

1) If it is determined that an operator's actions will prevent the occurrence of similar errors, the operator should be permitted to continue NAT/MNPS operations with close surveillance of the operator's navigational performance. If similar errors occur in subsequent operations more frequently than permitted by the standard, stronger action must be taken.

2) If an operator fails to take action to improve navigation performance, action must be initiated to suspend NAT/MNPS authorization (OpSpec B039 is rescinded).

3) If it is determined that an operator's actions to improve navigational performance are inadequate or otherwise unsatisfactory, the operator must be notified that the corrective action is unacceptable. When an operator does not implement a satisfactory solution in a timely manner, the action must be initiated to suspend NAT/MNPS authorization and it could include enforcement action.

NOTE: It is FAA policy that one of the agency's NextGen oceanic specialists participate in the investigation of GNEs. These specialists, at their option, may also participate in the evaluation of the actions proposed by the operator to preclude the occurrence of similar errors. AFS-400 must be notified as soon as possible when an inspector and/or a NextGen oceanic specialist determine that actions should be taken to suspend NAT/MNPS authorization.

Figure 4-2. Illustration of NAT/MNPS Rectangular Separation

NORTH ATLANTIC MNPS SEPARATION STANDARDS. Aircraft are separated by one of the following methods:

- A. *Lateral Separation.* Lateral separation between co-altitude aircraft (aircraft at the same flight level) is 60 nm.
- B. *Vertical Separation.* Vertical separation between aircraft on the same track is 2,000 feet.
- C. *Longitudinal Separation.* Basic longitudinal separation between aircraft on the same track is 10 minutes. If an aircraft is flying faster than the aircraft behind it (mach advantage), then this criteria may be reduced.

NOTE: Separation standards may be changed. Consult Regional Supplementary Procedures (ICAO Document 7030/3) for current standards applied in the NAT Region.

4-99 CANADIAN MNPS AIRSPACE. Certain high altitude airspace in northern Canada has been designated as MNPS airspace (see the Canadian Aeronautical Information Publication (AIP)). The navigational performance criteria for operation in Canadian MNPS airspace are identical to the criteria for NAT/MNPS airspace.

A. General Criteria. In general, any aircraft/navigation system combination approved for unrestricted operation in NAT/MNPS airspace for a particular operator also meets Canadian

MNPS criteria. A particular operator can (under most circumstances) be authorized (without recertification under the current edition of AC 120-33, Operational Approval of Airborne Long-Range Navigation Systems for Flight within the North Atlantic Minimum Navigation Performance Specifications Airspace) to conduct Canadian MNPS operations with those aircraft and navigation system combinations authorized for that operator in NAT/MNPS airspace. However, due to the unique nature of operations in high latitudes and in areas of magnetic unreliability (AMU), approval for Canadian MNPS operation is not automatic. Each proposed operation must be evaluated on its own merits. OpSpec B059 is available for issuance to 14 CFR part 135 certificate holders or part 91 subpart K (part 91K) program managers only. OpSpec B039 would be issued for NAT/MNPS in the part 135 database of the WebOPSS. OpSpec B039 is available in the 14 CFR parts 121 and 125 databases of the WebOPSS, as the policy for authorization for these certificate holders may be conducted and approved concurrently.

B. Special Factors. The following special factors must be considered and carefully evaluated before granting air navigation approvals for operation in Canadian MNPS airspace.

1) The following directions apply for operators currently authorized to use an aircraft in NAT/MNPS airspace:

a) A primary means inertial navigation system (INS)/inertial reference system (IRS)/Inertial Reference Unit (IRU) meeting NAT/MNPS criteria automatically meets Canadian MNPS criteria.

b) Other LRNS meeting NAT/MNPS criteria automatically meet Canadian MNPS criteria except for operations in the AMUs. The LRNS must be evaluated on a case-by-case basis for AMU authorization.

c) Operations at high latitude airports (greater than 67° N/S) must not be authorized unless INS platform alignment has been successfully demonstrated and approved for those latitudes. If operations are proposed for areas in the Canadian MNPS that fall within the AMU, a validation flight and AMU authorization is required. One of the FAA NextGen oceanic specialists must be consulted.

2) Training programs and crew procedures for operations at high latitudes must provide techniques and methods for the following:

- Approaches and departures using appropriate heading references other than magnetic; and
- Use of ground-based Navigational Aids (NAVAID) oriented to appropriate directional references other than magnetic.

3) The following directions apply for operators who are not currently authorized to use an aircraft and a navigation system combination in NAT/MNPS airspace, but propose to operate in the Canadian MNPS airspace.

a) The operator's equipment must meet the criteria in the appropriate AC (or equivalent), considering the conditions unique to Canadian MNPS airspace. The Canadian AIP should also be consulted for airspace requirements.

b) The operator must also meet the special factors specified in subparagraphs 4-99B1) and/or 4-99B2), as appropriate.

C. Canadian MNPS Approvals. For parts 121 and 125 certificate holders, Canadian MNPS airspace approvals are granted by adding that area of en route operations to OpSpec B050. For part 135 certificate holders, the Canadian MNPS airspace approvals are granted by issuance of OpSpec B059 and by adding that area of en route operations to OpSpec B050. For part 135, OpSpec B039 may or may not be issued, as applicable.

4-100 REFERENCES, FORMS, AND JOB AIDS.

A. References (current editions):

- North Atlantic MNPS Airspace Manual, International Civil Aviation Organization (ICAO) NAT Doc 007, Guidance Concerning Air Navigation In and Above the North Atlantic MNPS Airspace (available from the European and North Atlantic (EUR/NAT) Office Web Site at <http://www.paris.icao.int>).
- Aeronautical Information Service (AIS) of NAT Air Traffic Service (ATS) Provider States.
- ICAO Doc 7030, Regional Supplementary Procedures (SUPPS).
- AC 120-33, Operational Approval of Airborne Long-Range Navigation Systems for Flight within the North Atlantic Minimum Navigation Performance Specifications Airspace.

B. Forms. None.

C. Job Aids. None.

4-101 CENTRAL EAST PACIFIC (CEP) ROUTE SYSTEM.

NOTE: We have adopted the acronym "CEP" in place of "CEPAC" to be congruent with the term that ATC is using for the Central East Pacific.

A. General. The CEP system is the organized route system between Hawaii and the west coast of the United States. Several ATS routes and associated transition waypoints are within the CEP. Effective February 24, 2000, RVSM and Required Navigation Performance 10 (RNP 10) is required for aircraft operating on the CEP routes. Non-approved aircraft can expect to fly above or below the exclusionary airspace. See AC 91-70 and the Alaskan AIP, as well as the Pacific Supplement, for further information.

B. Applicable ATC Procedures. Applicable ATC procedures can be found in the current edition of FAA Order 7110.65, Air Traffic Control; the current edition of FAA Order 8400.12, Required Navigation Performance 10 (RNP 10) Operational Authorization;

ICAO Doc 7030; ICAO Annex 2, Appendix 3; and ICAO Doc 9574, Manual on Implementation of a 300 m (1,000 ft) Vertical Separation Minimum Between FL 290 and FL 410 Inclusive (RVSM guidance).

4-102 RVSM AND RNP IN CEP AND NORTH PACIFIC (NOPAC) AIRSPACE:

OPSPECS B037 AND B038. This paragraph provides guidance for OpSpecs B037 and B038 to reflect the implementation of RVSM and RNP 10 approval requirements on the CEP and NOPAC route systems. This information is applicable to all part 91 operators and parts 121, 125, and 135 certificate holders that have been or that wish to be authorized to operate on these route systems.

A. Background.

1) RVSM programs enable 1,000-foot vertical separation to be applied between aircraft above FL 290. Section 91.706 and part 91 appendix G provide regulatory policy for RVSM programs.

2) Approval of operators and aircraft for RNP 10 enables a 50-NM lateral separation to be applied between aircraft operating in oceanic/remote areas. AFS policy and procedures for approval of aircraft and operators to operate in areas or on routes designated as RNP 10 airspace are contained in FAA Order 8400.12.

