US Antarctic Program Inter-agency Air Operations Manual

2012-2013 Season

Division of Antarctic Infrastructure and Logistics
Office of Polar Programs
National Science Foundation
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Inter-agency Lead Approval

___//Signed//_____16 Aug 2012___

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UNITED STATES ANTARCTIC PROGRAM (USAP) INTER-AGENCY AIR OPERATIONS MANUAL 1 AUGUST 2012

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The NSF is congressionally charged with the management of the USAP. Via the NSF/DoD MOA, the DoD is charged with heavy-lift logistics support to the USAP. In accordance with this arrangement, Deputy Commander, Joint Task Force Support Forces Antarctica is responsible for the safe operations of all DoD air assets. Civil aircraft under contract to NSF/OPP/AIL are an integral component in the support of science on the continent and share the airspace with DoD aircraft. These civil aircraft are under the direct charge of AIL and operate in accordance with their respective Operations Specifications (OPSPECS) and their contract with AIL.

Oversight of the on-ice operations of the civil aircraft is NSF-delegated to the Dept of the Interior/OAS Office of Aviation Services (OAS) in accordance with the SLA between OAS/AIL. Joint use of the USAP airspace in Antarctica requires close coordination between the DoD and NSF (and its delegations). This is achieved through daily meetings between the 13AEG/CC and the NSF Rep and via bi-weekly meetings of the Air Operations Planning Board (AOPB). NSF/AIL delegates the publication and administration of the USAP Air Operations Manual to DCJTF-SFA. The AIL Director is single point of contact for NSF technical coordination.

This manual outlines responsibilities and major actions required on the part of all agencies that support and interact with the United States Antarctic Program (USAP). It shall not be construed as superseding directives of higher authority or as precluding the exercise of good judgment or compliance with other aviation safety practices. The USAP Air Operations Manual (AOM) has been revised as requested by NSF Office of Polar Programs to reflect the most recent changes regarding Antarctic air operations, procedures, and participants and must be completely reviewed. It supersedes USAP Air Operations Manual dated 1 August 2007.

The intent of this manual is to provide USAP Aviation Service Providers (ASP's) key information relating to the safe and efficient execution of their duties and to provide a common reference for those operations. Information in this manual is not to supersede ICAO and/or FAA regulations; military flight regulations, civilian operations specifications, and/or National Science Foundation contracts.

The following publications contain key information to USAP ASP's: DoD/NOAA FLIP series, the Antarctic Flight Information Manual (AFIM), and the International Flight Information Manual. Refer to Attachment 1 for a glossary of references and supporting documentation.

Chapter 1

GENERAL INFORMATION

1.1. Aviation Service Providers (ASP's).

1.1.1. Several US and New Zealand military organizations, US Government agencies, and civilian contractors provide aviation services to the USAP. ASP's must adhere to standard operating practices to ensure safe operations and efficient airlift utilization. The DCJTF-SFA in conjunction with the National Science Foundation (NSF) publishes the USAP Air Operations Manual. All ASP's should become familiar with the information in this manual. This is a joint, inter-agency manual; as such, DCJTF-SFA and 13AEG/CC are responsible for DoD air safety; and civilian aircraft under contract to National Science Foundation (that operate to FAA and contract requirements). Civilian operators report to NSF (via OAS) on the ice but will coordinate to the fullest extent possible with DoD to operate safely in the combined airspace environment.

1.1.2. The Chief of Joint Operations and Plans for Operation DEEP FREEZE (JTF-SFA) will facilitate an annual revision of this manual. DoD units will submit coordinated changes to the JTF-SFA; other agencies will submit changes through the process designated by NSF/OPP/AIL or his designate. The Annual Planning Conference (APC) presents an opportune time and location for coordination of all parties.

1.1.3. USAF C-17 aircraft provide the majority of intercontinental airlift, supplemented by RNZAF C-130s, RNZAF 757, an Australian contract A-319, and New York ANG LC-130s. NYANG LC-130 aircraft provide the majority of heavy airlift on continent and fly scientific research missions. NSF contracted ski-equipped Basler and Twin Otter aircraft and helicopters fly scientific research missions and provide medium and light airlift on continent.

1.1.4. USAF/ANG aircrews operate IAW governing Air Force Instructions (AFI's). RAAF, RNZAF, and Civilian ASP's will adhere to their respective Operations Specifications, company policies, and National Science Foundation contract language. Information contained within this manual is for informational purposes. If there is a conflict between the AOM and AFI's, Operation Specifications, or contract language, ASP's will adhere to the latter. ASP's will:

1.1.4.1. Coordinate transportation support requirements with Prime Contractor's Fixed/Rotary Wing Coordinators.

1.1.4.2. Coordinate mission requirements with the user, Fixed/Rotary Wing Coordinators, and support agencies the day prior to mission execution (usually accomplished at the daily operations meeting).

1.1.5. Rotary Wing Operations. See Chapter 3

1.2. USAP Landing Locations.

1.2.1. Primary airfields for the USAP are located in the McMurdo Station area and at the South Pole Station (ski-equipped aircraft only). The primary heliport is located at McMurdo Station. Additional ice runways, skiways, and helicopter landing sites are established throughout the continent supporting the USAP science activities as planned by the Prime Contractor's Fixed/ Rotary Wing Coordinators.

1.3. USAP Primary Airfields

1.3.1. Descriptions of USAP primary airfields can be found in the DoD/FLIP Enroute Supplement and the Antarctic Flight Information Manual (AFIM).

1.3.2. McMurdo airfields operate as prior-permission-required (PPR) through the USAP Airfield Manager to ensure safe operations on the airfields.

1.3.3. **Pegasus Airfield (NZPG).** Airfield is located approximately 8 NM Grid North of McMurdo Station on the Ross Ice Shelf. Pegasus field has both a "white ice" (compacted snow) runway for wheeled operations and a skiway for ski operations.

1.3.3.1. Pegasus White Ice Runway is used primarily to support heavy airlift wheeled operations and certified by the U.S. Air Force for use by C-5, KC-135, C-17, C-130, LC-130, P-3, A-319, and smaller aircraft. Pegasus skiway is limited to ski-equipped aircraft only.

1.3.3.2. The Pegasus White Ice Runway is 10,000' x 220' and oriented Grid 33/15.

1.3.3.3. The Pegasus skiway is 10,000' x 220' and oriented Grid 26/08.

1.3.3.4. Pegasus Field is serviced by a TACAN, MLS, and RNAV (GPS) approaches.

1.3.3.5. Wheeled aircraft parking is located Grid east of the approach end of Runway 33. Ski-equipped aircraft parking is located Grid south of the approach end of Skiway 26.

1.3.3.6. Hazardous Cargo or Explosives loading or unloading designated area is located on the approach end runway 33 approximately 500ft south of the ramp on the runway.

1.3.3.7. Pegasus White Ice Runway is maintained and operated IAW Air Force Civil Engineer Support Agency (AFCESA) Engineering Technical Letter (ETL), available separately. Construction waivers are reviewed by AMC/A7 and DCJTF-SFA. Operational waivers for AMC aircraft require approval from 18AF/CC or AMC/A3. DCJTF-SFA (jtfsfadc@usap.gov) shall ensure all waivers are coordinated with USAP Airfield Manager, SPAWARSYSCEN Office of Polar Programs (SOPP) Manager, and McMurdo NSF Representative.

1.3.3.7.1. The NSF Prime Contractor maintains Pegasus White Ice Runway according to specifications contained in AFCESA ETL. Additionally, distance

remaining markers (flag with a number embroidered on it) are installed every 1,000 feet.

1.3.3.7.2 A maximum of one-inch depth of loose snow is permissible on the runway and 2 inches on the ramp for wheeled operations.

1.3.3.8. All LC-130 aircraft shall land/taxi on wheels when landing on the Pegasus White Ice Runway unless otherwise advised by NOTAM.

1.3.3.9. All aircraft on Pegasus White Ice Runway shall use the overrun (red fabric markers denote beginning of 1000ft overrun) to accomplish 180 degree turns for taxi back to the ramp area when landing runway 33.

NOTE:
Turning short of overrun on the runway is not authorized

CAUTION:
Keep all aircraft wheels within runway edge markings. The shoulders where the runway markers are located are not stressed for aircraft use.

1.3.3.10. 180-degree turns on any portion of the Pegasus skiway are authorized.

1.3.3.11. During the months of December through January, warm weather can affect the landing surface of the Pegasus White Ice Runway. The USAP Airfield Manager shall publish airfield operating hour restrictions by NOTAM when necessary. These restrictions may dictate late evening arrivals or delays for arriving aircraft from Christchurch to the Pegasus White Ice Runway.

1.3.3.11.1. Engine running refueling or cargo operations are NOT authorized without prior coordination with the Airfield Manager. Exhaust particulates damage the compacted snow surface.

1.3.3.11.2. Engine runs will be accomplished only in designated locations approved by USAP Airfield Manager.

1.3.3.11.3. Aircrews will take all practicable measures to minimize exhaust/soot damage to airfield surfaces to include minimizing taxi times, shutdown of symmetrical engines, taxiing with flaps up, etc. However, all required checklist items will be accomplished.

1.3.3.11.4. Deviations from airfield restrictions require prior approval from USAP Airfield Manager.

1.3.4. **Seasonal Sea Ice Runway (NZIR).** The Seasonal Sea Ice Runway complex is constructed annually on McMurdo Sound sea ice. The NSF Prime Contractor personnel build the Seasonal Sea Ice Runway between mid-August and early October.

1.3.4.1. The position and alignment of the runway(s) vary depending upon sea ice conditions. The runway's weight bearing capacity is determined each season from graphs published by the Air Force in ETL 06-7,[i], and takes into account ice thickness, ice temperature, aircraft type, and landing weight.

1.3.4.2. At a minimum, the NSF Prime Contractor will monitor the sea ice thickness and temperatures weekly IAW ETL 06-7.[ii] During rapid changes in sea ice temperature/thickness at the start of Period Two, as defined in the AFCESA ETL, measurements of sea ice will be taken and reported prior to go/no-go decision for every C17 mission takeoff from Christchurch, in order to establish maximum landing weight.

1.3.4.3. The runway(s) are serviced by a TACAN, a MLS, and RNAV (GPS) approaches. The runway(s) are serviced by a TACAN (ZIR), and a MLS to the primary runway/skiway.

1.3.4.4. A maximum of one-inch depth of loose snow is permissible on the runway and two inches on the ramp and taxiways.

1.3.4.5. A designated High Power Run-Up area is determined annually and shall be used by all ski-equipped aircraft for high power run-up operations. This area is normally located off the ramp in unpacked snow.

NOTE:

There is no designated high power run up area for wheeled aircraft. They must perform this operation on the runways. Skier Maintenance (deployed 139 AES maintenance personnel) shall coordinate all engine runs with Tower and Aircraft Rescue and Fire Fighting (ARFF) prior to engine runs.

1.3.5. **Williams Field Skiway(NZWD).** Williams Field is located on the Ross Ice Shelf approximately 7 NM from McMurdo. Williams Field is available for emergency diverts only and has limited grooming. The main skiway is 220' X 10,000' and oriented 25/07. The crosswind skiway is 220' X 10,000' and oriented 33/15. The Ross Ice Shelf moves Grid east at the approximate rate of one foot per day and may require Williams Field complex to be infrequently relocated/rebuilt.

1.3.5.1. The Williams Field skiway is limited to ski-equipped aircraft only.

1.3.5.2. Williams Field is serviced by a TACAN approach.

1.3.5.3. Williams Field Operations and Restrictions.

1.3.5.3.1. 180-degree turns on any portion of the skiways are authorized.

1.3.6. **McMurdo Heliport.** McMurdo heliports are located on the Grid northwest side of McMurdo Station and constructed on prepared gravel, populated with cement pads on the lower heliport.

1.3.6.1. There are two heliports, distinguished by levels, adjacent to one another. The lower level (elevation 60 feet MSL) has six helipads. The upper level (elevation 75 feet MSL) has two helipads. The McMurdo heliport is uncontrolled. All helicopters on the upper pads will avoid flying over helicopters on the lower pads.

1.3.6.2. Both NSF and Antarctica New Zealand (ANTNZ) contract aircraft provide support to field parties within 200 miles of McMurdo Station and Marble Point. USCG helicopters no longer operate from McMurdo Station Heliport or the USCG Icebreaker during season operations, until further notice.

1.3.7. **Marble Point Heliport.** Marble Point Heliport is approximately 45 NM Grid SSE from McMurdo Station and constructed on semi-prepared rock. It is uncontrolled and serves as a staging area and refueling station for helicopter support for numerous science parties in the Dry Valleys.

1.3.8. **South Pole Skiway (NZSP).** The South Pole skiway is located at the South Pole Station approximately 730 NM Grid North from McMurdo. The skiway is 12,000' x 220' and oriented Grid 02/20.

1.3.8.1. Clean Air Area – See Attachment 4.

1.3.8.2. Cargo drifting (Ski-combat offload) is authorized, but must be pre-coordinated with the South Pole Area Manager a minimum of 45 minutes in advance of landing, thus ensuring cargo personnel can support ramp clearing operations.

1.4. Ramp Operations.

1.4.1. Williams Field Ramp.

1.4.1.1. Williams field is an uncontrolled airfield, and no tower services are available.

1.4.1.2. Pilots will operate under their own cognizance and provide their own obstacle separation.

1.4.2. Seasonal Ice Runway and Ramp; Pegasus Field skiway/runway and ramp.

1.4.2.1. When the control tower is operational at the Seasonal Sea Ice Runway or Pegasus Airfield, ATC has sole authority to clear an aircraft onto the skiways or runways. taxiways at all airfields are non-movement areas.

1.4.2.2. Pilots will provide their own obstacle separation.

NOTE:
Skier Maintenance controls the ramp.

1.4.2.3. For operations on the Skier (LC-130) ramp, pilots will also notify "Skier Maintenance" (139 EAS Maintenance Control) on VHF 123.45 MHz prior to starting

engines and prior to initiating any movement on the ramp as an advisory call only.

1.4.2.4. Skier Maintenance will provide aircraft marshalling for LC-130s. NSF prime contractor (AGE) personnel will provide other aircraft marshalling services.

1.4.2.5. Skier Maintenance controls sequencing at the fuel pits. C-17 aircraft will be given priority, in order to reduce ground time.

1.4.2.6. Loading or unloading in refueling pits with a sled (once adequate spacing is assured) or single loader is authorized upon coordination with McMurdo Air Terminal Operations (ATO) through Skier Maintenance. Aircraft will contact "Skier Maintenance" (139 EAS Maintenance Control) is available on VHF 123.45 MHz.

NOTE:

The use of sleds (specialized cargo loading sleds) in the fuel pits are standard operations. The USAP Airfield Manager may discontinue this practice if fuel pit conditions become degraded.

1.4.2.7. LC-130 aircraft are approved to combat offload (drift cargo) on the backside of the ramp in front of the Cargo Yard. Prior coordination between the user and Skier maintenance is required.

NOTE:
The USAP Airfield Manager, if required due to snow conditions, can restrict combat offloads.

1.4.2.7.1. Aircraft Commander shall notify Skier Maintenance of intent to combat off-load cargo as soon as determined, but at least 30 minutes prior to arrival. Skier Maintenance shall in turn notify the USAP Airfield Manager, McMurdo ATO, and Williams Field Tower.

1.4.2.7.2. Skier Maintenance and the Aircraft Commander shall ensure the combat offload area is clear of personnel and equipment prior to commencing combat offload.