3) The OpSpec providing general authority for RVSM operations is B046. The general authority for RNP operations in oceanic/remote areas is B036.

4) The revised OpSpecs B037 and B038 do not address requirements as they pertain to specific FLs or routes because Air Traffic Service Providers (ATSP) notify operators of requirements for filing flight and aircraft navigation equipment requirements on oceanic/remote area routes in aeronautical publications. Oakland and Anchorage Oceanic Centers publish such information in Notices to Airmen (NOTAM) and the Pacific and Alaska Chart Supplements. Tokyo Oceanic Center publishes such information in AIPs and NOTAMs.

B. Policy.

1) All operators conducting operations on the CEP and/or NOPAC route systems must be issued OpSpecs B037 and B038. The principal inspectors (PI) will issue these OpSpecs in accordance with the appropriate guidance for each authorization. Inspectors will also need to review the guidance for RVSM authorization in OpSpec B046 and for Class II navigation authorization in OpSpec B036 whenever issuing B037 and/or B038.

2) Part 91 operators conducting flights on the NOPAC and CEP route systems at FLs where RVSM and/or RNP 10 approval is required must be issued a letter of authorization (LOA) approving such operations. Part 91 operators currently holding an LOA authorizing RVSM and/or RNP 10 operations are not required to be issued a separate LOA for individual areas of operation or route systems where RVSM and/or RNP 10 are implemented.

4-103 AMUs. Two large areas of en route operation have unique features which significantly complicate air navigation. These two areas are centered around Earth's magnetic poles.

A. Concept. Conventional magnetic compasses sense magnetic direction by detecting the horizontal component of Earth's magnetic field. Since this horizontal component vanishes near the magnetic poles, magnetic compasses are highly unreliable and unusable in an area approximately 1,000 NM from each magnetic pole. Within these areas, air navigation tasks are further complicated by very rapid changes in magnetic variation over small distances. For example, when flying between the magnetic North Pole and the true North Pole, a heading of true North results in a magnetic heading of South (a magnetic variation of 180 degrees).

B. Convergence of the Meridians. Since these two major AMUs also occur near Earth's geographic poles, the convergence of the meridians also presents additional directional complications. When flying "great circle" courses at latitudes greater than 67 degrees, convergence of the meridians can create rapid changes in true headings and true courses with small changes in aircraft position. As a result, relatively small errors in determining the aircraft's actual position can produce very large errors in determining the proper heading to fly and to maintain the assigned flightpath. When even small errors occur, very large navigation errors can develop over extremely short distances. An extreme example of this phenomenon occurs at Earth's geographic North Pole. Flight in any direction from the exact pole is initially due South (that is, the direction to Russia or the United States is South).

C. Special Equipment, Techniques, and/or Procedures. Special navigation equipment, techniques, and/or procedures are critical to operate safely in polar areas, including the two AMUs. Operations based solely on magnetic references within AMUs are unsafe, unacceptable, and must not be approved. Operations within these areas can only be conducted safely if the primary heading reference is derived from sources other than magnetic.

1) All INS/IRS/IRU are capable of calculating true North independently from other aircraft systems. INS/IRS/IRU can be approved and safely used for operations in AMUs and polar areas provided the following conditions are met:

a) The INS is certified as Airworthy for the highest latitude authorized for these operations.

b) Ground alignment of the INS/IRS/IRU is restricted to those airports where satisfactory alignment has been demonstrated or otherwise approved.

c) The operator's training programs and crew procedures provide acceptable techniques and methods for the following:

- Approaches and departures using appropriate heading references other than magnetic.
- The use of ground-based NAVAIDs, which are oriented to appropriate directional references other than magnetic.

NOTE: It is the FAA's direction and guidance that inspectors must not approve operations in polar areas and/or AMUs without the participation and concurrence of one of the agency's NextGen oceanic specialists.

2) There is a wide variety of other methods, systems, techniques, and procedures that can be used for navigation in AMUs and polar areas. However, due to the variety of means and the complexity of air navigation in these areas, specific direction and guidance for these other means of navigation are not provided in this order.

NOTE: It is the FAA's direction and guidance that inspectors must obtain assistance from one of the agency's NextGen oceanic specialists in evaluating and approving or denying an operator's request to use systems, techniques, or procedures that are not discussed in this section.

D. Boundaries of the AMU.

1) For the northern hemisphere, the Canadian AIP establishes the basic boundaries for the AMU. Canadian Air Navigation Order, current edition, states that no person may operate an aircraft in instrument flight rules (IFR) flight within Canadian northern domestic airspace unless it is equipped with a means of establishing direction that is not dependent on a magnetic source. The special equipment, training, and procedures discussed in this paragraph are required for all operations into the area of northern domestic airspace. The boundaries of this area are shown in Figure 4-3, Canadian Domestic Airspace. This area is also outlined on Canadian en route charts. For the purposes of this paragraph, northern domestic airspace is considered to extend from ground level to infinity.

2) For the southern hemisphere, any operation south of lat. 65°00'00" S is considered to be within the AMU. Any proposal to operate within the AMU in the southern hemisphere must be reviewed and concurred with by AFS-400 before approval.

E. Approvals. All approvals for operations into AMUs are granted by issuing OpSpec B040, and by adding that area of en route operation to the standard OpSpec B050. A checklist for operations in AMUs is available in the guidance subsystem in association with OpSpec B040.

4-104 NORTH POLAR OPERATIONS. The North Polar area of operations is defined as the area that lies north of lat. 78°00'00" N (see OpSpec A002). The north polar routes across Russia are shown in the Russian AIP or in commercial charting publications for Eastern Europe and Eurasia. OpSpec B055 authorizes north polar operations. See Volume 3, Chapter 18, Section 4, OpSpec B055 for more information on this authorization. In general, in addition to the authorization for operations in the AMUs, the following will be required for authorizing operations in the polar areas.

A. Fuel Freeze Temperature. A procedure must be established to determine the fuel freeze temperature of the actual fuel load onboard the aircraft that requires coordination between maintenance, dispatch, and assigned flightcrew. The operator may develop a fuel freeze analysis program in lieu of using the standard minimum fuel freeze temperatures for specific types of fuel used.

B. Communication Capability. In accordance with part 121, § 121.99, the operator must have effective communications capability with dispatch and with ATC for all portions of the flight route. The operator must show the FAA the communications medium(s) that it intends to use to fulfill these requirements in the North Polar Area.

1) The communications medium used must meet FAA regulatory requirements and fulfill policy/procedures established by each ATS unit providing control on the route of flight. Anchorage Center publishes this information in the U.S. Government Flight Information Publication (FLIP) Supplement for Alaska. Other countries publish ATS policies and procedures in their State AIPs.

2) High frequency (HF) voice has been considered the primary communications medium in the North Polar Area. However, other mediums may be used as a supplemental means in accordance with the applicable policy. For example, although HF voice remains primary for communications with Anchorage Center, in areas where there is satellite coverage, satellite communication (SATCOM) voice may be used as a backup to communicate with ARINC Radio and, in non-routine situations, to establish direct pilot-controller voice communications.

3) In areas of satellite coverage, Controller-Pilot Data Link Communications (CPDLC) may be used for ATC communications, provided the ATS unit has an approved capability. In addition, provided the capability is approved, HF datalink may also be used to fulfill communications requirements with ATS units having the capability and with airline dispatch. Inspectors must ensure that the operators meet the regulatory and policy requirements for long-range communication systems (LRCS). HF voice capability is always required.

4) It is recognized that SATCOM may not be available for short periods during flight over the North Pole, particularly when operating on some designated polar routes. Communication capability with HF radios may also be affected during periods of solar flare activity. For each dispatched polar flight, the operator must take into consideration the predicted solar flare activity and its effect on communication capability.

C. Minimum Equipment List (MEL). Before receiving FAA authority to conduct polar operations, the MEL must indicate that the following systems/equipment is required for polar operations dispatch:

- 1) Fuel quantity indicator system (FQIS) (to include fuel tank temperature indicating system).
- 2) Autothrottle system.
- 3) Communication system(s) relied on by the flightcrew to satisfy the requirement for effective communication capability.
- 4) Except for all-cargo operations, expanded medical kit to include automated external defibrillators (AED).

NOTE: See the current edition of AC 91.21-1, Use of Portable Electronic Devices Aboard Aircraft.

- 5) For Extended Operations (ETOPS) aircraft:
 - a) All MEL restrictions for 180-minute operations are applicable.
 - b) Auxiliary power unit (APU) for two-engine airplanes (including electrical and pneumatic supply to its designed capability).

D. Training Program Requirements. The following must be in the approved training programs:

- Training on Barometric pressure for Standard Altimeter Setting (QNE)/Barometric pressure for Local Altimeter Setting (QNH) and meter/feet issues is required for flightcrew and dispatcher training.
- Training on fuel freeze (included in maintenance, dispatch, and flightcrew training (special curriculum segments)).
- General area- and route-specific training on weather patterns and aircraft system limitations.
- Training on special considerations, such as diversion decisionmaking into austere airport environments to include aircraft performance; crash, fire, and rescue availability; and passenger support.
- Flightcrew training in the use of the cold weather anti-exposure suit.

E. Special Flightcrew Issues for Long-Range Operations. The operator needs to address the following special long-range flightcrew issues:

- Long-range flightcrew rest plan submitted to the principal operations inspector (POI) for review and approval.
- Multicrew (augmented flightcrews) flight proficiency/currency issues need to be addressed in the training program.

- The progression of pilot-in-command (PIC) authority, as designated in the operator's manual.
- A minimum of two cold weather anti-exposure suits will be required to be onboard so that outside coordination at a diversion airport with extreme climatic conditions can be accomplished safely.

F. En Route Polar Diversion Alternate Airport Requirements. Operators are expected to define a sufficient set of polar diversion alternate airports such that one or more can be reasonably expected to be suitable and available in varying weather conditions (the current edition of AC 120-42, Extended Range Operation With Two-Engine Airplanes (ETOPS), provides additional guidance for two-engine airplanes).

G. Aircraft and Passenger Recovery Plans. A recovery plan is required that will be initiated in the event of an unplanned diversion. The recovery plan should address the care and safety of passengers and flightcrew at the diversion airport and include the plan of operation to extract the passengers and flightcrew from that airport.

H. Validation Flights. An FAA-observed validation flight is required in which the operator exercises its reaction and recovery plan in the event of a diversion to one of its designated en route polar diversion alternate airports. The exercise of the operator's reaction and recovery plan may also be completed prior to the validation flight. The Air Transportation Division (AFS-200) will give favorable consideration to a request by the operator, through the POI, to conduct the validation flight in a passenger revenue status only if the operator's reaction and recovery plan has been previously demonstrated to the satisfaction of the FAA. If the operator elects to demonstrate its reaction and recovery plan as part of and during the validation flight, the flight cannot be conducted in a passenger revenue status. The carriage of cargo revenue is permissible in this case and is encouraged for airplane Weight and Balance (W&B) purposes.

4-105 AREAS WITH SIGNIFICANT COMMUNICATIONS AND/OR ATC DIFFICULTIES. The levels of sophistication in communication, navigation, and ATC capabilities in certain areas of operation outside North America and Europe vary widely. The following subparagraphs provide evaluation criteria that must be considered when approving operations in these areas.

A. NAVAIDs. The ground-based facilities that are implemented to support air navigation in some of these areas are based on antiquated technology and frequently experience reliability problems. The National Airspace System (NAS) and the navigational performance requirements in many countries are based almost exclusively on non-directional radio beacons (NDB). Also, many of the NAVAIDs do not operate continuously. For example, NAVAIDs are shutdown from dusk to dawn in certain countries.

B. Communication. The primary means of en route communication with ATC in many areas of operation is almost exclusively HF radio. Atmospheric noise created by extensive thunderstorm activity in tropical areas and aurora activity in polar areas significantly increases the difficulty of using HF as a prime means of communication with ATC.

C. ATC. The level of ATS varies from radar-based services (equivalent to domestic U.S. operations) to a total absence of any ATC. Flight information regions (FIR) have been established in most areas of the world. Specific ICAO Member States have been assigned the responsibility of providing ATS in these FIRs. There are wide variations in the ATC services available. En route ATC radar is not available in all countries and ATS may rely heavily on position reports and airborne navigation performance capabilities for the separation of aircraft. Various levels of ATS provided in these areas are as follows:

NOTE: It is critical that flightcrews understand that subtle terminology differences and language barriers may exist in foreign countries where they operate. For example, crews must ensure they understand whether the altimeter setting issued by ATC is in hectopascals (millibars) or inches of mercury.

1) Within controlled airspace, ATC provides ATC service to prevent collisions between aircraft and to expedite and maintain an orderly flow of air traffic. This also includes air traffic advisory services and those alerting services related to weather and search and rescue.

2) Within advisory airspace, air traffic advisory service is available to provide separation, to the extent possible, between aircraft operating on IFR flight plans. It is important to understand that this is an advisory service (similar to a Flight Service Station (FSS)), not a control service (prevention of collision). In advisory airspace, flightcrews are provided information concerning the location of other aircraft. Prevention of collision is the responsibility of the PIC. Terrain clearance is also the responsibility of the PIC. The ATSS available also include those alerting services related to search and rescue. In certain areas, special reporting procedures called “broadcasts in the blind” have been established to assist pilots in avoiding other aircraft. At designated intervals, each pilot broadcasts the aircraft’s position, route, and FL over a specified very high frequency (VHF). Awareness of the proximity of other aircraft is obtained by maintaining a continuous listening watch on the specified frequency. This procedure is an “expected” practice in large portions of Northwestern Africa (including the Dakar FIR) and South America (including most Brazilian airspace). In many of these areas, the “broadcast in the blind” procedure is used to augment the separation of IFR aircraft.

3) FIRs have not been established for a few areas in the world. These are commonly called uncontrolled information regions or “no man’s land.” The largest of these areas is in the South Atlantic Ocean, annotated as “No FIR.” Flight Information Services (FIS) also do not exist in the high altitude structure in other large areas (above the top of controlled airspace). Within no man’s land, aircraft separation (prevention of collision) is entirely the responsibility of the PIC. Advice and information for the safe and efficient conduct of flights is not provided from an ATS unit. An ATS unit does not provide alerting services related to search and rescue.

D. Metric FLs. The NAS in the CIS, many Eastern European countries (former Eastern Bloc countries), and some mainland Asian countries are based on the use of metric flight altitudes/FLs. Operations within these areas require special procedures for conversion charts between metric FLs and FLs based on feet. For example, a FL of 10,000 meters represents FL 328 or a flight altitude of 1,000 meters represents an altitude of 3,280 feet.

4-106 EVALUATION CRITERIA FOR AREAS WITH COMMUNICATIONS AND ATC DIFFICULTIES. POIs must evaluate, on a case-by-case basis, all proposals to conduct operations in the sovereign airspace of countries that are not equivalent or similar to the U.S. NAS.

A. General Criteria. The operator must show (considering factors unique to the proposed area of operation) that safe operations can be conducted within the area of operation and that the facilities and services necessary to conduct the operation are available and serviceable during the period when their use is required. The operator must also show that the proposed operation is in full compliance with the requirements in OpSpecs Part B that are applicable to that operation.

B. Operations in Advisory Airspace. The operator must show that its training programs and operating procedures permit safe operations in advisory airspace and ensure compliance with the “expected” operating practices. The operator must also show that the operation is in compliance with OpSpec A014.

C. Operations in Uncontrolled Information Regions (No Man’s Land). Since ATC, air traffic advisory, flight information, and alerting services are not available from ATS units when operating within these areas, the operator must show that acceptable, alternative means are available to ensure the following:

- 1) The appropriate organization can be notified in a timely manner when search and rescue aid is needed.
- 2) Changes in significant weather information can be provided to the flightcrew in a timely manner.
- 3) Changes in the serviceability of the required NAVAIDs are available to the flightcrew and the operator’s operational control system.
- 4) Reliable information concerning other IFR aircraft operating within this area is available in flight (e.g., Traffic Alert and Collision Avoidance System (TCAS), Automatic Dependent Surveillance-Broadcast (ADS-B)). This includes “broadcast in the blind” procedures and other “expected” practices.
- 5) The required navigation facilities necessary to safely conduct the operation are available and serviceable.