1.4.2.8. Skier Maintenance shall coordinate all engine runs with Tower and Aircraft Rescue and Fire Fighting (ARFF) prior to engine run. ARFF vehicles on standby shall not be parked closer than 500 feet from centerline of runway.

1.5. Adverse Weather Landing Sites/Diverts

1.5.1. When whiteout conditions occur, an aircraft may be unable to complete an instrument approach to the Seasonal Sea Ice Runway, Pegasus White Ice Runway, Pegasus skiway, or Williams Field skiway.

1.5.2. Currently there are no adverse weather landing sites available for wheeled aircraft in Antarctica. Aircrew must ensure sufficient reserve fuel is carried to allow diverting to an alternate airfield off continent.

1.5.3. **Mario Zucchelli Station (Terra Nova Bay - NZTB).** The Italian Antarctic Ente per le Nouve Tecnologie, l'Energia e l'Ambiente – (ENEA) builds Terra Nova Bay Ice Runway seasonally on "fast ice" in Terra Nova Bay. This seasonal sea ice runway is operational from late October through early December. However, it may not be operational every season or its operations may be terminated early due to adverse ice conditions. Its primary purpose is to support the Italian Antarctic Program airlift. Terra Nova Bay Seasonal Sea Ice Runway may only be used as an emergency divert airfield by USAP LC-130s or C-130s when the runway is operational and with 139EAS/CC approval.

1.5.3.1. Approximate location is 74° 41.0'S, 164° 06.7'E; 190 miles grid south (true north) of McMurdo Station.

1.5.3.2. Ice Runway Alignment and Dimensions: 026T/206T, 10,000 feet x 250 feet.

NOTE: Runways are oriented to True North.

1.5.3.3. Due to high terrain (3400 feet 2 NM southwest of the runway) the designated runway for landing is 21T and for takeoff 03T. There is an NDB servicing MZS – identifier NZTB, with an associated NDB/GPS approach.

NOTE:
Headings are TRUE headings and may change from season to season.

1.5.3.4. Terra Nova Bay Handout can be referenced for runway layout and communications plan. Copies are available at Christchurch Base Operations and McMurdo Base Operations once Terra Nova Bay Seasonal Sea Ice Runway is operational. The Terra Nova Bay facilities and runway layout can also be found in the Antarctic Flight Information Manual (AFIM).

1.5.3.5. Terra Nova Bay Operations maintains a listening watch on HF 5.371 kHz during scheduled Italian flight operations.

1.5.4. **Whiteout Landing Area.** A Whiteout Landing Area has been established on the Ross Ice Shelf, for ski-only landings, when landings are not possible on prepared surfaces due to weather or other factors.

1.5.4.1. The NSF Prime Contractor annually surveys and certifies the Whiteout Landing Area prior to the commencement of LC-130 operations to ensure the area is free of crevasses or obstructions.

1.5.4.2. The Whiteout Landing Area is inspected monthly between Nov – Feb by the NSF Prime Contractor to verify it remains obstruction free for Whiteout landings.

1.5.4.3. SOPP develops a Whiteout Area approach plate each season. The approach plate shall include navigational guidance from all McMurdo area fixed wing airfields to the whiteout area.

1.5.4.4. Only one aircraft will land in the white area at any given time. If more than one aircraft requires a whiteout landing, aircrew will use all available communications means to provide positive deconfliction in the whiteout area.

1.5.5. **New Zealand Emergency Airfields/ Diversion Procedures.**

1.5.5.1. Primary recovery base will be Christchurch IAP, NZ; the secondary recovery base is Auckland IAP, NZ, for C-17, and Wellington IAP for LC-130 aircraft. Other NZ airfields are available as divert locations. Reference DoD FLIP Pacific Enroute Supplement for information on potential divert locations.

1.5.5.2. Aircrews should contact Christchurch operations as soon as possible with ETA to diversion base.

NOTE:

Christchurch operations will notify diversion airfield base operations or airport control. Customs, agriculture, etc. will be requested as required.

1.5.5.3. Once on the ground at the alternate/diversion airfield, LC-130 Aircraft Commanders will contact 13 AEG Det 1 Representative by telephone. Collect calls are acceptable. C-17 Aircraft Commanders must notify CHC Base Operations and 304 EAS/CC or DO.

1.6. Airfield Construction, Markings and Lighting

1.6.1. USAP primary airfields and outlying camps that support fixed-wing aircraft operations are constructed and marked by the prime contractor in accordance with the specifications contained in AFI 13-217, *Drop Zone and Landing Zone Operations* Chapter 4, *LC-130 Skiway and Ski Landing Area Criteria*. Additionally, Pegasus and the Seasonal Sea Ice Runway have distance remaining markers (flag with a number embroidered on it) installed every 1,000 feet on the left side of the runway. United States Navy is the TERPS certification authority for Pegasus and the Seasonal Sea Ice Runway. The Chief of Naval Operations has approved a permanent waiver for airfield lighting and marking allowing Pegasus and the Seasonal Sea Ice Runway to be certified for IMC operations.

NOTE:

Skiway and ice runway markings are installed as early in the season as practical.

1.6.2. Lighting

1.6.2.1. Airfield lighting systems are established at the Seasonal Sea Ice Runway and Pegasus Field. The NSF Prime Contractor maintains airfield markings and lighting

systems in accordance with AFMAN 32-1076, *Design Standards for Visual Air Navigation Facilities.*

1.6.2.2. International orange windsocks are installed on the approach ends (left side) of all skiways and ice runways.

1.6.2.3. Short Simplified Approach Lighting with Runway Alignment Indicator Lights (SSALR) lighting systems may be installed on active primary runways of Pegasus Field (NZPG) and Seasonal Sea Ice Runway (NZIR) IAW Air Force Manuals.

1.6.2.3.1. Approach lighting intensity settings are consistent with AF requirements and follow FAAO 7110.65 regulations. ATC Tower personnel use those settings for setup and operations. For desired changes in intensity at Pegasus and Seasonal Sea Ice Runway, aircrews should notify ATC Tower personnel as soon as possible prior to expected landing.

Note:

AFLC's (Airfield Lighting Computer) is installed and remotely controls airfield lighting.

1.6.2.4. Runway End Identifier Lighting System (REILS) is a portable lighting system located in line with, and outboard of the threshold lighting of the primary instrument runway/skiway for the Seasonal Sea Ice Runway and Pegasus Field complex.

1.6.2.4.1. The REILS system consists of a pair of amber-shielded white lights with solar powered light panels.

NOTE:

Approach lights and REILS are capable of being operational simultaneously at Ice Runway and Pegasus Airfields. REILS are serviced and maintained by SOPP Ground Electronics Maintenance and the Approach lights are maintained by the NSF Prime Contractor. The REILS are remote controlled and may be activated by selecting the appropriate VHF frequency (published annually by SOPP) and keying the transmitter 5 times within a 10 second window.

1.6.2.4.2. Once activated, the REILS will remain in operation for approximately 15 minutes, deactivating automatically. The system may be deactivated manually by clicking the transmitter 7 times.

1.6.2.4.3. The REILS operate with a single intensity setting and are activated for an arriving aircraft 5 minutes prior to the aircraft's ETA when the ceiling and visibility is 3,000/5 or less, or upon pilot request.

1.6.2.5. Precision Approach Path Indicator (PAPI) is a two box, two-lamp system placed on the edge of the primary runway/skiway. The touchdown and 2.5-degree glide slope are

coincident with the MLS.

1.6.2.5.1. Currently three sets of PAPIs are located in McMurdo.

1.6.2.5.2. PAPI lights are installed at the approach end of the primary runway/skiway of each operating airfield.

1.6.2.5.3. There is no PAPI at the South Pole skiway.

1.7. Airfield Navigation Aids and Instrument Approaches

1.7.1. Air Navigational Approach Aids.

NOTE:

All navigational and approach aids are intended strictly for use by USAP approved aircraft only. The use of navigational aids by non-USAP aircraft is not authorized and if used are strictly at the pilot's own risk.

1.7.1.1. TACAN approaches may be available at the Seasonal Sea Ice Runway, Pegasus Field, and Williams Field. These approaches are developed and normally certified annually to minimums of 300 feet and 1 mile. Minimums may change due to seasonal proximity of runway(s)/skiways to terrain.

1.7.1.2. MLS approaches: the MLS is operational at the Ice Runway, and Pegasus Field. MLS approaches are developed and certified annually to minimums of 200 feet and ¾ mile.

1.7.1.4. RNAV (GPS) arrival and TACAN based departure procedures are available at Pegasus Field, Ice Runway, and South Pole Station. All approaches are developed and certified annually.

1.7.2. Instrument fly-ability checks, as stated in AFMAN 11-230 Attachment 9, *Instrument Procedures*, are flown by aircrews to ensure procedures are safe, practical, and consistent with good operating procedures.

1.7.3. SOPP ensures development, submission, review, approval, and use of instrument approach procedures in the Antarctic are consistent with DoD policies.

1.7.4. The DCJTF-SFA or designee, in accordance with the NSF-DoD MOA, authorizes interim IFR flight certification of instrument arrivals, approaches, and departures until FAA flight checks are completed in mid to late October and final instrument procedures are published.

1.7.5 Precision MLS instrument approaches are certified to minimums of 200 feet and ¾ mile. Non-precision TACAN and ARA (LC-130 only) approaches are normally certified to 300 feet and 1 mile. Minimums may change due to seasonal proximity of runways/ skiways to terrain.

1.7.6. IFR Airborne Radar Approaches (ARAs) are developed by 139 OSF/OSK (Tactics), reviewed by the 109 OG/OGV (Stan Eval), and approved by NAVFIG. These ARAs are approved for LC-130 aircrew use only. Minimums for approved IFR ARAs are as published. Upon ARA clearance, pilot assumes responsibility for terrain and obstacle clearance. ATC retains responsibility for separation of IFR aircraft.

1.8. Airfield Status Reports.

1.8.1. The USAP Airfield Manager:

1.8.1.1. Southbound flights: Provides to Charleston ROF and Mac Center, via email using the airfield status update form, the airfield information for the Seasonal Sea Ice Runway (NZIR), Williams Field (NZWD), Pegasus Field (NZPG) and South Pole (NZSP), no later than **6 hours prior** to a scheduled departure from Christchurch, for all southbound flights. Attachment 7 contains an example of the airfield status update.

1.8.1.2. On-Continent flights: Provides to Charleston ROF and Mac Center, via email using the airfield status update form, all Field Camp status reports and the airfield information for the Seasonal Sea Ice Runway (NZIR), Williams Field (NZWD), Pegasus Field (NZPG) and South Pole (NZSP) no later than **3 hours prior** to the first scheduled departure for all on-continent flights. All USAP aviation agencies will coordinate with the Fixed/Rotary Wing Coordinator to ensure accuracy of all field camp data.

1.8.2. MAC Center Air Traffic Control personnel:

1.8.2.1. Compile all McMurdo Airfield Status Reports, receive and review airfield status update forms from the airfield manager or his designated representative, review and update the status of SOPP equipment (TACAN, MLS, PAPI, REILS, HF Communication, and SATCOM), and disseminate to the appropriate email distribution list. To be added to the Airfield Status report distribution list, please email Macatc.chs@usap.gov. Notify USAP Airfield Manager of discrepancies in the Airfield Status Report.

1.8.2.2. Post all status reports in Flight Planning area no later than 3 hours prior to the first scheduled departure for all on-continent flights. This information will be e-mailed to the 139 EAS Supervisor of Flying (SOF) in Raven Operations. Mac Center will post a copy of the current Airfield status report in Flight Planning.

1.9. Runway Condition Reading (RCR).

1.9.1. RCR checks are conducted as required due to changing weather conditions, or as requested by aircrew for both the Seasonal Sea Ice Runway/Ramp and the Pegasus White Ice Runway/Ramp. The entire length of the runway is checked. If there are significant differences noted between sections of any runway, this difference is reported in the Runway Surface Condition (RSC) report and passed to the USAP Airfield Manager.

1.9.2. The USAP Airfield Manager or designated representative is responsible for forwarding the airfield information to Mac Center. Mac Center personnel distribute the RCR and applicable airfield information, via email, to McMurdo Weather, NSF Rep, 13 AEG/CC, 304 EAS Mission Commander and other agencies in Christchurch.

1.9.3. During the WINFLY period (mid to late Aug ea year) at Pegasus Field, the RCR and airfield status report for the airfield are accomplished by the NSF's Prime Contractor Fleet Operations personnel at the end of the duty day prior to a scheduled flight and called into Mac Center. If weather conditions change, which could affect the RCR or airfield status, the NSF Prime Contractor Fleet Operations will accomplish another RCR and airfield status report at the earliest opportunity.

1.10. Airspace System.

1.10.1. By Letter of Agreement (LOA) with Airways Corporation of New Zealand Limited (AWC) and Civil Aviation Authority (CAA) of New Zealand, Mac Center has been delegated the following airspace from Auckland Oceanic Control Center, which is within the Auckland Flight Information Region (FIR). This airspace is known as the McMurdo Sector. It is inclusive of the airspace south of a line joining 60° S/163°E, 60° S /174°W, 73°30'S /131W, and 90°S/ 00°E.

1.10.2. The McMurdo Sector is activated annually from October through February and will be depicted on DoD or other aviation charts and publications. The system includes airspace designated as Class A, D, E, and G.

1.10.3. **Class A:** Within the McMurdo Sector, applicable to all aircraft, includes the airspace beginning at Flight Level 245 up to and including Flight Level 600.

1.10.4. **Class D:** The area around the operating control tower at Pegasus Field and Ice Runway is designated Class D airspace. The area is a 4.3 NM (5 SM) radius from the center of the airport surface up to and including 2500 AGL. Two-way radio contact with the control tower is mandatory prior to entering Class D airspace.

1.10.5. **Class E:** Class E airspace is controlled airspace within 100 NM of the seasonal Sea Ice Runway, Williams Field, or Pegasus Field TACANs (excluding Class D airspace) extending from the surface up to, but not including, FL 245.

***NOTE*:**
Aircraft may operate under VFR within Class E airspace from the surface up to the floor of Class A airspace.

1.10.6. **Class G:** All other airspace is considered class G or uncontrolled. All USAP support aircraft operating in this airspace comply with ICAO Standard Airfield Reporting Procedures and command or company policies for air operations.

***NOTE*:**
For USAP participating aircraft, Class A airspace extends over the entire continent of Antarctica.

Additionally, Class D and E airspace is applicable to USAP participating aircraft. All other aircraft are encouraged to recognize established airspace categories to ensure flight safety.

1.11. Air Traffic Control.

1.11.1. SPAWARSYSCEN Atlantic's Office of Polar Programs (SOPP) is responsible for providing air traffic control and flight advisory services for all aircraft operating in the McMurdo sector of the Auckland FIR.

1.11.2. Services: McMurdo ATC provides En Route/Oceanic Air Traffic Control, flight following, Non Radar Approach Control, VFR Control Tower services and Search and Rescue coordination. These services are provided for aircraft operating south of 60° South latitude in the McMurdo Sector and USAP flights operating over the Antarctic Continent. Other Antarctic ATC agencies may assist Mac Center in providing these services.

1.11.2.1. Mac Center coordinates with Auckland Center for flights between Antarctica and New Zealand, and Melbourne Center for flights between Antarctica and Australia. The transfer of control and responsibility between Mac Center and Melbourne or Auckland Centers is 60° South latitude.

1.11.3. SOPP and the 109th AW develop approach plates, standard route and GPS RNAV STARS annually. ATC may descend IFR inbound aircraft via the published routing. Aircrews shall comply with published MEA's unless restricted by ATC.