D. Role of NextGen Oceanic Specialists. The uniqueness of operations in advisory airspace and in no man’s land usually requires assistance from persons with special navigational knowledge, skills, and expertise. Inspectors are expected to request the assistance of these specialists when evaluating proposals to conduct operations outside controlled airspace.

4-107 OPERATIONS IN RESTRICTED INTERNATIONAL AREAS. Operations by U.S. operators within the sovereign airspace of certain countries have restrictions levied by various agencies of the U.S. Government. The following are examples:

- Commercial trade restrictions,
- No-fly zones,
- Special Federal Aviation Regulations (SFAR) flight prohibitions,
- Restriction of certain transactions related to aircraft services,
- Suspension of cargo air operations, and
- Suspension of passenger-carrying operations to the United States because the airport authorities do not maintain and carry out effective security measures.

NOTE: These restrictions frequently specify certain airports, selected routes, and special procedures that must be used.

A. Information on Restricted Areas. The current list of restrictions and information about the processes and agencies to contact in regard to those restrictions is located on the FAA International Programs and Policy Division (AFS-50) Web site at https://employees.faa.gov/org/linebusiness/avs/offices/afs/divisions/hq_region/afs50. Since the processes periodically change, the AFS-50 Web site will provide the current list of restrictions and the specific processes for the operator to follow.

B. FAA Review of Restrictions. The operator should review the current list of restrictions with the POI to confirm what restrictions apply in order for the operator to obtain the applicable license and/or exemption for flight operations in that restricted area.

C. Operator Actions Required. It is important that the operator be advised to take simultaneous actions with all of the agencies that are necessary for the licenses and/or exemptions for the restricted country or countries in which or over which they are requesting to operate. The POI should advise the operator that the FAA does not have control over the process by which other agencies grant licenses. Therefore, the POI should recommend that operators make the requests as far in advance as possible of the intended date of flight. It is critical that overflight permits be coordinated in a timely manner and under no circumstances should the operator conduct an overflight of a restricted airspace unless the issuing authority has given approval.

1) The operator is responsible for obtaining the appropriate licenses and/or exemptions from the U.S. Government agency or agencies that impose the restrictions for that country or area.

2) Except for an SFAR prohibiting flight operations, the POI may issue an amendment to OpSpec B050 authorizing operations to or over countries or areas on the Restricted International Areas list, provided the operator shows that it meets the requirements of 14 CFR part 119, § 119.51(a)(2).

3) If there is an SFAR that imposes a flight prohibition and if other Federal agencies have imposed restrictions for flights into or over a restricted country or area, before flight operations can be authorized, the operator must provide its POI with either:

a) All applicable written Federal agency authorizations and an FAA exemption granting authorization to operate in or over the restricted international area.

b) Applicable written Federal agency authorizations with written FAA approval from the Director of Flight Standards Service (AFS-1). If an exemption to a SFAR was granted as one of the requirements, the exemption number must be listed in OpSpec A005 and not in OpSpec B050. If approval was granted from AFS-1, the effective and expiration dates of the approval must be noted in the optional nonstandard text of OpSpec A005.

D. Approval of Operations in Restricted Areas. If an operator requests authorization to conduct operations into or over restricted international areas for which an FAA flight prohibition is not in effect and shows that it meets the requirements of § 119.51(a), the POI should authorize the operation by adding the area of en route operation to OpSpec B050. Even though the information is not required by 14 CFR to be recorded, but an authorization to operate into or over a restricted international area is required, the POI may request the date of issuance and its expiration date for insertion in the “note” section of OpSpec B050.

4-108 RNP IN CLASS II AIRSPACE. The implementation of RNP is integral to the achievement of NextGen Integration and Implementation and part of a worldwide ICAO effort for the implementation of performance-based communication, navigation, surveillance, and air traffic management (CNS/ATM) concepts.

A. General. Aircraft/operators that operate on routes where RNP navigation specifications (NavSpecs) are applied must be approved by the State of Operator or State of Registry, as appropriate, as capable of navigating to prescribed RNP standards (e.g., RNP 10 for the entire route on which RNP 10 is required). Different airplane separation standards require different RNP NavSpecs (e.g., 50-NM lateral separation requires RNP 10, while 30-NM lateral separation requires Required Navigation Performance 4 (RNP 4), as well as enhanced communication and surveillance capabilities). The implementation of more stringent RNP and other CNS capabilities is part of an ICAO-coordinated effort to introduce separation standards that will enable more efficient ATM while maintaining acceptable levels of safety. Benefits to users are increased availability of fuel-/time-efficient altitudes, routes and enhanced airspace capacity, and controller flexibility.

B. Applicability of Guidance to Multiple LRNS and Single Long-Range Navigation System (S-LRNS) Equipage. The guidance provided below applies both to airplanes equipped with two or more LRNSs and to S-LRNS-equipped aircraft. Operators and airplanes must be evaluated in accordance with FAA Order 8400.12.

C. S-LRNS Eligibility for RNP 10 in a Limited Number of Designated Areas. OpSpec/MSpec/LOA B054/MB054 may be issued to authorize an operator to conduct Class II navigation using S-LRNS with an RNP 10 authorization in a limited number of designated areas of operation. The Gulf of Mexico will be the first of a limited number of areas where this authority will be permitted. A 50-NM lateral separation between airplanes authorized RNP 10 or RNP 4 is planned to be implemented in the Gulf of Mexico oceanic control areas (CTA) in October 2011.

D. Operational Approval in Oceanic Airspace Where RNP 10 is Required.

1) Background.

a) RNP 10 and RNP 4 are the only RNP NavSpecs currently applicable to oceanic and remote area operations. Other Area Navigation (RNAV) and RNP NavSpecs are applicable to continental en route, terminal area, and approach operations. In accordance with ICAO Doc 7030, aircraft/operators that operate on routes where these separation standards are applied must be approved by the State of Operator or State of Registry, as appropriate, as capable of navigating to RNP 10 or RNP 4 for the entire route on which the NavSpec is required.

2) Policy.

a) FAA Order 8400.12 is a guide to RNP 10 aircraft and operator approval in any airspace where an RNP 10 NavSpec is applied. The FAA has determined that Order 8400.12 provides acceptable criteria and processes for an operator to obtain authority to operate specific aircraft/navigation systems in areas or on routes where RNP 10 is required.

b) CNS requirements, job aids, and policy and guidance for operation in oceanic airspace can be found on the Oceanic and Offshore Operations Group Web site (http://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/enroute/oceanic). This Web site contains links to Web sites for individual areas of operation, such as the West Atlantic Route System (WATRS), the Pacific, and the Gulf of Mexico. AFS-400 is coordinating with their Air Traffic counterparts to expand this Web site as new CNS requirements are introduced in oceanic areas.

c) Operator applications for RNP 10 approval must be evaluated in accordance with Order 8400.12 and any additional criteria specified in this paragraph. If an operator requests to deviate from the practices and procedures provided in Order 8400.12, the inspector should forward a request for assistance through the regional Flight Standards division (RFSD) to AFS-400.

d) Parts 121, 121/135, 125, and 135 certificate holders and part 91K program managers are approved for RNP 10 by the issuance of standard OpSpec/MSpec paragraphs:

- OpSpec/MSpec A002,
- OpSpec/MSpec B036, if applicable,
- OpSpec/MSpec B037, if applicable,
- OpSpec/MSpec B038, if applicable, and
- OpSpec/MSpec B054/MB054, if applicable.

e) Part 91 operators and part 125M LODA holders will be approved through the issuance of automated operator LOA B036 or, if applicable, LOA B054. For operators requiring short-term operations, LOA D098 will be used.