1.11.4. ATC-provided services for McMurdo Station Area:

1.11.4.1. *Mac Center* provides en route/oceanic air traffic control, flight following, and search and rescue coordination services to all USAP participants operating over the Antarctic continent. In addition, Mac Center provides non-radar arrival and departure services in Class E airspace within 100 NM of the Seasonal Sea Ice Runway, Pegasus Field, and Williams field below FL245 when there is no operating control tower.

1.11.4.2. Remote Operating Facility *(ROF*): ROF is a functional mirror facility of Mac Center, physically located in Charleston SC, capable of remotely providing all Mac Center services. Specific products prepared or maintained by the ROF are listed below.

-Movement report notifications for all USAP aircraft to include arrival/departure/delay and turnaround aircraft
-Emergency activation/deactivation
-SAR callout/secure
-Aircraft movement report notifications
-Airfield status report dissemination

To be added to a distribution list for any of these products, please email atc.chs@usap.gov.

1.11.4.3. *Tower* is responsible for:

- providing air traffic control services to aircraft within Class D airspace.
- providing non-radar arrival and departure services in Class E airspace.
- providing traffic advisories and Air Traffic Control service for VFR and IFR aircraft within Class D and E airspace.
- providing air traffic control service to aircraft within Class D airspace.

1.11.4.4. Mac Center provides traffic advisory service for VFR and IFR aircraft outside Class D airspace.

1.11.4. Visual Separation.

1.11.4.1. Aircraft cleared to maintain visual separation must remain in VMC until other approved IFR separation can be applied.

1.11.4.2. Visual separation clearances will be applied in accordance with procedures set forth in FAAO 7110.65 rules and regulations.

1.11.4.3. Visual separation is authorized up to the base of class A airspace.

1.11.5. Emergency Procedures.

1.11.5.1. The emergency procedures section of the DoD FLIP Flight Information Handbook and or applicable ICAO documents apply to all USAP aircraft.

1.11.6. Aircraft Emergency/Mishap Alert Procedure.

1.11.6.1. ATC (Mac Center or Tower) alerts required personnel in the event of an aircraft emergency or mishap. The control tower alerts Station II (airfield fire station) and Mac Center via CH-2 with the following information:

- aircraft identification,
- aircraft position,
- nature of emergency,
- fuel on-board in pounds,
- number of persons onboard,
- pilot intentions, and
- any other pertinent information.

1.11.6.2. Station II ensures that an ambulance is dispatched to the appropriate location and positions all emergency vehicles.

1.11.6.3. Mac Center/Tower notifies Raven Operations or the aviation activity involved in an emergency. Mac Center notifies the Mac Center Manager/Air Traffic Manager

(ATM) of all incidents, mishaps, or emergencies on or near the airfields of McMurdo.

1.11.6.4. All concerned agencies are alerted via email by Charleston ROF. To be added to the Emergency distribution list please email Macatc.chs@usap.gov.

1.11.6.5. The ATM collects controller statements and ensures the tapes are safeguarded IAW FAAO 7210.3 *Facility Operation and Administration and* FAAO 8020.11 *Aircraft Accident and Notification, Investigation and Reporting.*

1.11.6.6. In the event of DoD involved assets, the 13 AEG/CC, in coordination with the NSF Representative, designates the appropriate military representative who has received aviation safety officer training to initiate the safety/mishap investigation procedures, to include the collection and preservation of evidence, IAW AFI 91-204, *Safety Investigation and Reports.*

1.12. Flight Following.

1.12.1. Flights north of 60° South latitude and operating between McMurdo Station and New Zealand are under the control of Auckland Center or Melbourne Flight Service Center.

1.12.2. Mac Center provides en route flight guard, air traffic control and advisory service for all USAP sponsored aircraft operating over the continent of Antarctica and South of line joining 60°S 163°E, 60°S 174°W, 73°30'S l31°W, and 90°S 00°E at all altitudes above the surface.

1.12.3. Mac Center also provides the above services to all known aircraft operating in the McMurdo Sector that includes the area noted above and within a sector defined by longitudes 163°E and 131°W to the geographic South Pole. Exceptions are:

1.12.3.1. Independent support missions at outlying stations.

1.12.3.2. Aircraft remaining under shipboard control and operating more than 15 miles from the Seasonal Sea Ice Runway/Williams Field TACAN below 500 feet altitude.

1.12.3.3. Aircraft under the control of the Seasonal Sea Ice Runway tower.

1.12.3.4. All non-USAP aircraft that are operating outside the boundaries of McMurdo Sector.

1.13. Flight Reports.

1.13.1. Pilots shall provide Auckland Center/Mac Center and Christchurch Base Operations with a departure report as soon as practical after establishing initial HF or VHF radio contact.

1.13.1.1. Departure reports shall include:

- departure station,
- actual time of departure (ATD),
- destination,

- estimated time of arrival (ETA),
- en route altitude,
- ETA at first reporting point,
- ETA at 60° South (if required),
- ETA at PSR (for Southbound intercontinental flights only), and
- any applicable remarks.

1.13.2. IFR fixed-wing aircraft shall make position reports at compulsory reporting points along the route of flight in standard ICAO format.

1.13.3. Pilots landing at locations not having flight guard capability will advise Mac Center of their point of intended landing, estimated landing time, and estimated time of departure.

1.13.4. Aircrew shall attempt contact with Mac Center after landing and prior to take off. Hourly "ops normal" radio calls will be made to Mac Center while on the ground unless other arrangements are coordinated between the Aircraft Commander and Mac Center.

1.13.5. VFR fixed-wing aircraft will report flight position at hourly intervals.

NOTE:
Aircraft separation services are not provided for VFR aircraft.

1.14. Aviation Meteorological Services.

1.14.1. SOPP Meteorology provides meteorological services to USAP participants and partners' aviation service providers from the McMurdo Weather Office at McMurdo Station and the SOPP Remote Operations Facility (ROF) in Charleston, South Carolina. Aviation meteorological forecasting services for Antarctic continental sites, other than McMurdo, are provided remotely by the SOPP Remote Operations Facility.

1.14.1.1. The McMurdo Weather Office provides aviation meteorological services for USAP aircraft missions originating at McMurdo and routinely issues METAR and SPECI observations and TAFs (Terminal Area Forecasts) for the McMurdo active airfields. The weather office performs over-the-counter flight weather briefings and can provide weather updates by Iridium telephone or UHF broadcast when patched through by Mac Operations.

1.14.1.2 The SOPP Remote Operations Facility routinely issues TAFs for selected USAP field camps and South Pole station. It also hosts the flight weather briefing for USAP aircrews of southbound missions originating at Christchurch, New Zealand via web-conference with Christchurch USAP Base Operations. The SOPP Remote Operations Facility can provide voice weather updates for continental and intercontinental missions via Iridium or other telephone systems.

1.14.1.3 A flight weather packet will be provided for all scheduled flights. The continental flight weather packet will contain a Flight Weather Briefing (DD Form 175-1) or VFR Briefing sheet and Flight Level Winds. The intercontinental flight weather

packet will contain, at a minimum, a Flight Weather Briefing (DD Form 175-1), Flight Level Wind Charts, and a Significant Weather (SIGWX) Prognosis (FL100-FL450).

1.14.2. The following section delineates the Met services SOPP provides to its customers and their expectations

1.14.2.1. Joint Task Force – Support Forces Antarctica

1.14.2.1.1. SOPP-provided Met Services

1.14.2.1.1.1 Provide weather support for Operation DEEP FREEZE airlift missions between Christchurch and Antarctica and within Antarctica

1.14.2.1.1.2. Provide weather impacts on scheduled airlift via daily briefings of SFA and staff.

1.14.2.1.1.3. Notification of significant degradation of weather observing or weather forecasting capabilities

1.14.2.1.2. SOPP expects that SFA will:

1.14.2.1.2.1. Provide SOPP with a current listing of SFA's meteorological service requirements

1.14.2.2. Commander, 304th Expeditionary Airlift Squadron

1.14.2.2.1. SOPP-provided Met Services

1.14.2.2.1.1. Provide Mission Commander weather briefing electronically five hours prior to ETD for Go/No-Go decision

1.14.2.2.1.2. Issue TAFs for the McMurdo active runway and provide pertinent observations

1.14.2.2. 2. SOPP expects that the 304th will:

1.14.2.2.2.1. Provide SOPP Remote Operations Facility and the Fixed Wing Coordinator with the SOE for each mission.

1.14.2.2.2.2. Notify the Aviation Service Providers of any changes to flight schedule

1.14.2.3. Aircraft Commander, 304th Expeditionary Airlift Squadron

1.14.2.3.1. SOPP-provided Met Services

1.14.2.3.1.1. Issue flight weather packet

1.14.2.3.1.2. Conduct flight weather briefing at Christchurch USAP Base Operations via a web-based conference

1.14.2.3.1.3. Issue TAFs for the McMurdo area active runway

1.14.2.3.1.4. Take, record, and disseminate aviation weather observations for the McMurdo area active runway

1.14.2.3.1.5. Take, record, and disseminate Aviation Selected Special Weather Report (SPECI) for the McMurdo active runway every half hour beginning two hours prior to Point-of-Safe Return until arrival at the McMurdo area active runway

1.14.2.3.1.6. Issue Point-of-Safe Return forecast and updated Christchurch (NZCH) TAF for southbound leg of mission

1.14.2.3.2. SOPP's expectations of the aircraft commander:

1.14.2.3.2.1. Provide PIREPS and AIREPS to Auckland Control and Mac Center when in their respective FIR/s.

1.14.2.4. Operations Officer, 139th Expeditionary Airlift Squadron (139EAS)

1.14.2.4.1. SOPP-provided Met Services:

1.14.2.4.1.1. Issue TAF/s for the McMurdo area active runway

1.14.2.4.1.2. Issue TAF/s for pertinent field camp landing sites

1.14.2.4.1.3. Take, record, and disseminate aviation weather observations for the McMurdo area active runway

1.14.2.4.1.4. Disseminate weather observations from field camp landing sites.

1.14.2.4.1.5. Provide significant changes to observed/forecast weather at LC-130 departure or arrival sites

1.14.2.4.2. SOPP's expectations of the 139th Operations Officer:

1.14.2.4.2.1. Inform McMurdo Weather Office of any changes to continental and intercontinental flight schedule.

1.14.2.4.2.2. Inform impacted aircraft of significant changes to forecasted weather at destination(s)

1.14.2.5. Aircraft Commander, 139th Expeditionary Airlift Squadron (139EAS)

1.14.2.5.1. SOPP-provided Met Services:

1.14.2.5.1.1. Issue flight weather packet

1.14.2.5.1.2. Provide timely flight weather briefings

1.14.2.5.1.3. Conduct flight weather briefing at Christchurch USAP Base Operations via a web-based conference

1.14.2.5.1.4. Issue TAF/s for the McMurdo area active runway

1.14.2.5.1.5. Issue TAF/s for pertinent field camp landing sites

1.14.2.5.1.6. Take, record, and disseminate aviation weather observations for the McMurdo area active runway

1.14.2.5.1.7. Disseminate Auto weather observations from equipped alternate landing sites where manned observations are not allotted (i.e. William's Field).

1.14.2.5.1.8. Take, record, and disseminate Aviation Selected Special Weather Report (SPECI) for the McMurdo active runway every half hour beginning two hours prior to Point-of-Safe Return until arrival at the McMurdo area active runway

1.14.2.5.1.9. Issue Point-of-Safe Return forecast and updated Christchurch (NZCH) TAF for southbound leg of mission

1.14.2.5.2. SOPP's expectations of the 139th Aircraft Cdr:

1.14.2.5.2.1. Provide PIREPS and AIREPS to Auckland Control and Mac Center when in their respective FIR/s

1.14.2.6. Aircraft Commander, 40th Squadron Royal New Zealand Air Force

1.14.2.6.1. SOPP-provided Met Services:

1.14.2.6.1.1. Issue flight weather packet

1.14.2.6.1.2. Conduct flight weather briefing at Christchurch USAP Base Operations via a web-based conference

1.14.2.6.1.3. Conduct flight weather briefing when departing McMurdo

1.14.2.6.1.4. Issue TAF/s for the McMurdo area active runway

1.14.2.6.1.5. Take, record, and disseminate aviation weather observations for the McMurdo area active runway

1.14.2.6.1.6. Take, record, and disseminate Aviation Selected Special Weather Report (SPECI) for the McMurdo active runway every half hour beginning two hours prior to Point-of-Safe Return until arrival at the McMurdo area active runway

1.14.2.6.1.7. Issue Point-of-Safe Return forecast and updated Christchurch (NZCH) TAF for southbound leg of mission

1.14.2.6.2. Expectations

1.14.2.6.2.1. 40th Squadron shall inform aviation service providers of changes to flight schedule and briefing times.

1.14.2.8. Aviation Specialist, US Department of the Interior/Office of Aviation services (OAS)

1.14.2.8.1. SOPP-provided Met Services

1.14.2.8.1.1. Provide weather support for National Science Foundation contract aircraft within Antarctica

1.14.2.8.1.2. Notification of significant degradation of weather observing or weather forecasting capabilities

1.14.2.8.2. Expectations

1.14.2.8.2.1. Provide SOPP with meteorological service requirements

1.14.2.9. Contract fixed-wing service provider

1.14.2.9.1. Aviation Meteorological Services

1.14.2.9.1.1. Issue TAF/s for the McMurdo area active runway

1.14.2.9.1.2. Issue VFR Briefing with modified VFR TAF for primary and backup landing site, as identified in the Fixed Wing Schedule, no later than 1700 UTC

1.14.2.9.1.3. Conduct timely flight weather briefings for aircraft departing from McMurdo

1.14.2.9.1.4. Discuss VFR Briefing, via Iridium telephone, with those aircraft pilots operating from field camps

1.14.2.9.1.5. Take, record, and disseminate aviation weather observations for the McMurdo area active runway

1.14.2.9.1.6. Disseminate weather observations from field camp landing sites

1.14.2.9.1.7. Monitor Automated Flight Following (AFF) along route and destinations. Inform, via Iridium telephone, of any significant changes to observed/forecast weather at McMurdo airfield or field camp where aircraft are destined

1.14.2.9.2. SOPP's expectations of the NSF's fixed-wing service provider:

1.14.2.9.2.1. Inform Aviation Service Providers of changes to flight schedule.

1.14.2.9.2.2. Provide PIREPS and feedback regarding observed weather en-route and/or arrival weather.

1.14.2.9.2.3. Contact SOPP Remote Operations Facility prior to or upon departure from any field camp for updates to en-route and destination weather.

1.14.2.10. NSF's contract Helicopter services provider:

1.14.2.10.1. Aviation Meteorological Services

1.14.2.10.1.1. Issue the Daily Helo Briefing

1.14.2.10.1.2. Conduct flight weather briefings twice-daily

1.14.2.10.1.3. Monitor weather in the helicopter operating areas and notify Helo Operations of impending hazardous weather

1.14.2.10.2. Expectations

1.14.2.10.2.1. Contact McMurdo Weather Office for updates to weather in the helicopter operating area.

1.14.2.10.2.2. Notify McMurdo Weather immediately of significant weather in the helicopter operating area.

1.14.2.11. USAP Airfield Manager

1.14.2.11.1. Aviation Meteorological Services

1.14.2.11.1.1. Notification of expected Severe Weather Conditions for the airfields.

1.14.2.11.2. Expectations

1.14.2.11.2.1. Provide McMurdo Weather Office with intentions or plans regarding closing/opening of airfields and associated roads.