3) RNP 10 Authorization Approval Process. Inspectors should inform their operators for whom they are responsible that this subparagraph contains the approval process for

RNP 10 authorization. The steps in this process should be followed when an operator seeks authority to operate an airplane type/LRNS combination in Class II navigation areas where RNP 10 is applied and the operator has not previously received RNP 10 approval for that specific airplane type/LRNS combination. Normally, if an operator has received initial Class II navigation/RNP 10 approval for a specific airplane type/LRNS combination, that operator should not be required to reapply for approval to conduct Class II navigation/RNP 10 operations on additional routes or areas of operation. Operators should be made aware that references to the appropriate subparagraphs and sections of Order 8400.12 are indicated below:

a) Order 8400.12, paragraph 10 provides guidance on the content of an operator's RNP 10 application. The application will contain the items listed in subparagraph 4-108D3b)1-9. These subparagraphs provide additional detail on application items.

1. Airworthiness documents that establish the proposed aircraft/navigation system group, its RNP 10 approval status, and a list of airframes in that group.

2. Approved or requested RNP 10 time limit for aircraft for which INS or IRU is the only source of long-range navigation (LRN).

3. Documentation establishing the RNP 10 area of operations or routes for which the specific aircraft/navigation system is eligible.

4. Documentation that the operator has adopted operating practices and procedures related to RNP 10 operations.

5. Documentation showing that the pilot's and, if applicable, dispatcher's knowledge of RNP 10 operating practices and procedures will be adequate.

6. Documentation that appropriate maintenance practices and procedures have been adopted.

7. MEL updates, if applicable.

8. Operating history that identifies past problems and incidents, if any, and actions taken to correct the situation.

9. Awareness of the necessity for followup action after navigation error reports, and the potential for removal of RNP 10 operating authority.

b) In accordance with Order 8400.12, paragraph 12, the operator must show the aircraft/navigation system groups that will be presented for approval of RNP 10 operations and provide a list of airframes that are determined to be in the specific aircraft/navigation system groups to be evaluated.

c) Order 8400.12, subparagraph 13a requires that for aircraft navigation systems that have been approved by an aircraft certification authority to RNP 10 or better, the operator

must provide appropriate sections of the Aircraft Flight Manual (AFM) that address RNP, including any associated time limits for INS and IRU navigation systems.

d) Order 8400.12, subparagraph 13b(3) requires that for aircraft equipped with GPS, where such GPS units are the only systems for LRN, the operator must show that it is approved in accordance with subparagraph 13b(3). An RNP 10 time limit is not applicable.

e) Order 8400.12, subparagraph 13b(4), requires that for multisensor systems incorporating GPS, the operator must show that systems are approved and operated in accordance with Order 8400.12, subparagraph 13b(4). An RNP 10 time limit is not applicable.

f) The operator must show that the LRNS is approved in accordance with Order 8400.12, subparagraph 13b(5). An RNP 10 time limit is not applicable.

g) Order 8400.12, subparagraph 13b(5). Aircraft equipped with a single INS/IRU, or a single GPS approved for primary means of navigation in oceanic and remote areas, are eligible for RNP 10 authorization in a limited number of designated areas of operation. (The first area is the Gulf of Mexico oceanic CTAs.) With the exception of the requirement for two INSs or IRUs, the guidance in Order 8400.12, subparagraph 13b(1) applies. INS and IRU systems must be approved in accordance with part 121 appendix G. With the exception of the requirement for two primary means GPSs, the guidance in Order 8400.12, subparagraph 13b(3) applies. GPS systems must be approved in accordance with the current edition of AC 20-138, Airworthiness Approval of Positioning and Navigation Systems.

h) Order 8400.12, subparagraphs 13b(1) and (2) require the operator to show that INS or IRU installation is approved in accordance with subparagraphs 13b(1) and (2). Unless the operator takes action to extend the approved navigation system time limit and/or plans to update the system en route, a baseline RNP 10 time limit of 6.2 hours, starting at the time the system was placed in navigation mode, is applicable. See Order 8400.12, subparagraph 13d on extending navigation system time limit, and Order 8400.12, subparagraph 13e on en route updating.

i) Order 8400.12, subparagraph 13c specifies that for navigation systems not approved under existing criteria, the operator may demonstrate RNP 10 eligibility through data collection in accordance with Order 8400.12, subparagraph 13c using the processes detailed in Order 8400.12, appendix A or E.

j) Order 8400.12, subparagraph 16f requires the operator to show the routes or areas where it is eligible to operate if restrictions (e.g., INS RNP 10 time limit) apply to navigation systems. In accordance with Order 8400.12, subparagraph 16f, the operator can conduct a one-time evaluation of eligibility to fly in an RNP 10 area of operation or on specific RNP 10 routes, or may elect to evaluate on a per-flight basis.

1. For a one-time evaluation of a specific RNP 10 area or track system, aviation safety inspectors (ASI) should expect the operator to accomplish the following:

a. Calculate the longest distance from either departure airports or en route update points (if applicable) to the point at which the aircraft will begin to navigate by reference to VHF omni-directional range station (VOR), distance measuring equipment (DME), NDB, or comes under ATC radar surveillance.

b. As detailed in Order 8400.12, subparagraph 16f, using 75 percent probability wind component, convert this distance to en route time.

c. As detailed in Order 8400.12, subparagraph 13e, if navigation systems are to be updated en route, adjust the baseline RNP 10 time limit approved for the specific operator navigation system to account for update accuracy.

- Subtract 0.3 hours from the baseline for DME/DME.
- Subtract 0.5 hours from the baseline for VOR/DME.
- Subtract 1 hour from the baseline for manual update.

d. Compare calculated en route time to the navigation system RNP 10 time limit (adjusted for en route update, if applicable) to determine if the airplane is eligible for the operation.

e. If the aircraft navigation system is found eligible for operation on the specific routes evaluated, then the RNP 10 area of operations or routes on which RNP 10 operations can be conducted are established. If the aircraft navigation system is not found eligible for operation on all routes evaluated, then the operator will need to designate routes for which it is eligible or take action to gain approval for an extended RNP 10 time limit. See Order 8400.12, subparagraph 13d.

2. Order 8400.12, subparagraph 16f(6). For a per-flight evaluation of eligibility to fly a specific RNP 10 route, follow the steps shown in Order 8400.12, subparagraph 16e, using flight plan winds to determine en route time. If the RNP 10 time limit is exceeded, the flight must be rerouted or delayed.

k) Order 8400.12, subparagraph 13d specifies how the operator can show eligibility for an extended time limit by—

1. Obtaining approval from an appropriate Aircraft Certification Office (ACO), or

2. Conducting operational data collection using the processes established in Order 8400.12, appendix A or E.

l) Order 8400.12, paragraph 15 specifies that the certificate holder must provide documentation that appropriate maintenance practices and procedures have been adopted.

m) Order 8400.12, paragraph 14 requires the operator to revise the MEL to address any new operating requirements.

n) Operations programs.

1. FAA Order 8400.12, subparagraphs 10a(5), 13f, 13g, 16, and appendices D and F (if applicable).

a. Parts 91K, 121, 121/135, 125, and 135 operators must provide revisions to manuals and checklists to show the adoption of the RNP 10 operating practices and procedures contained in the reference paragraphs and sections listed in Order 8400.12, subparagraphs 10a(4) and 10a(5).

b. If applicable, parts 91, 91K, and 125 LODA operators should show appropriate sections of the AFM relating to RNP 10 aircraft/navigation system eligibility.

2. Order 8400.12, subparagraphs 10a(4), 13f, 13g, 15, and appendices D and F (if applicable).

a. Parts 91K, 121, 121/135, and 135 operators should show that training programs have been updated to include the practices in Order 8400.12, subparagraphs 13f and/or 13g (if applicable), paragraph 16, and appendices D and F (if applicable). Part 125 certificate holders' initial and recurrent pilot testing programs should be updated with applicable information from these paragraphs.

b. In accordance with Order 8400.12, appendix D, paragraph 5c, part 91K program managers and part 125M LODA holders must ensure that flightcrew members are qualified in accordance with the program manager's approved training program.

c. In accordance with Order 8400.12, appendix D, paragraph 5b, part 91 operators must show during the application process that pilot knowledge of Order 8400.12, paragraphs 13f and 13g (if applicable), paragraph 16, and appendices D and F (if applicable) will be adequate. Order 8400.12, appendix D, paragraph 5b contains options for part 91 operators to fulfill this requirement.

o) The administrator may authorize an operator to deviate from the RNP 10 requirements of OpSpec/MSpec/LOA B036 for a specific flight in designated RNP 10 airspace if the ATSP determines that the airplane may be provided appropriate separation and the flight will not interfere with, or impose a burden on, other operators. For operations under such authority, the certificate holder will not take off for flight in designated RNP 10 airspace, unless the following requirements of B036 or B054 are met:

1. If fuel planning is predicated on en route climb to FLs where RNP 10 is normally required, an appropriate request must be coordinated with the ATSP in advance of the flight.