1.14.2.12. Prime Contractor's Fixed Wing Coordinator (McMurdo station)

1.14.2.12.1. Aviation Meteorological Services

1.14.2.12.1.1. Provide VFR Briefing of the day no later than 1700 UTC

1.14.2.12.1.2. Provide updated VFR Briefing, allowing 30 minutes for each change in landing site, upon receipt of an updated Fixed Wing Schedule

1.14.2.12.1.3. Attend the twice weekly Air Operations Planning Board (AOPB) chaired by the Prime Contractor's Aviation Supervisor and provide weather impacts on scheduled airlift missions

1.14.2.12.1.4. Provide weather situational awareness briefings to the day and night shift assistant Fixed Wing Coordinators

1.14.2.12.2. Expectations

1.14.2.12.2.1. Include McMurdo Weather Office and SOPP Remote Operations Facility on distribution of all Fixed Wing Schedules

1.14.2.12.2.2. Fixed Wing Flight Schedule should contain all fixed-wing missions, including Unmanned Aerial Vehicles (UAV) flights, flights of our USAP Participating Partners, and flights of Non-Governmental Activities (NGA's) for which NSF has made prior agreements to provide aviation meteorological services support

1.14.2.13. Prime Contractor's Science Support

1.14.2.13.1. Aviation Meteorological Services

1.14.2.13.1.1. Provide aviation weather forecasts for helicopter detachment when embarked on USAP research vessels

1.14.2.13.1.2. Provide quality control for the outlying field camp weather observations prior to dissemination

1.14.2.13.1. 3. Provide Portable Polar Meteorological Kit (PPMK) operator training to outlying field camp observers

1.14.2.13.1.4. Issue PPMK/s, from GEM Building 159 at McMurdo Station, to outlying field Camp Managers for selected field camps

1.14.2.13.2. Expectations

1.14.2.13.2.1. Ensure McMurdo Fixed Wing Coordinator is informed of NSF agreements with non-USAP Participating Partners that require fixed-wing aviation meteorological services

1.14.2.13.2.2. Include the SOPP Meteorology Manager for representation at mission planning meetings for upcoming Antarctic research projects requiring aviation meteorological services support

1.14.2.13.2.3. Provide the SOPP Meteorology Manager all meteorological support requests contained in submitted Support Information Packages (SIP)

1.14.3. Properly trained NSF Prime Contractor personnel or grantees provide aviation METAR weather observations at the South Pole Station and outlying field camps. These observations are required and taken a minimum of three times a day at 0000Z, 0600Z, and 1800Z. Observation frequency increases to hourly, commencing six hours prior to aircraft departure for the camp, and continues through the duration of flight operations. SPECI observations are provided as required. Field camps designated for back-up missions increase frequency of observations to every three hours, commencing six hours prior to aircraft departure for primary camp, and continues through the duration of flight operations.

1.15. Antarctic Airfield Management.

1.15.1. General.

1.15.1.1. Airfield Management of the McMurdo Station area airfields provides safe, efficient, and effective aircraft operations for all USAP participants.

1.15.1.2. Airfield management responsibility for the McMurdo airfields and South Pole Station resides with the Prime Contractor's USAP Airfield Manager. 1.16.1.3. Airfield management responsibility for outlying camps resides with the NSF prime contractor through the camp manager/supervisor.

1.15.1.3. All exercises, traverses or training taking place on or near McMurdo or South Pole airfields and Whiteout Area are prior-coordinated with the NSF Representative, 13 AEG/CC, USAP Airfield Manager and SOPP Site Manager a minimum 7 working days in advance.

1.15.1.4. Failure to coordinate in advance could result in hazardous conditions requiring the USAP Airfield Manager to suspend airfield operations until the hazard(s) is (are) terminated. The coordination is to ensure events or exercises shall not impact the safe, continuous operations of airfields.

1.15.1.6. Personnel listed in 1.16.1.3 act as trusted agents and do not divulge exercise scenarios.

1.15.2. Airfield Preparation and Maintenance.

1.15.2.1. SKIWAYS**:** Williams Field and South Pole skiways and associated ramp and taxiway areas will be prepared and maintained by the NSF Prime Contractor to ensure a smooth and compact surface for use by ski-equipped aircraft.

1.15.2.1.1. Preparation and maintenance generally include grading, chaining, and rolling to obtain the desired surface conditions. The NSF Prime contractor should ensure that skiway surfaces are groomed in a timely manner following surface disturbance/damage by weather, to minimize impact on scheduled flight operations. This is especially important during the operating season to eliminate snowdrifts, windrows (caused by vehicle traffic), and ruts created by aircraft skis.

1.15.2.3. ICE RUNWAY**:** The Seasonal Sea Ice Runway, Pegasus White Ice Runway and associated taxiway areas are graded smooth and may have a firmly compacted snow pavement, and up to one-inch depth of loose snow; ramps are graded and may have surface covers similar to the runways.

1.15.3. Airfield Standards.

1.15.3.1. The airfield clear zone criteria outlined in ETL 02-16, "Design, Construction, Maintenance, and Evaluation of the Pegasus Glacial Ice Runway for Heavy Wheeled Aircraft Operations" and ETL 07-12, "Design, Construction, Maintenance, and Evaluation of the McMurdo Sound Sea Ice Runway for Heavy Wheeled Aircraft Operations", set the standards for the design, construction, maintenance, and operation of Pegasus and Seasonal Sea Ice runway. ETLs for Williams Field Skiways and South Pole Skiway are in the design/approval process.

1.15.3.2.To ensure flight safety, the USAP Airfield Manager, SOPP Manager and Airlift management personnel are advised on all construction activities on or near the airfields during periods of flight operations. Airfield waiver requests to the published clear zone criteria must be received a minimum of 90 days prior to the construction. Justification for non-compliance must be included in the request.

1.15.3.3. The Runway Lateral Clear Zones at the Seasonal Sea Ice Runway, Williams Field skiway and Pegasus White Ice Runway are established at 500 feet, measured from the centerline of the runway. No objects, including aircraft or structures, shall be sited within the Runway Lateral Clear Zones. Exception: Navigational aids and lighting.

1.15.3.4. The Seasonal Sea Ice Runway and skiway maintenance crews and inspection personnel utilize the following standards:

1.15.3.4.1. Airport markings will be in accordance with Air Force Manual 32-1076 and AFI 13-217 and free from snow accumulation and other obstructions. These markings apply to:

- approach lights,
- distance, threshold and low visibility markers,
- taxiway/ramp lights, and /or
- flags.

1.15.3.4.2. All runway lights and markers must be visible from an inspecting vehicle when located at the center point of runway.

1.15.4. Skiway and Seasonal Sea Ice Runway Standards:

1.15.4.1. Skiways and Seasonal Sea Ice Runways are 10,000 feet x 220 feet of smooth graded surfaces (ice runways are allowed to have up to one inch of loose snow cover.)

1.15.4.2. Normally, an additional 100 feet of prepared surface is added to the width of the last 300 feet of each runway (skiway) to provide for a turnaround area.

1.15.4.3. Runways will be groomed frequently - often daily. Skiways are graded and groomed often daily and always immediately after new snow accumulation.

1.15.4.4. Both Skiway and Seasonal Sea Ice Runway ramps and taxiways will be graded smooth. Additionally, Seasonal Sea Ice Runway ramps and taxiways can have up to two inches of loose snow cover.

1.15.5. Prime Contractor's USAP Airfield Manager Responsibilities

1.15.5.1. Maintenance of Seasonal Sea Ice Runways, Pegasus Ice Runway, Williams Field Skiway, and South Pole Skiway to ensure safe conditions for flight operations.

1.15.5.2. Maintenance of Access roads between McMurdo Station and the airfields to ensure safe conditions for flight operations.

1.15.5.3. Assurance that airfield checks and inspections are performed on a daily basis and after any event (heavy snowfall, numerous aircraft operations, high winds, etc.) that may affect the condition of the runway/skiway or ramp area.

1.15.5.4. Provisioning of a Runway Surface Condition (RSC) report detailing surface conditions and snow thickness. This report will be submitted to Charleston ROF prior to 0100 hours local when intercontinental flight operations are scheduled and no later than 0800 hours or 1 hour prior to the first scheduled aircraft departure or arrival. Any updates to the airfields other than the RSC will be emailed using the airfield status update form in attachment 7.

1.15.5.5. Report of any discrepancies to the tower, Charleston Remote Operations Facility (ROF), Mac Center, NSF Rep, and the 13 AEG/CC.

NOTE:

The USAP Airfield Manager has the authority to close/suspend and resume airfield, runway/skiway or taxiway operations. Time permitting; this will be done with the concurrence of the NSF Representative and 13AEG/CC.

1.15.6. South Pole Station/Outlying Camp Supervisor.

1.15.6.1. Station/Camp Supervisors of outlying camps shall designate a representative or personally make daily inspections (more frequently if conditions warrant) of skiways, taxiways and ramp facilities.

1.15.6.2. All Station/Camp Supervisors shall report daily, no later than 0600L, the current airfield status, to include Material Handling Equipment (MHE) and fuel availability, through Mac Operations who, in turn, phone or radio-patch the individual to the Fixed Wing Coordinator. Changes to airfield status are reported daily in the same manner.

1.15.6.3. Station/Camp Supervisors are required to communicate with the USAP Airfield Manager regarding questionable issues that may impact aviation operations. Station/Camp Supervisors shall ensure weather observations are taken with sufficient frequency to support fixed wing flight operations.

Chapter 2

STANDARD OPERATING PROCEDURES (SOP) AND INSTRUCTIONS

2.1. Christchurch Operations.

2.1.1. Each mission's success is the product of several agencies working together efficiently.

2.1.1.1. The National Science Foundation (NSF) is the airlift user and has engaged its Primary Contractor to manage intercontinental operations.

2.1.1.2. As the lead agency for the USAP, the National Science Foundation is ultimately responsible for the prioritization of passengers and cargo.

2.1.1.3. Command and Control (C2) of DoD airlift remains the responsibility of the 13 AEG/CC for Operation DEEP FREEZE.

2.1.1.4. In addition, there are many other agencies involved in the planning and execution of USAP missions. Early recognition of problem areas or conflicts allows sufficient intervention time to ensure successful mission accomplishment.

2.1.2. NSF Prime Contractor, Christchurch:

2.1.2.1. Provides air terminal support at Christchurch NZ in cooperation with AMC detachment.

2.1.3. Aircrew Transportation. Transportation to work from hotels for 139th EAS crews, if not within walking distance, may be attained by taking the aircrew van or requesting complimentary shuttle service by the hotel.

2.1.4. The Christchurch SFA/PERSCO/First Sergeant will be provided a van for his/her mission duties.

2.1.5. Meals. Pre-flight meals will be available either in the hotel restaurant or at the "60 South" restaurant located in the International Antarctic Center, or as coordinated otherwise for off hours.

2.1.5.1. For early flights, NSF Prime Contractor will coordinate the opening of one of the above facilities. The facility, which will be open, will be designated on the crew roster posted in the hotel. In-flight meals will be provided for all aircrew and passengers on intercontinental flights.

2.1.6. Passenger and Cargo Requirements.

2.1.6.1. Once operational requirements are determined, every attempt will be made to maximize allowable cargo loads (ACL) for each aircraft. This requires very close coordination among the aircrew and NSF Prime Contractor (Christchurch) / NZDF Terminal Operations.

2.1.7. Passenger Safety Briefings.

2.1.7.1. Passenger briefings will be accomplished on the aircraft or at the Antarctic Passenger Terminal (APT) by a qualified aircrew member for all flights.

2.1.7.2. C-17 passenger briefings will be accomplished on the aircraft.

2.1.8. Anti-Hijacking Passenger Processing and Awareness.

2.1.8.1. A passenger without a current passport and/or a valid DoD identification card will not be allowed on flights to Antarctica.

2.1.8.2. False statements about hijacking, bombing, or carrying concealed weapons are violations of Federal and International law.

2.1.8.3. Federal and International laws forbid, except for items authorized in governing regulations, the carriage of hazardous materials aboard aircraft in a passenger's checked or carry-on baggage/packages.

2.1.8.4. If a passenger has questions and is unable to ascertain if the item is unauthorized, the suspected item shall be called to the attention of APT security and physically inspected. In this case, the passenger will open the baggage/package and remove the suspected item for inspection by an authorized agent (Aviation Security personnel). If the item is unauthorized, the passenger must follow locally established rules for disposition of the item.

2.1.8.5. NSF Prime Contractor (Christchurch) has developed controls to screen and maintain passengers and hand-carried items in a sterile environment from the time they have been screened until they are loaded on-board the aircraft.

2.1.8.6. Baggage/Passenger Matching.

2.1.8.6.1. No aircraft shall depart a station until terminal personnel are certain there is a positive match between passengers on-board the aircraft and the baggage on-board the aircraft. If a passenger is manifested on a flight and does not show for the flight, the baggage belonging to the passenger will be removed from the aircraft.

2.1.8.6.2. Passenger baggage, except for hand carry, will be palletized.

2.1.8.7. Extreme Cold Weather Gear (ECW).

2.1.8.7.1. Extreme cold weather (ECW) gear is required for all personnel traveling to Antarctica.

2.1.8.7.2. Life Support personnel may arrange with NSF Prime Contractor personnel for issue of compatible ECW equipment from NSF supplies in Christchurch, if needed.

2.1.8.7.3. Passenger ECW gear (passenger ECW is in orange bags; aircraft emergency gear is in green bags) will be worn/available.

2.1.8.8 Anti-Hijacking Screening Procedures

2.1.8.8.1 The USAP has implemented drug/alcohol screening and combative passenger procedures as prescribed by applicable US Government policy.

2.1.9. New Zealand Arrivals.

2.1.9.1. There are two clearances given to the aircraft crew and passengers.

2.1.9.1.1. The Ministry of Agriculture and Forestry (MAF) first clears the aircraft into country and ensures its contents are free of contraband.

NOTE:
This clearance does not authorize personnel to leave the aircraft.

2.1.9.1.2. The second clearance will come from the New Zealand Customs agent, who will release the crew and passengers from the aircraft to process through NZ customs at the international arrival terminal.

2.1.9.1.3. The Customs Duty Officer may exempt the aircrew from processing through the international arrival terminal.

2.1.9.2. A maximum of 11 crewmembers for C-17, 22 crewmembers for C-5, and 12 (13 if a Flight Surgeon is part of the crew) crewmembers for LC/C-130 are allowed to be manifested on the General Declaration. The list may include mission essential personnel (MEP, formerly MEGP and ACM) as authorized.

2.1.9.2.1. When completing the General Declaration, the crew constituency includes the Aircraft Commander and the remaining crew, inclusive of MEPs. All other personnel must be manifested and processed as passengers.

2.1.9.3. All passengers and their baggage will be transported promptly to the international arrival area for processing by NZ Customs Service.

2.1.9.4. All passengers are required to complete a New Zealand Passenger arrival card and have in their possession a valid passport or military identification with valid orders, or other approved means of identification.

2.1.10. Smoking is prohibited in the secured area of the airfield and ramp. Smoking or drinking of alcohol is not permitted on any USAP related flight.

2.2. Christchurch Airport Ramp Operations.

2.2.1. The *Deep Freeze* ramp is part of the Christchurch International Airport and as such, a Christchurch International Airport Ltd. (CIAL) Airside Operations Agreement governs ramp operations. All USAP aircrews and support personnel are required to adhere to this agreement.