2. The appropriate information blocks on the ICAO flight plan filed with the ATSP show that the airplane and/or certificate holder is not approved for RNP 10.

3. For these flights at least one of the navigation system configurations listed below must be installed and operational:

- a. At least two independent INSs.
- b. At least two flight management system (FMS)/navigation sensor combinations (or equivalent).
- c. At least two independent approved GPS navigation systems acceptable for primary means of Class II navigation in oceanic and remote areas.
- d. At least two approved independent LRNS from the list below:
 - INS.
 - FMS/navigation sensor combination (or equivalent).
 - GPS navigation system approved for Class II navigation in oceanic and remote areas.

p) The administrator may authorize an operator to deviate from the RNP 10 requirements of OpSpec/MSpec/LOA B054 for a specific individual flight in designated RNP 10 airspace if the ATSP determines that the airplane may be provided appropriate separation and the flight will not interfere with, or impose a burden on, other operators. For operations under such authority, the certificate holder will not take off for flight in the designated RNP 10 airspace, unless the following requirements of OpSpec/MSpec/LOA B054/MB054 are met:

1. If fuel planning is predicated on en route climb to flight levels where RNP 10 is normally required, an appropriate request must be coordinated with the ATSP in advance of the flight.
2. The appropriate information blocks on the ICAO flight plan filed with the ATSP show that the airplane and/or certificate holder is not approved for RNP 10 as specified in the certificate holder's OpSpec/MSpec/LOA B054/MB054.
3. For these flights, at least one of the navigation system configurations must be installed and operational, such as an approved independent LRNS from the list below:
 - At least one independent INS. The INS or IRU systems must be approved in accordance with Order 8400.12 or part 121 appendix G.
 - At least one FMS/navigation sensor combination (or equivalent) where the navigation system must be suitable for the route to be flown. Multisensor systems must be approved in accordance with the guidance contained in AC 20-138.
 - At least one independent IFR GPS navigation system.

q) Order 8400.12, subparagraph 10b. The operator should indicate awareness of the provisions of subparagraph 10b for operator followup action on reported navigation errors and of the potential to remove RNP 10 operating authority.

- r) Validation tests and validation flights (see Volume 3, Chapter 29).

1. The following is intended to provide broad guidance for establishing requirements for validation tests and/or validation flights. The inspector should consider each application on its own merit and, in accordance with Volume 3, Chapter 29, must consult with a NextGen oceanic specialist. The oceanic specialists can be contacted through the regional NextGen branches (AXX-220).

2. Validation testing requires that ASIs evaluate operator programs and documents in accordance with the guidance in this paragraph.

3. The following is provided as guidance for ASIs to consider in determining whether or not validation flights are required.

a. For operators with previous Class II navigation experience with the same navigation equipment as that being proposed for RNP 10 approval, evaluation of the applicant's programs and documents is required. Tabletop exercises and demonstrations on a static airplane may also be required for evaluation purposes. A validation flight should not normally be required.

b. For operators with previous Class II navigation experience navigating with an LRNS other than that being proposed for RNP 10 approval, evaluation of the applicant's programs and documents is required. A validation flight may not be required if the inspector determines that operator policies, procedures, and programs concerning the LRNS being proposed for RNP 10 can be adequately evaluated through one or a combination of the following:

- Document review,
- Tabletop exercise,
- Demonstration on a static aircraft, and
- Any other means found acceptable.

c. For operators with no previous Class II navigation experience proposing to operate where RNP 10 is required, evaluation of the operator's programs and documents is required. A validation flight is required and must be conducted in Class II airspace. It should be a non-revenue flight with the exception that cargo may be carried.

4. Conditions for validation flights.

a. At least one flight should be observed by an FAA ASI.

b. A demonstration of any required dispatch procedures, if applicable, must be conducted for routes or areas where RNP 10 is required.

c. The flight(s) should be of adequate duration for the pilots to demonstrate knowledge of dispatch requirements (if applicable), capability to navigate with the system, and to perform the normal and non-normal procedures.

4) Program Tracking and Reporting Subsystem (PTRS) Codes. PTRS entries will be made. The operations activity code number will be 1442; the avionics activity code will be 5434; and the “National Use” field entry will be “RNP 10” followed by three spaces. (To facilitate the PTRS search function, please ensure that you insert a space between “RNP” and “10.”)

4-109 RVSM AIRSPACE. RVSM airspace is any airspace or route where aircraft are separated by 1,000 feet vertically between FL 290 and FL 410, inclusive. Generally, aircraft and operators that have not been authorized to conduct RVSM operations cannot operate at FLs where RVSM is applied. Exceptions to this rule are published by individual ATSPs. ATSPs have elected to implement RVSM as a means to provide more fuel-/time-efficient altitudes and routes to operators and to enhance en route airspace capacity.

A. RVSM Areas of Operation. For the latest information, see the RVSM Web site, http://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/enroute/rvsm, and click on “RVSM Status World-wide.”

B. Inspector Action. Using the guidance provided in AC 91-85, Authorization of Aircraft and Operators for Flight in Reduced Vertical Separation Minimum Airspace, inspectors will ensure that operators and aircraft meet the standards of part 91 appendix G. This document can be found on the RVSM Web page at http://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/enroute/rvsm/documentation.

C. Sources of Information on RVSM Programs.

1) The RVSM home page provides information on RVSM programs in various areas of the world. It provides a link to the U.S. Domestic RVSM Web site where information is posted on plans and programs to implement RVSM in the domestic United States. It also links to the RVSM Documentation page that provides specific information on aircraft and operator approval for RVSM operations. The RVSM home page can be accessed at http://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/enroute/rvsm.

2) The RVSM Documentation Web site provides access to regulations, guidance, documents, and contacts. This Web site is maintained by AFS-400. It can be accessed:

a) Through the RVSM home page at http://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/enroute/rvsm/, and clicking on “RVSM Documentation,” or

b) In WebOPSS, in association with OpSpec B046.

D. Regulations. Section 91.706 applies to RVSM operations outside the United States. Section 91.180 applies to RVSM operations within the United States. Both sections require that the operator and the operator’s aircraft comply with the standards of part 91 appendix G and that the operator obtain FAA authorization to conduct RVSM operations. Part 91 appendix G

provides basic RVSM standards for aircraft and operator programs. The RVSM Documentation Web site provides a link to §§ 91.180 and 91.706, and part 91 appendix G.

E. Guidance. AC 91-85 can be found on the RVSM Documentation Web page. It provides an acceptable means to authorize operators and aircraft to conduct flight in RVSM airspace. It provides detailed guidance for aircraft manufacturers, other engineering organizations, and operators to follow when developing programs intended to meet the standards of part 91 appendix G.

1) If an operator requests to deviate from the practices and procedures provided in AC 91-85, the inspector should forward a request for assistance through the RFSD to AFS-400. AFS-400 will respond after coordination with AFS-200, the Aircraft Maintenance Division (AFS-300), or the General Aviation and Commercial Division (AFS-800), as appropriate.

2) The precursor to AC 91-85 (ATO Guidance 91-RVSM, Approval of Aircraft and Operators for Flights in Airspace Above Flight Level (FL) 290 Where a 1,000 Foot Vertical Separation Minimum is Applied) was developed in national and international forums and was used by civil aviation authorities (CAA) throughout the world. ICAO Document 9574, Edition 2, cites ATO Guidance 91-RVSM as an acceptable means for RVSM approval.

F. Overview of the Authorization Process. The POI, principal avionics inspector (PAI), and principal maintenance inspector (PMI) should coordinate the issuance of OpSpecs B046 and D092 to grant the operator authority to conduct RVSM operations for a specific aircraft type or group. The FAA will issue the OpSpecs if the following conditions exist:

1) The FAA determines that operator aircraft comply with RVSM standards. For in-service aircraft, the FAA determines that inspections and/or aircraft system modifications are completed as required by the applicable Service Bulletin (SB), Service Letter (SL), Supplemental Type Certificate (STC), or other ACO-approved document.

2) For aircraft manufactured RVSM compliant, the FAA determines that the AFM or Type Certificate Data Sheet (TCDS) contains a statement of RVSM eligibility. The following are involved with RVSM approval:

- The FAA approves the operator's RVSM maintenance program.
- The FAA approves the operator's RVSM operations program.
- The FAA accepts the operator's plan to participate in monitoring programs.
- If required by the POI in coordination with the PAI and PMI, the operator successfully completes a validation flight.

G. RVSM Authorization Process and Policy.

1) Before issuing OpSpecs, inspectors must coordinate with the responsible Operations, maintenance, and avionics inspectors.

2) AC 91-85 provides guidance on the major events in the RVSM authorization process. Also, the "Getting Started" section of the RVSM Documentation Web site contains an

outline or checklist of the events or steps in the authorization process. It includes references to applicable document paragraphs and sections.

3) AC 91-85 provides the following policy for parts 91, 91K, 121, 125, 125M, and 135 operators: The FAA will authorize initial operational approval for RVSM operations by issuing OpSpecs B046 and D092. (Specific make, model, and series (M/M/S) and individual registration numbers are listed in D092.) Areas of RVSM operation that are new to the operator will be authorized by adding OpSpec B046 to OpSpec B050. (For questions regarding these OpSpec paragraphs, contact AFS-400 at 202-385-4586.)

4) Currently, in designated oceanic airspaces, operators are required to obtain both RVSM authorization and certain horizontal navigation authorizations. These are separate, specific authorization actions. For example, to operate in NAT/MNPS airspace, operators are required to obtain both RVSM and NAT/MNPS authority. In Pacific oceanic airspace, operators are required to obtain both RVSM and RNP 10 authorization.

5) Information on TCAS as it relates to RVSM operations can be found on the RVSM Documentation Web site. Part 91 appendix G does not require that aircraft be equipped with TCAS for RVSM operations. Part 91 appendix G, section 2 does require, however, that if an aircraft is equipped with TCAS II and is used in RVSM operations, then it must be a TCAS II that meets Technical Standard Order (TSO) C-119b, Traffic Alert and Collision Avoidance System (TCAS) Airborne Equipment, TCAS II with Optional Hybrid Surveillance, Version 7.0 or subsequent versions. TCAS equipage requirements can be found in parts 121, 125, 129, and 135.

6) The phrases “determining aircraft RVSM compliance” and “initial RVSM airworthiness approval” both appear in RVSM documents to indicate that the FAA has determined that the operator’s aircraft comply with the RVSM standards of appendix G. The following is provided as guidance for inspectors:

a) AC 91-85 provides guidance on the inspector’s determination that aircraft are RVSM compliant. AC 91-85 discusses the documents that the operator must submit to the FAA to show that in-service aircraft or aircraft manufactured RVSM compliant are in compliance with the RVSM requirements of part 91 appendix G.

b) For most in-service aircraft, the RVSM airworthiness documents take the form of SBs, SLs, or STCs. These documents contain requirements that are specific to individual aircraft types or groups and generally require inspections and/or hardware or software modifications. The operator must submit documents to the FAA to show that the required actions have been completed for each airframe that will operate in RVSM airspace.

c) For aircraft manufactured RVSM compliant, the AFM or TCDS must contain statements that show the aircraft to be eligible for RVSM operations.

7) When the inspector determines that individual operator airframes are RVSM compliant, the PTRS must be updated and the airframes must be listed in OpSpec D092 or an LOA, as appropriate.

8) Other volumes contain Airworthiness inspector guidance for the evaluation and approval of an operator's RVSM maintenance program.

9) Evaluation of operations programs should be completed in conjunction with the evaluation of maintenance programs.

a) AC 91-85 provides operating practices and procedures applicable to all RVSM operations. It also lists special emphasis items for pilot training.

b) AC 91-85, appendix 5 provides specific practices and procedures for RVSM operations in oceanic airspace.

c) Operators can use AC 91-85 as the basis for their RVSM operations training and operating practices/procedures. Operational procedures such as those for en route failure of RVSM systems in the U.S. NAS have been published. Guidance has also been published in the Aeronautical Information Manual (AIM) and, in addition, AFS-400 published and distributed a sample Pilot Bulletin that can be incorporated into individual operator programs. Operators will be responsible for incorporating this material into their programs prior to conducting RVSM operations in the United States. The operational procedures unique to domestic U.S. airspace are not extensive.

10) Validation tests and flights.

a) AC 91-85 provides guidance on the RVSM validation test. In some cases, review of the operator's RVSM application and program documents may suffice for validation test purposes. However, as determined by the POI, PMI, and PAI, the final step of the approval process may be the completion of a validation flight. The FAA may accompany the operator on a flight to verify that RVSM operations and maintenance procedures and practices are used effectively. The validation flight may be accomplished during a revenue flight, as determined by the PIs on a case-by-case basis.

b) Validation flights are *not* required to be conducted in conjunction with the monitoring flights described below. Also, the validation flight may be conducted before monitoring requirements are completed.

H. Monitoring Programs.

1) The primary goal of monitoring is to provide a quality control (QC) check on the altitude-keeping performance of the wide variety of operators and aircraft. It has been determined that this may be accomplished by sampling a number of airframes of each aircraft type that an operator will operate in RVSM airspace. Altitude-keeping performance data is analyzed to determine that the aircraft fleet, as well as individual operators, exhibit performance that is consistent with RVSM standards.

2) AC 91-85 calls for each operator to submit a plan to participate in monitoring programs in its application for RVSM authority. It further notes that the current monitoring

requirements for individual operators in specific RVSM areas of operation are published on the FAA RVSM Documentation Web site.

NOTE: Operators are no longer required to complete monitoring prior to being granted operational approval.

3) Monitoring procedures for ground-based and GPS-based monitoring systems are published on the RVSM Documentation Web site. Operator aircraft of a specific type or group are monitored after they have been determined to be RVSM compliant. Currently, the operator can have its aircraft monitored by either the ground-based height monitoring unit (HMU) or a portable GPS-based Monitoring Unit (GMU) that can be placed on the aircraft.

4) When an operator has successfully completed monitoring requirements for the specific aircraft type or group, the FAA Technical Center Separation Standards Group (ACB-310) will notify the POI and/or PAI (Flight Standards District Office (FSDO) or certificate management office (CMO) notification).

I. Inquiries. Each RFSO has appointed RVSM focal points. A list of the focal points is published on the FAA RVSM Documentation Web site. For general questions on RVSM, the appropriate regional focal point should be contacted first. Questions on this order's material and specific questions on RVSM policy should be directed to the applicable policy division.

4-110 SPECIAL AREAS WHERE REDUNDANT LRNS ARE USUALLY NOT REQUIRED. Certain special areas have been identified where LRN can be conducted with an S-LRNS.

A. Concept. The provisions of §§ 91.511 and 121.351; part 125, § 125.203; and part 135, § 135.165 related to Class II navigation do not specifically require redundant or dual LRNS. The primary Class II navigation requirements are related to the level of navigational performance necessary for the control of air traffic. The objective of requirements for redundant navigational systems is to permit the flight to continue to navigate to the degree of accuracy necessary for the control of air traffic in the event a failure occurs in the navigational system being used.