2.2.2. Military personnel operating vehicles on CIAL ramps must comply with licensing and/or training requirements outlined in Operation Deep Freeze reporting instructions and Operations Order, if any.

2.2.3. Personnel will don reflective vests when on the ramp and flight line. They will also wear hearing protection when on/near the ramp area**.**

2.2.4. Smoking on the flight line or ramp area is prohibited at all times.

2.2.5. In any emergency, notify the Airport Fire Service by the fastest means possible, either by apron phone or dialing 1-111 on any phone.

2.2.6. Security is a significant aspect of USAP operations. All individuals must be security conscious at all times and report any security incident or suspicious activities to the 13 AEG Det 1 Supervisor or First Sergeant and/or local police or airfield security.

2.2.6.1. CIAL Aviation Security provides airport and ramp security at all times. USAF Security personnel may be temporarily assigned to patrol the Deep Freeze ramp while USAF aircraft are deployed to support Operation DEEP FREEZE.

2.2.7. Engine runs will be conducted IAW the Airside Operations Agreement. A copy of this is available from the prime contractor Christchurch Terminal Operations Manager.

2.3. Flight Planning and Filing

2.3.1. Christchurch Base Operations will provide pilots an ATC briefing prior to flight to McMurdo Station. Twin Otter and Helicopter crews will be briefed as soon as possible after arrival at McMurdo Station.

2.3.2. USAP aircraft shall be on an approved flight plan appropriate for intended operation, filed through Base Operations.

2.3.3. The local flying area for fixed-wing aircraft includes the entire continent of Antarctica.

2.3.4. Intercontinental flights between New Zealand and Antarctica will require USAP aircrew to file a DD Form 1801 (International Flight Plan) in Christchurch Base Operations to Christchurch Clearance Delivery. Flights utilizing the Macquarrie route will require a FIR estimate for Melbourne and Auckland boundaries.

2.3.5. Flights within the Antarctic continent will file a DD Form 1801, International Flight Plan with McMurdo Center unless on STANDARDIZED ROUTING.

NOTE:
PSR time will be included on all DD Form 1801's.

2.3.6. IFR flights will be cleared via filed flight plan routing, stereo route prescribed Departure Procedure (DP), and/or Standard Terminal Arrival Routing (STAR) to their destination.

2.3.7. Pilots flying VFR will notify Mac Center of their departure and individual flight legs for flight following. The VFR flight information must include:

- aircraft identification,
- type aircraft,
- departure point,
- destination,
- time en route,
- endurance and
- souls on-board.

2.3.8. NOTAMS will be posted daily in Christchurch Base Operations and Mac Center by ATC. NOTAMS will include information such as runway and NAVAID status, version numbers with effective dates (DD Month YYYY to DD Month YYYY) of current approved approach plates, and other pertinent information.

2.3.9. In addition to NOTAMS, the USAP Airfield Manager will provide daily airfield status reports for McMurdo airfields.

2.3.10. Crew list (including MEPs) and passenger manifests may be filed separately with Raven Operations. The NSF Prime Contractor will maintain a file copy of all passenger manifests until the cessation of season flying operations.

2.3.11. Once ACL is determined, the Mission Commander / Aircraft Commander / DO will ensure final coordination of ACL and fuel load with Terminal Operations.

2.3.11.1. Both the C-17 and LC-130 units order their own fuel.

2.4. Operating Minimums.

2.4.1. ASP's will operate IAW their established flying regulations (OPSPECS) and contract language.

2.4.2. Consideration will be given to weather trends, i.e., surface/horizon definitions, and winds. If, at any time prior to reaching PSR, the weather trend creates doubt as to the suitability of McMurdo airfield arrival conditions, then the Aircraft Commander will consider reversing course.

2.4.3. Each operator should also consider other operational issues such as: NAVAIDs, communications, airfield conditions as well as potential divert locations.

2.5. Antarctic Operating Environment

2.5.1. **Polar Grid System.**

2.5.1.1. The Polar Grid System (grid) will be used and/or referenced for all DoD fixed-wing navigation true south of 60 degrees south latitude. Directional information given to or received from DoD pilots and references to directions published in this manual will be based on grid direction unless otherwise stated.

NOTE:
USAP Otter, Basler, and Helicopter pilots use TRUE headings for all references to direction unless otherwise stated.

2.5.2. **Antarctic Pressure Altitude.**

2.5.2.1. Due to nonstandard pressure altitude and extremely cold temperatures, aircraft will make appropriate altitude corrections per the FAA Airmen's Information Manual and the DoD Flight Information Handbook or applicable ICAO regulations.

2.5.3. **Altitude Reference.**

2.5.3.1. The lowest usable flight level over the Antarctica continent will be FL 200 (the floor of controlled airspace is FL 245). Transition altitude is 18,000' MSL and the transition level is FL 200. Refer to AIM 7-2-1 (USAF aircrew also refer to AFI 11-202v3) for more information and cold weather altitude correction tables.

NOTE:
When using an altimeter setting of 29.92 in areas of low pressure, actual altitude may be lower than indicated altitude. The lack of reported altimeter settings combined with extremely low pressures over the Antarctic continent might require an adjustment to the minimum usable altitudes in the FLIP Enroute supplement.

2.5.3.2. To ensure altitude separation between aircraft flying at 18,000 feet on a local altimeter setting and those aircraft flying at FL 200, the following procedure is evoked:

2.5.3.2.1. When climbing, pilots will set altimeters to QNE (29.92) upon reaching 18,000 feet MSL. When descending, pilots will set reported or forecast QNH passing through FL 200. When operating in uncontrolled airspace outside 100nm from a reported or forecast altimeter-setting aircraft, crew will set QNE (29.92).

2.5.4. **Surface/Horizon Definitions and White-Out Conditions.**

2.5.4.1. Surface definition is the ease with which features on a snow–covered surface can be distinguished, either from the air or by a surface observer. Horizon definition is the ease with which the boundary between the ground and the sky can be determined. It is a parameter most appropriate over ice or areas where there are no mountains or nunataks visible, which provide visual references on the horizon. Surface and horizon definitions

are reported as good, fair, poor, or nil, although there are no internationally agreed-upon definitions for either of these categories.

2.5.4.2. A whiteout condition is an optical phenomenon that occurs in uniformly overcast sky conditions over a snow–covered surface. It is associated with diffuse (uniform), shadow less illumination that causes a complete lack of surface and horizon definitions.

2.5.4.2.1. A person's ability to perceive snow covered orographic features depends on the shadows that they cast. Such features become indistinguishable under whiteout conditions. Without any visual stimulation, it is common to incorrectly evaluate an incline. Judgments of the distance and orientation of objects in the field of view are severely handicapped. Such spatial disorientation is exacerbated while airborne. Whiteout conditions can occur while visibility (i.e. transparency of the air) remains good.

2.5.4.2.2. While total whiteout results from nil surface and horizon definitions, there are degrees of this effect. For example, partially degraded horizon and surface definitions can occur under a broken cloud layer, snow, or blowing snow. Figure 1.1 describes the terminology of surface and horizon definitions used by SOPP.

Figure 2.1 Surface/ Horizon Definitions and Terminology

Qualitative Term	Surface definition	Horizon definition
Good	Snow surface features such as sastrugi, drifts, and gullies are easily identified by shadow. The sun is usually unobscured. Surface features are clearly defined for as far as the eye can see.	The horizon is sharply defined by shadow or contrast. The horizon is distinct with an obvious difference between land (snow) and sky.
Fair	Snow features can be identified by contrast. No definite shadows exist. The sun is usually totally obscured. Surface features become indistinct at distances of more than a few kilometers.	The horizon may be identified, although the contrast between sky and snow is not sharply defined.

Poor	Snow surface features (e.g. skidoo tracks) cannot readily be identified except from close-up (within 50 meters). The sun is usually totally obscured.	The horizon is barely discernable: in other words, the sky can be discriminated from land but no distinct horizon is visible.
Nil	Snow features cannot be identified. No shadows or contrast exist. Dark colored objects appear to float in the sky. The sun is totally obscured, although the overcast sky may exhibit considerable glare. The glare appears equally bright from surface reflection and from all directions.	Total loss of horizon: the snow surface merges with the whiteness of the sky.

2.6. ACL Coordination

2.6.1. LC-130 Mission Commander / Aircraft Commander / DO will pass the required fuel load and ACL to NSF Prime Contractor Flight Operations not later than 2 ½ hours prior to scheduled takeoff. C-17 crews will pass information as coordinated.

2.6.2. Approximately 2 hours prior to takeoff, the Air Cargo Yard supervisor should have the initial load plan completed. An aircrew loadmaster will go to the Air Cargo Yard to verify the cargo and load plan paperwork.

2.6.3. ACL may be adjusted at the Aircraft Commander's discretion. This decision should consider safety, mission objectives, and aircraft limitations. New ACLs must be passed onto NSF Prime Contractor Movement Control Center (MCC) as soon as practical.

2.7. Arrival and Departure Procedures.

2.7.1. Enroute Procedures.

2.7.1.1. The Aircraft Commander (AC) will maintain a listening watch on an appropriate ATC frequency at all times.

2.7.1.2. As the aircraft approaches PSR, the Aircraft Commander will advise Mac Center and/or Auckland Center of their decision to proceed or turn around.

2.7.1.3. The Aircraft Commander will obtain ATC approval prior to executing a turn-around to ensure separation from other known IFR aircraft.

2.7.2. McMurdo Station Arrival Procedures.

2.7.2.1. IFR. McMurdo ATC retains responsibility for all IFR aircraft. Aircraft will be

instructed to contact Tower prior to entering Class E airspace. Mac

2.7.2.2. VFR. Aircraft are normally instructed to contact tower no closer than 10 miles from the airport for landing instructions.

2.7.2.3. Aircraft operating in Class D airspace will be in radio contact with the tower and should remain at 1,000 feet AGL or higher (500 feet for helicopters) until commencing final descent.

2.7.3. McMurdo Station Departure Procedures.

2.7.3.1. IFR aircraft will call for IFR clearance. Tower will relay IFR clearances and issue departure instructions to aircraft departing on an IFR flight plan.

2.7.3.2. VFR aircraft will be given appropriate VFR departure information.

NOTE:
Heavy aircraft, such as the C-5 and C-17 should start their takeoff roll at the 9000 feet runway remaining marker to protect low visibility markers at the approach end from blast damage.

2.8. Uncontrolled Airfield Operations.

2.8.1. For operations at uncontrolled McMurdo area airfields, fixed/rotary wing aircraft pilots will follow uncontrolled field procedures.

2.8.1.1. Coordination must be established at least one hour in advance with the USAP Airfield Manager for approval to use airfields.

2.8.1.2. Flight plans will be filed with Mac Center and advisory service provided.

2.8.1.3. Fifteen (15) minutes prior to departure from an uncontrolled airfield, the pilot will notify Mac Center/Tower of planned activity via landline or radio.

2.8.1.4. Mac Center/Tower will notify Aircraft Rescue and Fire Fighting (ARFF) on FM Channel 2 of intended uncontrolled airfield operations.

2.8.1.5. Pilots will announce their intentions on the Common Traffic Advisory Frequency (CTAF) VHF 129.7 MHz.

2.9. Common Traffic Advisory Frequency (CTAF <u>129.7</u>).

2.9.1. Traffic information broadcasts by aircraft are to be used within the traffic information coverage (VHF radio range) of South Pole Station and outlying camps. They are intended to be advisory reports transmitted on a Common Traffic Advisory Frequency (CTAF) providing information to other aircraft in the vicinity. When procedures are not otherwise specified, attempt to comply with US Federal Aviation Regulations / Airman's Information Manual (FAR/AIM) guidance.

NOTE:
CTAF procedures and uncontrolled airfield operations are not authorized at airfields with an operational control tower.

2.9.1.1. The CTAF may be a UNICOM or MULTICOM frequency identified in appropriate aeronautical publications.

2.9.1.2. CTAF frequencies are designated in the USAP Communications Plan.

2.9.1.3. The form of the broadcast should start and end with the airfield name, such as: (*Airfield*) Traffic this is (*call sign*) appropriate movement advisory information (i.e. starting engines, taxiing, departing, arriving, climbing or descending to altitude), (*Airfield*) Traffic.

2.9.1.4. Broadcasts are not normally acknowledged except when another aircraft or ground station is aware of the potential for close proximity or conflict with another aircraft or the need for mutual support, communications relay, or contingency back-up exists.

2.9.1.5. CTAF procedures will be used at all outlying camps/stations. Pilots will use the CTAF frequency to broadcast pertinent UNICOM information.

2.9.1.6. Mac Center will instruct arriving aircraft to change to advisory frequency upon entering Class G or when advised by ATC in Class E airspace.

2.9.1.7. All inbound traffic should monitor and communicate as appropriate on the designated CTAF from 10 miles out to landing.

2.9.1.8. Aircraft should maintain a listening watch on the primary HF frequency for further advisories from Mac Center or relay of ATC information.

2.9.1.9. Departing aircraft will monitor CTAF frequency while on the snow and will relay UNICOM information as required.

2.9.1.10. Departure aircraft should monitor and communicate on the appropriate frequency from engine start-up, during taxi, and until 10 miles from the station or camp.

2.10. Over-flight Restrictions.

2.10.1. Direct over-flight of McMurdo Station/Scott Base shall be avoided.

2.10.1.1. If necessary, fixed-wing aircraft over-flying McMurdo Station or Scott Base will maintain an altitude at or above 1500 feet AGL.

2.10.1.2. Over-flight within one nautical mile of the McMurdo Heliport is restricted to an altitude at or above 1500 feet AGL.

2.10.2. ASPAs: Antarctic Special Protected Areas (ASPAs) were created to protect areas of special environmental, scientific, historic, aesthetic, and wilderness value. Certain flight restrictions are associated with these areas. All airlift service providers should be familiar with the Antarctic Conservation Act of 1978, as amended by the Antarctic Science, Tourism, and Conservation Act of 1996.

2.10.3. As a general rule, aircraft will avoid disturbing concentrations of birds and animals. Flights shall not approach within 500 feet lateral and no lower than 3,000 feet AGL of these concentrations.

2.10.4. Information regarding flight restrictions of ASPAs is available from the National Science Foundation Representative at McMurdo Station, or in Public Law 95-541, *The Antarctic Conservation Act of 1978*. The ASPA Manual, depicting and describing all the ASPAs in/around the McMurdo station/Dry Valleys area, can be found at the USAP.gov website.

2.10.5. Information on these areas may be included in the local flying area brief provided by Mac Center, if applicable.

2.10.6. Resolution 2 of the XXVII Antarctic Treaty Consultative Meeting recommends that the "Guidelines for the Operation of Aircraft near Concentrations of Birds in Antarctica" be used by those engaged in the operation of aircraft in Antarctica. (See attachment 3)

2.11. Weather Balloon Launches.

2.11.1. McMurdo Weather regularly launches weather balloons between 2100Z and 0000Z and between 0900Z and 1200Z from a point ¼ mile grid south of McMurdo Heliport.

2.11.2. Mac Center and the tower will broadcast additional pertinent balloon launch information when required.

2.11.3. Notification of upper atmosphere balloon launches, including NASA's Long Duration Balloons (LDB) and Crary Lab, will be by NOTAM.

2.11.3.1. LDB launches have priority over aircraft operations. The LDB Camp Supervisor shall coordinate 48 hours in advance with the USAP Airfield Manager of intent to launch LDB.

2.11.3.2. LDB and Crary Lab balloon launches will be coordinated through the ROF in Charleston. Coordination process is as follows: Camp Supervisor shall notify USAP Airfield Manager, SOPP Site Manager, Mac Center, ROF Charleston, and 13 AEG/CC, providing all known details, to include launch date and time.

2.11.3.3. ROF Charleston shall initiate and disseminate NOTAMs, which are posted in Mac Center Flight Planning and CHC Base Operations.

2.12. Degraded HF Communication Procedures.

2.12.1. In the event of loss of communications, a listening watch will be maintained on the primary HF frequency 9.032 kHz. MAC Center will also maintain a watch on HF 11.256 kHz.

2.12.2. On a secondary radio, proceed with HF radio checks on the secondary frequency 5.726 kHz and tertiary HF frequencies of 13.251 kHz, 11.256 kHz, or 6.708 kHz.

2.12.3. Iridium phones, SATCOM, and text messaging will be used as a back up to HF communications.

2.12.4. See the USAP Communications Plan for current seasonal frequency assignments. Aircraft operators should refer to current seasonal manuals for specific lost communications procedures.

2.13. Ground Support and Servicing.

2.13.1. Fueling: Aviation fuel is provided for USAP aircraft through the NSF Prime Contractor. AN-8 fuel (JP-8 with anti-gelling additive) is normally the only aviation fuel available at Williams Field, Seasonal Sea Ice Runway, Pegasus Field and South Pole Station.

2.13.1.1. NSF Prime Contractor Fuels personnel are required to be present during all refueling operations.

2.13.2. The NSF Prime Contractor provides Aerospace Ground Equipment (AGE) for all DoD aircraft operating at the McMurdo airfields.

2.13.2.1. Transient aircrews should request AGE support services through Mac Center one hour prior to their arrival.

2.13.2.2. During LC-130 operations at the Seasonal Sea Ice Runway, Skier Maintenance will provide radio and telephone coordination of AGE assets. Transient aircrews should contact Skier Maintenance on VHF frequency 123.45 MHz or UHF frequency 251.25 MHz prior to arrival.

NOTE:
Aircraft heaters shall not be used on LC-130 or C-17 aircraft when winds exceed 25 knots.

WARNING:
When heaters are operational and connected to aircraft, they shall be closely monitored at all times either by the user or AGE personnel. Heaters shall not be left unattended when operational.

2.13. 3. USAP contract aviation service providers (ASPs) will provide their own ground support, maintenance and spare parts. 139 EAS Maintenance personnel, within their capability, may provide transient alert support for aircraft other than LC-130.

2.14. Operational Risk Management (ORM).

2.14.1. The goal of ORM is to identify and eliminate unnecessary risks. ASP's are expected to utilize ORM practices in the conduct of flight operations, within the bounds of their applicable operation specifications or contracts. For 139 EAS aircrew, ORM worksheets are available in the MCM flight planning area and should be turned in to the 139 EAS Supervisor of Flying (SOF) prior to flight.

2.15. Aviation Ground Safety.

2.15.1. Support personnel must be aware of the hazards involved in working and moving around aircraft, including propeller and jet engine danger zones.

2.15.2. Support personnel are instructed not to approach an aircraft until directed to do so by the aircrew.

2.15.3. Vehicles not directly involved in loading, maintenance or servicing of aircraft will avoid approaching the aircraft and will remain outside the "circle of safety."

2.15.3.1. A "circle of safety" is defined as a circular area with a 25-foot radius, from wingtip to wingtip, around parked aircraft. If an engine is running or propellers are turning, this area is increased to 50 feet, from wingtip to wingtip, towards the rear of the parked aircraft.

2.15.4. The McMurdo USAP Airfield Manager or outlying camp Station Supervisor is responsible for training and certifying their ground support personnel for flight line operations.

2.16. Explosive and Hazardous Cargo Areas Procedures.

2.16.1. All hazardous cargo will be handled and transported IAW AFJAM 24-204.

2.16.2. The USAP Airfield Manager and the Terminal Manager will designate the Hazardous Cargo storage area seasonally.

2.16.3. The USAP Airfield Manager, in coordination with the Explosives Manager and flight operations personnel, will designate the Explosive Cargo storage area seasonally.

2.16.4. Areas will be designated at the airfields for loading/unloading explosive material and for loading/unloading hazardous cargo.

2.16.5. All hazardous and explosive cargo will be unloaded or loaded with the aircraft engines shutdown in the designated location. Exception: C-17 aircraft may conduct engine running on/offloads (ERO) with prior coordination.

2.16.6. USAP passengers are considered 'Duty Passengers', so applicable regulatory guidance will be in effect when transporting hazardous cargo on USAP aircraft with passengers.

2.16.7. Upon notification of hazardous cargo movement, the NSF's Prime Contractor Fixed Wing Coordinator will notify the following positions/stations no later than 24 hours prior to scheduled

movement:

2.16.7.1. NSF Representative

2.16.7.2. 13th AEG Commander

2.16.7.3. USAP Airfield Manager

2.16.7.4. McMurdo Station Explosives Manager

2.16.7.5. McMurdo Station ARFF

2.16.7.6. McMurdo Station ATC

2.16.7.7. McMurdo Station Medical

Chapter 3

ROTARY WING OPERATIONS

NOTE: rotary wing ops are conducted by NSF's Helo contractor and are bound operationally by their Ops Spec and the NSF contract.

3.1 Local Flying Area.

3.1.1 The local flying area for rotary aircraft is a 60 NM radius of McMurdo Station and Marble point with provisions up to 130 NM with a single helicopter (based on max of 1 hr transit time to execute SAR with another Helo).

3.1.2 Helicopters use TRUE headings for information given to or received from pilots, and all references to direction for helicopters are in TRUE unless otherwise stated.

3.1.3 Contractually, Helos operate under VMC only, although contractor crews are IFR qualified.

3.1.4 The Helo contractor is not authorized to fly over open water.

3.2 Local Operating Procedures.

3.2.1 All departures and arrivals will be at pilot discretion with due consideration of safety.

3.2.2 When Winter Quarters Bay and the sea around Observation Hill are covered by fast ice, normal procedures will apply (see Figure 3.2. *Helicopter Arrival and Departure Routing*). This will consist of departing and arriving over the sea ice west of the Heliport area.

3.2.3 Arrival.

3.2.3.1 Helos will make appropriate outbound/inbound radio calls.

3.2.3.2 Recommended altitude is 500 feet or below within 10 NM of McMurdo Station until entering Class D airspace. Be aware other helicopters may be operating around McMurdo Station at varying altitudes.

3.2.3.3 Make approaches to Heliport from over the sea ice to assigned landing spot whenever possible.

3.2.3.4 Avoid over-flying other aircraft, buildings, or people. The prevailing wind at the Heliport is from the true southeast, so over-ice departures are often downwind.

3.2.3.5 With a strong westerly wind, an approach paralleling the shoreline from the ice wharf or around Observation Hill is recommended.

3.2.3.6 A direct approach through the "gap" (known as the area between Observation Hill

and Crater Hill) and down the steep slope is strongly discouraged.

3.2.3.7 When fifteen (15) minutes out from McMurdo, advise Helo Hanger on Helo Ops frequency that you are inbound and if you will need fuel, transportation, or special assistance. Advise Operations if carrying a sling load.

3.2.3.8 If unable to use Helo Ops, ask Mac Center to relay this information to the Helicopter Hangar.

3.2.3.9 At 10 NM out, contact Mac Center on 118.5 MHz, report intentions and ascertain if Ice Tower is open.

3.2.3.10 If Ice Tower is open, remain within ½ mile of the Ross Island land mass or contact Ice Tower on 126.2 MHz for clearance into Class D airspace.

3.2.3.11 If Pegasus Tower is open, request clearance into Class D airspace if arriving from anywhere east of a line extending from McMurdo Station to Scallop Hill on Black Island (see map 1).

NOTE:

Runway numbering is relative to Grid North, Grid North = True + 167 degrees.

3.2.4 Departure.

3.2.4.1 Prior to lift-off, contact Mac Center on 118.5 MHz and pass flight plan and intended departure route.

3.2.4.2 Mac Center will provide information on conflicting traffic and the operational control tower.

3.2.4.3 If possible, broadcast intentions on Helo Ops frequency prior to liftoff.

3.2.4.4 If Ice Tower is open, contact them prior to lift-off on 126.2 MHz if departure path is further than ½ mile from the Ross Island landmass.

3.2.4.5 Contact Pegasus Tower on 126.2 MHz as soon as possible if departure is through the “gap” or east of a line extending from McMurdo Station to Scallop Hill on Black Island (see **Figure 3.1.** McMurdo Helicopter Operations Area Map).

3.2.4.6 Monitor 126.2 MHz until clear of Class D airspace, report clear to Ice/Pegasus Tower and change to 118.5 MHz beyond 10 NM radius of McMurdo Station.

3.3 Heliport Traffic Patterns.

3.3.1 Standard Pattern.

3.3.1.1 The prevailing wind at McMurdo Station is from true southeast. This wind passing through the “gap” is normally stronger and has more gusts than other locations in

the area.

3.3.1.2 Due to the winds in the "gap," helicopters should approach the heliport from the true northeast, over McMurdo Sound, for a straight-in approach. Departures should also be made to the true northeast and may require an immediate turn downwind. Pilots should avoid over-flying power lines, buildings, and transmission towers.

3.3.1.3 During an approach under average conditions with winds of 10 to 20 knots, updrafts can be expected approximately ¼ mile on final approach followed by a down draft at approximately 1/8-mile. Pilots should be aware of these conditions.

3.3.2 Ice-Out Pattern Procedures.

3.3.2.1 If there is open water in Winter Quarters Bay and/or the sea area around Observation Hill, all helicopters should use a shoreline approach and departure or the "gap" procedures (see **Figure 3.3.** Gap Procedures). Note: USAP helos are not float equipped.

3.3.2.2 When water precludes approaches and departures true northeast of Observation Hill, the following procedures are recommended:

3.3.2.3 Departure.

3.3.2.3.1 After making the appropriate radio calls, takeoff and departure should be accomplished by flying directly up slope toward the "gap" to the right of the pipes and power lines.

3.3.2.3.2 Avoid over-flying the fuel tanks located in the "gap" and avoid the antenna farm on top of the ridge on the east side of the "gap".

3.3.2.3.3 Be prepared for turbulence and wind shear when flying this route.

3.3.2.3.4 Avoid over-flying aircraft, buildings, or people.

3.3.2.3.5 Contact Mac Center prior to departure while stating intention to make a "gap" departure. Aircraft would proceed along the grid eastside of the main station, then through the pass, climbing to a minimum altitude of 500 feet MSL and remaining to the right side of the pass. Contact Ice Tower/Williams Tower when advised by Mac Center.

3.3.2.4 Arrival.

3.3.2.4.1 After making the appropriate radio calls and advising Mac Center that you will be making a "gap" arrival, proceed to the "gap".

3.3.2.4.2 Entry (see **Figure 3.3.** Gap Procedures) will be along the east or right side of the "gap". The arrival path will be a slow left circle around the outside of

McMurdo Station proper over-flying the roads, across the inland end of Winter Quarters Bay and then along the shoreline to the Heliport.

3.3.2.4.3 Avoid over-flying buildings, fuel tanks, people, or aircraft.

3.3.2.5 Approach Routing.

3.3.2.5.1 Contact tower on frequency VHF 126.2 MHz or UHF 340.2 MHz prior to entry into Class D airspace, stating intention for a "gap" approach. Approach McMurdo Station from the grid southwest through the pass between Observation Hill and Crater Hill, at a minimum altitude of 500 feet MSL, remaining to the right side of the pass.

3.3.2.5.2 The aircraft should continue grid northeast across the station area and make a descending left turn to the heliport, remaining over the outskirts of the main station as much as possible. Pilots should anticipate turbulence in the pass and throughout the approach.

3.4 Helicopter Use of McMurdo Airfields.

3.4.1 McMurdo airfields operate as prior-permission-required (PPR) through the USAP Airfield Manager to ensure safe operations on the airfields.

3.4.2 The primary initial landing areas are on the runways, taxiways or designated helipads under the control of ATC Tower personnel.

3.4.3 The prime contractor's Helicopter Coordinator shall, if practical, coordinate at least 24 hours in advance with Control Tower and Skier Maintenance to ensure safe movement on the taxiways or ramps.

3.4.4 When requested to operate helicopters on ramps, Skier Maintenance shall ensure a military marshaller and military "Follow Me" vehicle is available to escort helicopters from taxiway to parking locations on ramps.

3.4.5 Primary landing area for Pegasus Field is on the Alternate Ramp, which is located on the true east side of the true north end of the runway.

3.5 Williams Field Procedures.

NOTE:
These procedures apply if Williams Fields is a controlled airport.
Normally, Williams is uncontrolled; used for emergency divert purposes only.

3.5.1 Generally, Williams Field is available for emergency divert purposes concurrent with the opening of Pegasus and the Seasonal Sea Ice Runway. Williams is a "ski only" airfield and is only moderately groomed. It is suitable for Helo landings if required.

3.5.2 Airspace.

3.5.2.1 McMurdo Heliport is not in Williams Field Class D airspace.

3.5.2.2 Scott Base is within the border of Williams Field Class D airspace.

3.5.3 Communications.

3.5.3.1 All helicopters proceeding to/from or flying within 5 statute miles of Williams Field shall contact Williams Field Tower on 126.2 MHz prior to entering Williams Field Class D airspace.

3.5.3.2 When returning from or departing to any area east of a line extending from McMurdo Station to Scallop Hills on Black Island, south of the peninsula, or Windless Bight, contact Williams Field Tower for clearance into Class D airspace (see **Figure 3.1** McMurdo Helicopter Operations Area Map).

3.5.3.3 On a "gap" departure from McMurdo Station, contact Williams Field Tower prior to exiting the "gap".

3.6 Helicopter Ship Operations.

3.6.1 Tourist Ship helicopters will establish communications with Mac Center prior to commencing "ship to shore" flight operations in the McMurdo Station vicinity.

3.7 Communications.

3.7.1 Communications will be made with McMurdo Center (Mac Center) prior to departure or arrival.

3.7.2 All communications with Mac Center within 10 NM of McMurdo Station should be on the Common frequency, 118.5 MHz.

3.7.3 Flight Following (135.5 MHz (Transmit) and 143.975 MHz (Receive)) and Helo Ops (143.4 MHz) on VHF-FM should also be monitored, if possible, when operating into or out of McMurdo Heliport.

3.7.4 When Ice Tower is open, contact them on 126.2 MHz prior to arrival or departure if anticipating being more than ½ mile from the Ross Island landmass**.**

3.7.5 Beyond 10 NM radius from McMurdo Station:

3.7.5.1 Use Flight-following frequencies 118.5 MHz, or HF 4.718 kHz to communicate with Mac Center and monitor Area Common frequency 129.7 MHz and/or Helo Ops frequency if possible. See Section 7.12 for Williams Field procedures.

Figure 3.1. McMurdo Helicopter Operations Area Map.