B. Combination of Standard ICAO Ground-Based NAVAIDs and an S-LRNS.

1) Operations can also be safely conducted in much larger areas using a combination of redundant ICAO standard NAVAIDs and an S-LRNS. These operations consider:

- The availability of ICAO standard NAVAIDs,
- The lateral separation minimums applied by ATC (the navigational performance required),
- The length of the route or route segment,
- The complexity of the route structure, and
- The density of the air traffic.

2) Approval of the use of an S-LRNS may be granted by the issuance of OpSpec B054. It should be noted in OpSpec B050 in association with the applicable areas of operation.

C. West Atlantic Route System (WATRS). The WATRS, Caribbean Sea, and Gulf of Mexico routes are special case routes in which the use of an S-LRNS may be authorized for Class II navigation. These routes are located offshore in the WATRS CTA, the Caribbean, and Gulf of Mexico CTAs, as shown on en route charts and described in § 91.511.

NOTE: The WATRS is defined as North Atlantic Ocean west of a line that extends from 44°47'00" N/67°00'00" W to 39°00'00" N/67°00'00" W to 38°30'00" N/60°00'00" W, south along the long. 60°00'00" W line to the point where the line intersects with the northern coast of South America.

1) RNP for WATRS Plus CTAs. On June 5th, 2008, the FAA implemented a redesigned route structure with a reduced lateral separation on oceanic routes or areas in the WATRS Plus CTAs. The existing lateral route separation is 90 NM. The WATRS Plus initiative will reduce the separation to 50 NM between aircraft that are authorized with a NavSpec of RNP 10 or RNP 4.

2) The WATRS Plus initiative builds upon the experience gained from:

- The FAA's introduction of the RNP 10 NavSpec for aircraft operating in the U.S.-controlled Pacific FIRs, and
- The ongoing operational trial with aircraft authorized for an RNP 4 NavSpec.

3) Reference material and compliance procedures for an RNP 10 NavSpec can be found in FAA Order 8400.12. For RNP 4, use the material and procedures in the current edition of Order 8400.33, Procedures for Obtaining Authorization for Required Navigation Performance 4 (RNP 4) Oceanic and Remote Area Operations. Job aids and further information concerning the applicable ICAO oceanic operational procedures are on the FAA Web site at http://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/enroute/oceanic/WATRS_Plus.

D. WATRS Procedural Areas. The current edition of FAA Order 7400.2, Procedures for Handling Airspace Matters, establishes the areas in which these operations are conducted to serve aircraft operations between U.S. territorial limits and oceanic CTA/FIR boundaries and/or domestic flights that operate in part over the high seas.

E. Special Provisions for the WATRS, Caribbean Sea, and Gulf of Mexico. The unique nature of the WATRS, the Caribbean Sea, and the Gulf of Mexico permits operations with turbine-powered airplanes and certain offshore helicopter operations to be safely conducted with an approved S-LRNS, in accordance with § 91.511(f).

F. Special Provisions for Certain Routes in NAT/MNPS Airspace. Special contingency routes have been established in limited portions of NAT/MNPS airspace where aircraft equipped to use standard ICAO NAVAIDs can operate with an S-LRNS. These routes

are specified in the International Flight Information Manual (IFIM). Operations over these routes can be authorized, provided the operator shows that the LRNS/aircraft combination used and the operational procedures used meet the NAT/MNPS requirements. (For guidance, see AC 120-33.) The approval is granted in accordance with OpSpec B054 and by adding that area of en route operation to the standard OpSpec B050.

G. Operational Approval for S-LRNS.

1) All Class II navigation operations must be conducted so that the aircraft is continuously navigated to the degree of accuracy established by ATC for operations in that airspace where applicable requirements are in force. For areas where these accuracy and navigation performance standards have *not* been formally established, the LRNS must be used to continuously navigate the aircraft. This is required so that the crosstrack and/or the alongtrack errors will not equal or exceed 25 NM at any point along the flight plan route specified in the ATC clearance.

2) The navigation system must be operational, as required by OpSpec B039.

3) Before conducting any operations authorized by OpSpec B054, the flightcrew must be qualified in accordance with the certificate holder's approved training program for the system and procedures being used.

4) Before entering any airspace requiring the use of an LRNS, the aircraft position will be accurately fixed and recorded using airways navigation facilities or ATC radar. After exiting this airspace, the aircraft position will be accurately fixed and the LRNS error must be determined and logged in accordance with the operator's approved procedures.

5) An LRNS fix may be substituted for a required en route ground facility when that facility is temporarily out of service, provided the approved navigation system has sufficient accuracy to navigate the aircraft to the degree of accuracy required by ATC over that portion of the flight.

6) At dispatch, at least one of the navigation systems listed below must be installed and operational:

a) At least one independent INS. INS and IRS must be approved in accordance with part 121 appendix G.

b) At least one FMS/navigation sensor combination (or equivalent), where the navigation system must be suitable for the route to be flown. Multisensor systems must be approved in accordance with the guidance contained in AC 20-138, or equivalent guidance.

c) At least one independent IFR-approved GPS navigation system, approved in accordance with one of the following:

1. The guidelines for operational approval of GPS to provide the primary means of Class II navigation in oceanic and remote areas of operation apply (see AC 91-70). The guidelines must be followed with the exception that the operational control restrictions related to

fault detection and exclusion (FDE) do not apply. This is because S-LRNS operations in oceanic/remote areas have only been approved on short-duration routes with options available to use other NAVAIDs in the event of an LRNS malfunction.

2. The guidelines for using GPS for IFR en route and terminal operations, and for nonprecision instrument approaches in the U.S. NAS, apply. These guidelines allow for single GPS units that have receiver autonomous integrity monitoring (RAIM) capability (or equivalent) and are approved for IFR operations to serve as the S-LRNS on oceanic routes where an S-LRNS is allowed.

3. Flightcrew procedures must be in place in the event of the loss of the S-LRNS after dispatch. The certificate holder must ensure that the pilots are trained on procedures to continue to navigate and to communicate with ATC in the event of an S-LRNS malfunction.

4. The first area in which S-LRNS-equipped airplanes will be eligible for RNP 10 authorization is the Gulf of Mexico.

H. Other Special Areas. Inspectors cannot authorize operations with S-LRNS in any other areas of operation without the review and concurrence of the NextGen oceanic specialists and AFS-400.

1) When a request to operate with S-LRNS in areas not described in this paragraph is received, inspectors must request assistance from one of the agency's NextGen oceanic specialists. If the responsible inspector and the NextGen oceanic specialist determine that the proposed operation can be safely conducted, a request for review and concurrence should be forwarded, through the RFSD, to AFS-400.

2) In general, the following are necessary for consideration of this request:

- The required justification for the request, and
- The ability to comply with the limitations and provisions set forth in the applicable guidance and OpSpec B054 for the authorization of the S-LRNS in another area.

4-111 PERFORMANCE-BASED EN ROUTE OPERATIONS.

A. Performance-Based En Route High Altitude RNAV Routes. The first performance-based en route high altitude RNAV routes were published in 2004 as Q Routes. The performance requirement for these operations is a 95 percent accuracy of 2 NM and the route widths for this implementation are a conventional + 4 NM. This performance level is specified as RNAV-2. RNAV systems for this type of operation will be updated with GPS or DME/DME/IRU to obtain the required accuracy. DMEs along Q Routes are also evaluated so that none are identified as critical in nature to support the route. Operators need to be aware that only DMEs that are part of the NAS can be used (normally no Tactical Air Navigational Aid (TACAN)). If DMEs are in test mode radiating a signal, they may not be used in navigation

solution. Q Route operations must be approved in accordance with the current edition of AC 90-100, U.S. Terminal and En Route Area Navigation (RNAV) Operations.

B. Performance-Based Operations Aviation Rulemaking Committee (PARC).

The PARC has recommended that the FAA establish en route operations throughout the performance-based NAS with a route-to-route separation of 8 NM and obstacle clearance standards of ± 4 NM. These operations will initially be based on a required performance level of RNAV-2 and will use radar as an operational mitigation. The PARC also recommended that RNP aircraft with an en route performance of RNP 2 or better should also be authorized to conduct these operations. In 2005, the FAA began to implement those recommendations.

RESERVED. Paragraphs 4-112 through 4-125.