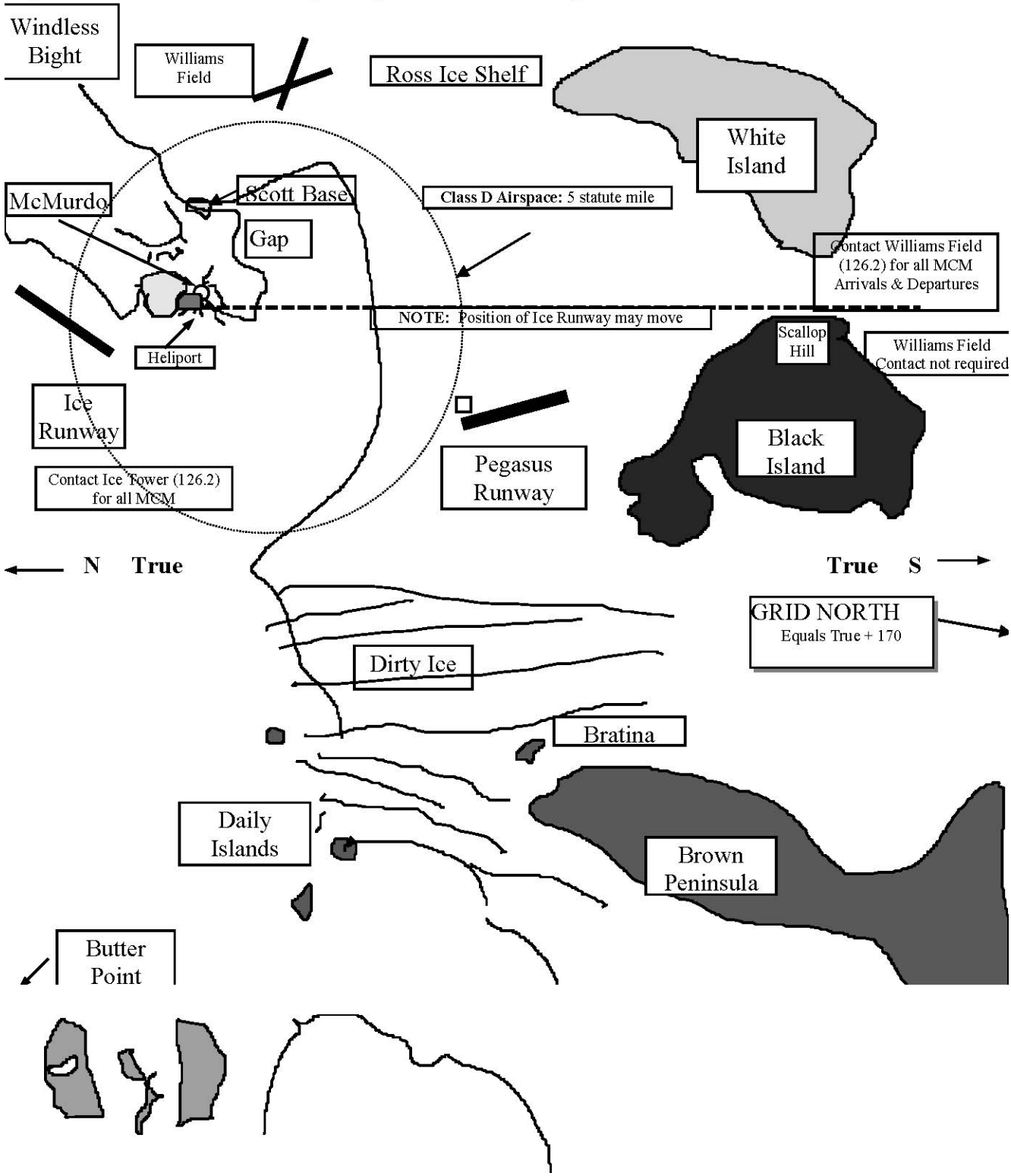
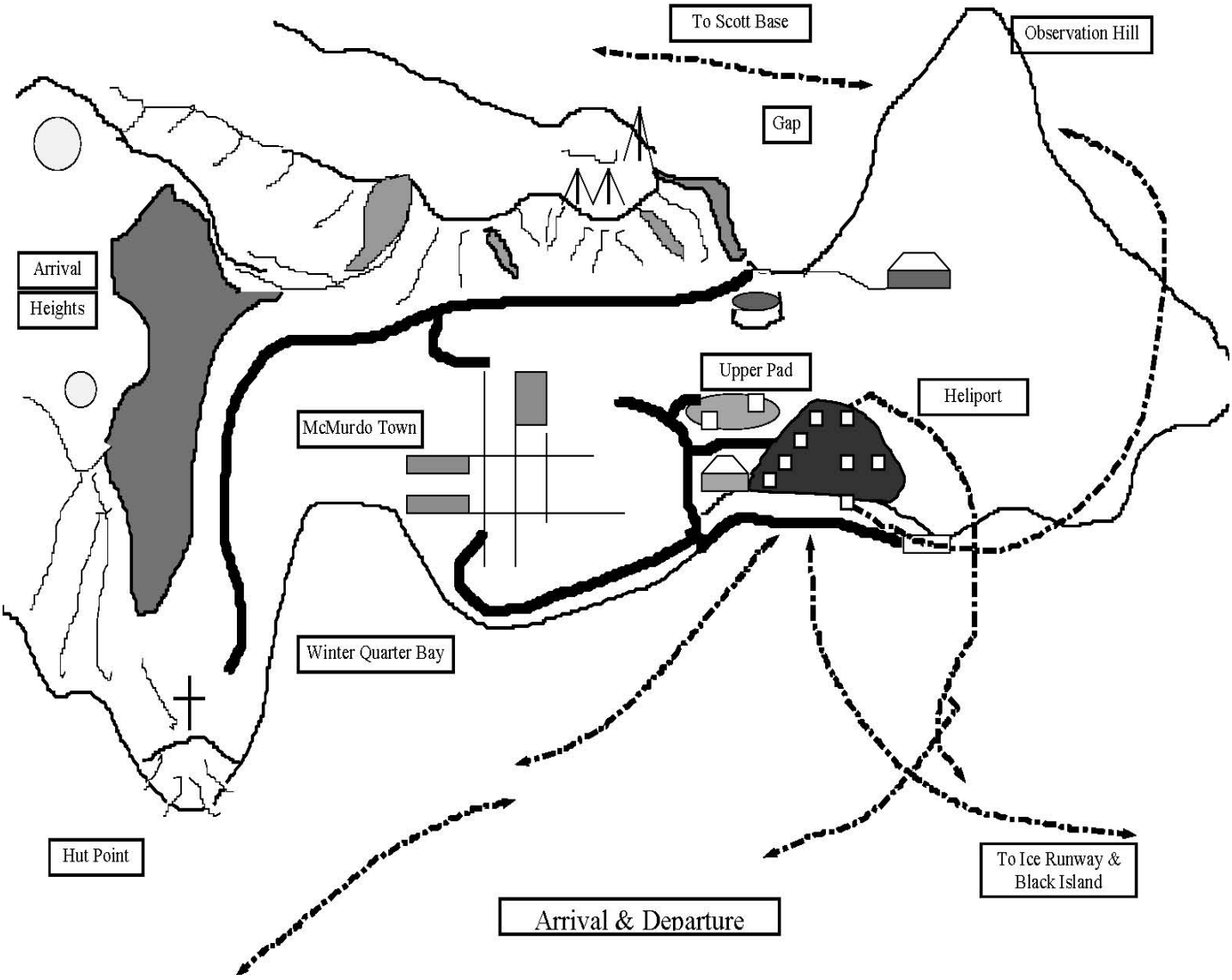
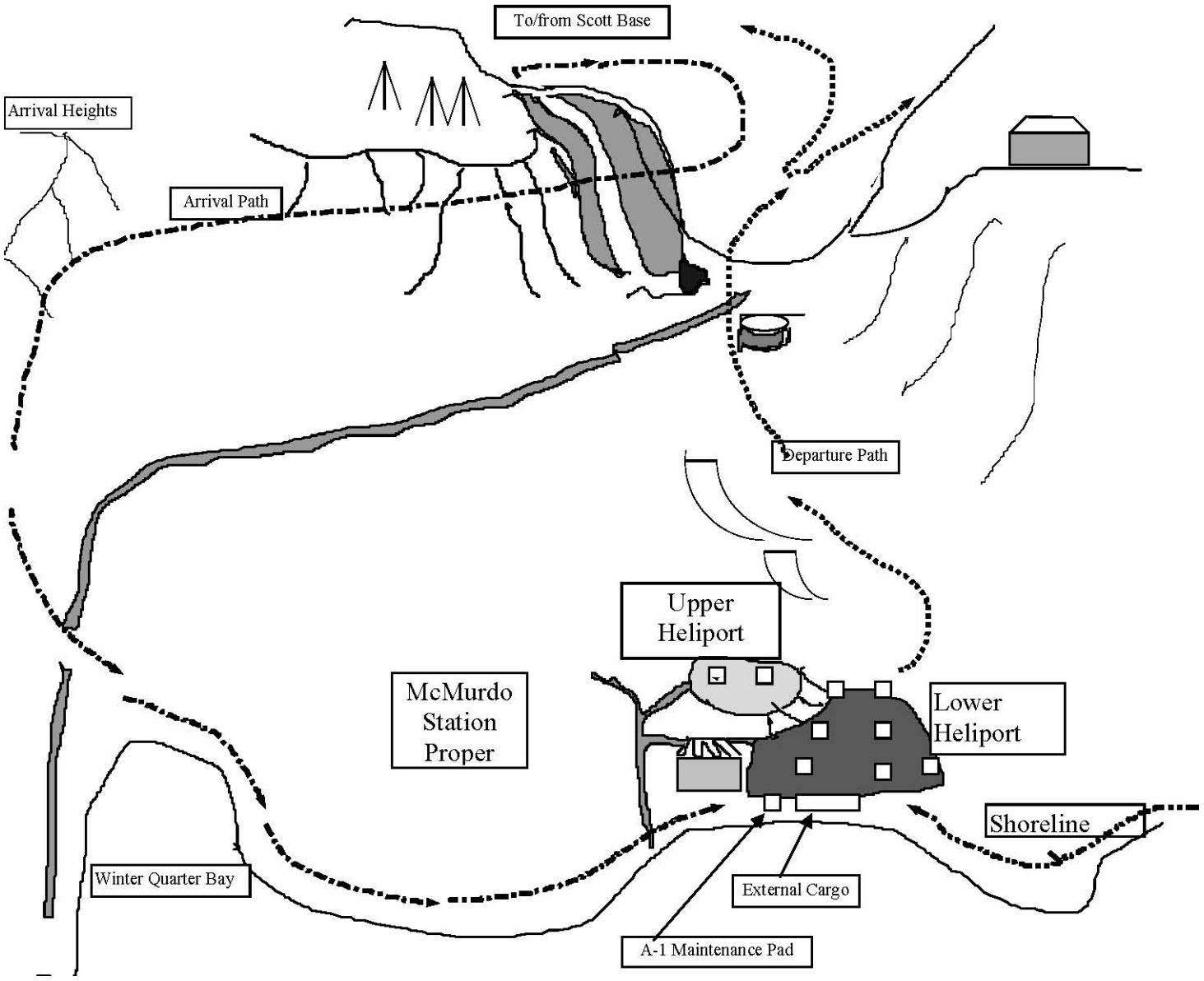


Figure 3.2. Helicopter Arrival and Departure Routing.



Hut Point

Figure 3.3. Gap Procedures.



3.8 Upper Heliport Procedures.

3.8.1 Departure. (See **Figure 3.4.** Upper Heliport Procedures).

3.8.1.1 Make appropriate radio calls prior to takeoff.

3.8.1.2 Fly one of the following takeoff paths:

3.8.1.2.1 Around the outside boundary of the lower heliport and outside of the aquarium to over the sea ice or shoreline; through the "gap".

3.8.1.2.2 Along the road on the North side of the Helo Hanger to over the sea ice or shoreline.

3.8.1.3 Avoid over-flying the Helo Hanger, buildings, aircraft, or people.

NOTE:

Be aware that the dust and rocks kicked up by the departing aircraft can cause injury to personnel and damage to the aircraft on the lower Heliport.

3.8.2 Arrival.

3.8.2.1 Approach path to the upper heliport should be made along the road north of the Helo Hangar or around the outside of the aquarium and outside boundary of the lower heliport.

NOTE:

If no helicopter is parked on A-1 pad (closest to the Helo Hangar) and there are no personnel on the lower heliport, an approach straight in from the sea ice/shoreline may be made close along the south side of the hangar.

3.8.2.2 A direct approach from a "gap" arrival is not recommended due to the steepness of the slope onto the heliport and the rapid rates of descent that could develop.

3.8.2.3 Avoid over-flying any buildings, aircraft, or people.

3.9 Heliport Pad Locations.

3.9.1 There are eight landing pads on the lower heliport and two on the upper heliport, (see **Figure 3.4.** Upper Heliport Procedures).

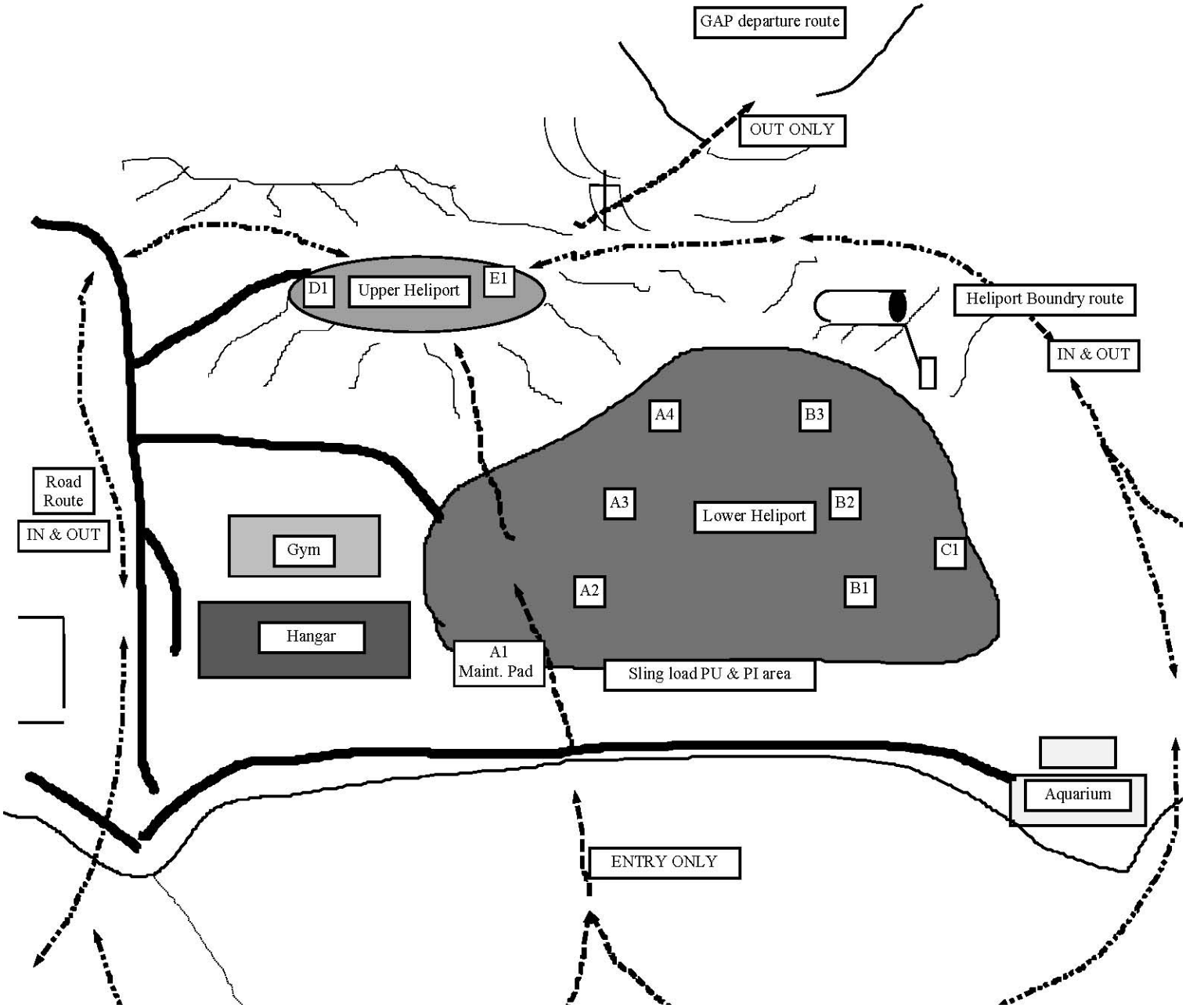
3.9.2 The upper helipads are not typically used. They are designated Upper Heliport Pads D1 and E1.

3.9.3 The lower heliport consists of three rows, Alpha, Bravo, and Charlie consisting of 4, 3, and 1 landing pads respectively.

3.9.4 Alpha 1 (A-1) is the maintenance pad and should be kept clear except for maintenance, movement into or out of the Helo Hanger, or hot loading or unloading of cargo/passengers.

3.9.5 Fuel will be available at all helipads except A-1.

Figure 3.4. Upper Heliport Procedures.



3.10 Vehicle Traffic.

3.10.1 Do not over-fly vehicles at very low altitude or when making an approach or takeoff. Be aware of vehicle traffic around or on the Heliport.

3.10.2 Vehicles entering either the upper or lower heliport shall contact the Helo Hanger on the Helo Ops Frequency (VHF-FM) prior to driving onto or across the heliport.

3.11 Passengers.

3.11.1 All passengers must have attended the Field Safety Training Program (FSTP) Helicopter Training or refresher course during the current season before boarding a USAP helicopter.

3.11.2 Passengers shall be escorted to and from the helicopter by a helitech or pilot. NEVER APPROACH THE HELO [WHEN BLADES ARE TURNING] FROM THE REAR.

3.11.3 All passengers should be briefed immediately before going out to the helicopter.

3.11.4 The pilot shall ensure that a safety briefing is given to all passengers prior to takeoff in accordance with the governing procedures of the pilot's respective organization and the NSF's contract language.

3.11.5 Passengers may disembark from the helicopter prior to shutdown when operationally essential and only if escorted by qualified personnel, usually the (Helo) contractor's HeliTech or pilot.

3.11.6 Escorts should ensure they have the pilot's permission to approach or depart an aircraft that is running and that all ground personnel and passengers stay well clear of the tail rotor.

3.12 Fueling Operations.

3.12.1 Initial helicopter fueling time is after 0700 each morning. A fuel person should be present at that time.

3.12.2 Returning flights requiring refueling should call the Helo Hanger or have Mac Center Relay that they will require fuel at least 15 minutes prior to arrival.

3.12.3 Fueling with the helicopter running is not authorized unless using single point refueling and parent organization has given authority.

3.12.4 Only trained personnel should operate the fueling system.

3.13 External Load Procedures.

NOTE:
External (sling) load operations are inherently risky; all aircraft in the vicinity of sling-load operations should "give way" to the sling-load aircraft due to its reduced maneuverability.

3.13.1 Pick Up.

3.13.1.1 External loads shall be picked up from the area along the west side of the Lower Heliport. Generally, outgoing loads will be set up closest to the hangar.

3.13.1.2 Aircraft picking up an external load shall advise Mac Center on 118.5 MHz, and, if possible, the Helo Hangar on Helo Ops frequency.

3.13.1.3 When possible, pilot[s] will maintain radio communications with ground personnel.

3.13.1.4 When departing, DO NOT OVERFLY aircraft or people and avoid over flying buildings, vehicles, or fuel tanks.

3.13.1.5 Ensure adequate clearance from all ground obstructions.

3.13.2 Drop Off.

3.13.2.1 It is recommended, when making the call to Mac Center inbound; advise them of the external load. This is to make other aircraft operating in the vicinity aware that the Helo has an external load and is less maneuverable.

3.13.2.2 Use 118.5 MHz to contact Mac Center inbound.

3.13.2.3 If possible, advise the Helo Hangar 15 minutes out on Helo Ops that the Helo is inbound with an external load. All external loads will be put in on the west side of the Lower Heliport.

3.13.2.4 Use the first 15 feet of the helipad along the west edge.

3.13.2.5 Generally, all incoming loads should be placed progressively further away from the Helo Hanger (see **Figure 3.4**).

3.13.2.6 When putting in an external load, DO NOT over-fly aircraft or people and avoid over-flying buildings, vehicles, other loads, or fuel tanks.

3.13.2.7 Drop off external loads along the west edge of the Heliport, away from the Helo

Hanger (see **Figure 3.3.** Gap Procedures). After releasing the external load, proceed to the assigned parking spot or maintenance pad (A-1) if maintenance is scheduled.

3.13.2.8 Be aware that the Lower Heliport is approximately 40 feet above sea level.

3.13.2.9 If ground advisories or ground handling personnel are desired, please advise the Helo Hanger either on Helo Ops frequency or through Mac Center.

3.14 Hazardous Cargo.

3.14.1 Contact Mac Center and advise them on initial flight plan call when departing and returning to McMurdo Station of any Hazardous Cargo on-board.

3.14.2 Report all types of hazardous material on-board using the code numbers found on the NSF hazardous cargo manifest form.

3.15 Maintenance Parking.

3.15.1 Aircraft scheduled for maintenance may be parked in front of the Helo Hanger on A-1 pad at Maintenance's request.

3.15.2 The aircraft should be parked with the tail facing the hanger.

3.15.3 Inbound aircraft should advise the Helo Hanger prior to arrival that they would be parking on A-1 maintenance pad 1, generally when the '15 minutes out' report is made.

3.16 Flight Following.

3.16.1 Helicopters shall report "operations normal" every 30 minutes to Mac Center.

3.16.2 Helicopters use **TRUE** headings for information given to or received from pilots, and all references to direction for helicopters is in **TRUE** headings unless otherwise stated.

3.17 Over-flight Restrictions.

3.17.1 Fixed-Wing aircraft over-flying McMurdo Station or Scott Base will maintain an altitude at or above 1500 feet AGL. Over-flight within one nautical mile of the McMurdo Heliport is restricted to an altitude at or above 1500 feet AGL.

3.17.2 Antarctic Special Protected Areas (ASPAs) were created to protect areas of special environmental, scientific, historic, aesthetic, and wilderness value. Certain flight restrictions are associated with these areas. All airlift service providers should be familiar with the Antarctic Conservation Act of 1978.

3.17.3 As a general rule, aircraft will avoid disturbing concentrations of birds and animals. Helicopter flights shall not approach within ¼ mile lateral and no lower than 1000 feet AGL of these concentrations.

3.17.4 Information regarding flight restrictions of ASPAs is available from the National Science

Foundation Representative at McMurdo Station or in Public Law 95-541, *The Antarctic Conservation Act of 1978*

Chapter 4

UAV PROCEDURES

UAV Operations

1.) UAV groups shall:
   a. Schedule missions so as to de-conflict with manned fixed and rotary wing flights to the maximum extent possible.
   b. Coordinate with the Fixed Wing Coordinator 24 hours prior to any UAV mission.
   c. Provide a qualified pilot to communicate with ATC.
   d. Maintain constant two way radio communications with ATC for the duration of all missions.
   e. Coordinate with ATC for special use airspace and special use airspace NOTAMs.
   f. Establish and publish lost communication and lost data link procedures.

2.) The Fixed wing Coordinator will add the scheduled UAV mission to the daily flying schedule.

3.) SOPP will develop special use airspace as required by the UAV groups, ATC, and the USAP flying community.

4.) ATC shall:
   a. Provide traffic advisories as required to UAV groups.
   b. Provide UAV groups with current airfield and weather information.
   c. Ensure that UAV aircraft operating within the local area, are either on the snow or established within the NOTAMed special use airspace, prior to a fixed wing arrival reaching 100NM from the airport or departing fixed wing aircraft starting takeoff roll.
   d. Advise all fixed and rotary wing aircraft of the position and intentions of all UAVs operating within the local area.

ATTACHMENT 1: GLOSSARY OF REFERENCES

AFI 13-217	*Drop Zone and Landing Zone Operations*
AFI 11-202 Vol 3	*General Flight Rules*
AFI 11-2C-130 Vol 1	*C-130 Aircrew Training*
AFI 11-2C-130 Vol 3	*C-130 Operations Procedures*
AFI 11-2C-17 Vol 1	*C-17 Aircrew Training*
AFI 11-2C-17 Vol 3	*C-17 Operations Procedures*
AFI 91-204	*Safety Investigations and Reports*
AFJMAN 11-226	*FAAO 8260.3 Terminal Instrument Procedures*
AFI 11-230	*Instrument Procedures*
AFMAN 32-1076	*Design Standards for Visual Air Navigation Facilities*
AMC 24-101 Vol 15	*Transportation Military Aircraft, Baggage Service*
AFIM	*Antarctic Flight Information Manual*
FAAO 7110.65	*Air Traffic Control*
FAAO 7210.3	*Facility Operation and Administration*
FAAO 8020.11	*Aircraft Accident and Incident Notification, Investigation and Reporting*
FLIP	*DoD Flight Information Publication*
ICAO DOC 7030/4	*Regional Supplementary Procedures*
Public Law 95-541	*The Antarctic Conservation Act of 1978*
T.O. 00-25-172	*Ground servicing of Aircraft and Static Grounding/Bonding*
TERPS MOU	*Terminal Instrument Procedures Memorandum of Understanding*

ATTACHMENT 2: ABBREVIATIONS AND ACRONYMS

ARFF	Aircraft Rescue and Fire Fighting
AGL	Above Ground Level
AMC	Air Mobility Command
OAS	Office of Aviation Services (of the Dept. of Interior)
ANG	Air National Guard
ANTNZ	Antarctic New Zealand Program
ARA	Airborne Radar Approach
ARFF	Aircraft Rescue and Fire Fighting
ATC	Air Traffic Control
ATM	Air Traffic Manager
CTAF	Common Traffic Advisory Frequency
DP	Departure Procedures
ENEA	Ente per le Nouve Tecnologie, l'Energia e l'Ambiente (Italian Antarctic Program)
ETP	Equal Time Point
FAAO	Federal Aviation Administration Order
FMC	Full Mission Capable
HF	High Frequency
IAP	Italian Antarctic Program
ICAO	International Civil Aviation Organization
IFR	Instrument Flight Rules
IMC	Instrument Meteorological Condition
IP	Instrument Procedures
KIAS	Knots Indicated Airspeed
LDB	Long Duration Balloon
Mainbody	Main Deployment Phase for Operation DEEP FREEZE
Mac Center	McMurdo Air Traffic Control Center
MC	Mission Commander
MDA	Minimum Descent Altitude
MOU	Memorandum of Understanding
MPH	Miles Per Hour
NM	Nautical Mile
NOTAM	Notice to Airmen
NSF	National Science Foundation
ODF	Operation DEEP FREEZE
OPORD	Operations Order
ORM	Operation Risk Management
PHI	Petroleum Helicopter Inc.
PSR	Point of Safe Return
Redeployment	Main Redeployment Phase for Operation DEEP FREEZE
ROF	Remote Operations Facility at SPAWAR, Charleston SC
RSC	Runway Surface Condition
SAR	Search and Rescue
SATCOM	Satellite Communication
SITREP	Situation Report
SOAR	Support Office for Aerogeophysical Research
SOPP	SPAWAR Office of Polar Programs
SPAWARSYSCEN	Space and Naval Warfare Systems Center
TERP	Terminal Instrument Procedures
USAP	United States Antarctic Program
VFR	Visual Flight Rules
VMC	Visual Meteorological Condition
WINFLY	Winter Flight Period

ATTACHMENT 3: GUIDELINES FOR THE OPERATION OF AIRCRAFT NEAR CONCENTRATIONS OF BIRDS IN ANTARCTICA

A.3.1. Working Paper on Guidelines for the Operation of Aircraft near Concentrations of Birds in Antarctica

A.3.1.1. Fixed-wing aircraft and helicopter operations are now integral to most national Antarctic research programs, as well as being used by a small number of commercial tourist and air transport companies. The potential for harmful disturbance to concentrations of birds makes it important to provide pilots with guidelines that would prevent or minimize damaging impacts during over flights. Unfortunately, there is a lack of definitive scientific data on which to base firm guidelines for pilots. Moreover, most of the available research relates to penguins and different species of birds are likely to react in different ways or to different degrees to over flights.

A.3.1.2. United Kingdom introduced Working Paper ATCM XXV / WP-26 at ATCM XXV in Warsaw (2002) to bring the issue to the attention of Treaty Parties and to propose a particular set of guidelines. The CEP invited COMNAP, in consultation with SCAR, to review the guidelines, and to report back to the CEP. The present paper presents conclusions and a recommended set of guidelines. Pending further scientific evidence, these guidelines are considered to constitute a reasonable basis for voluntary implementation. They are based on the practical experience of researchers, including input from SCAR, and on experience derived from the national operators' provision of logistics support to researchers. These guidelines are designed to help aircraft operations in Antarctica to be undertaken safely with the minimal environmental impact. COMNAP recommends that aircraft operations in Antarctica should be planned and carried out in accordance with these guidelines to the maximum extent practicable.

A.3.2. Guidelines on Minimum Distances for Aircraft Operations Close to Concentrations of Birds

A.3.2.1. There are many variables in noise levels received on the ground during aircraft operations. Determining factors on noise levels include flight height, the type of aircraft and engine, the flight profile, the weather and the location. Pilots will need to make their own judgements based on the aircraft type, task and operational safety considerations.

A.3.2.2. Unless otherwise specified, for example by an ASPA management plan or ASMA guidelines, recommended distances are set out below. It is recognised however that whilst these represent preferred distances, which should be adhered to the extent possible, operators may already have developed guidelines to suit their own particular needs and circumstances.

A.3.2.2.1. Penguin, albatross and other bird colonies are not to be over flown below 2000ft (~ 610 m) Above Ground Level (AGL), except when operationally necessary.

A.3.2.2.2. Landings within ½ nautical mile (~ 930 m) of penguin, albatross or other bird colonies should be avoided wherever possible.

A.3.2.2.3. Never hover or make repeated passes over wildlife concentrations or fly lower than necessary.

A.3.2.2.4. Maintain a vertical separation distance of 2000 ft (~ 610 m) AGL, and a horizontal separation of 1/4 nautical mile (~ 460 m), from the coastline where possible.

A.3.2.2.5. Cross coasts at right angles and above 2000ft (~610 m) AGL where possible.

A.3.3. Location of Aircraft Operations (Other Considerations)

A.3.3.1. Be aware that concentrations of birds are most often found in coastal areas.

A.3.3.2. Be aware that when operating aircraft in inland areas, snow and Antarctic petrel colonies are frequently found on nunataks. Minimum over-flight distance should be maintained in such areas.

A.3.3.3. Where practical, landings near to concentrations of birds should be downwind and/or behind a prominent physical barrier (e.g. hill) to minimize disturbance.

A.3.3.4. Avoid Antarctic Specially Protected Areas, unless authorized to over-fly and/or land via permit issued by an appropriate national authority. For many ASPAs there are specific controls on aircraft operations, which are set out in the relevant Management Plans.

A.3.3.5. Follow aircraft flight heights, preferred flight paths and approach paths contained in the Antarctic Flight Information Manual (AFIM), in station aircraft operation manuals and on relevant charts and maps. Once the guidelines have been adopted, COMNAP envisages the preparation of Wild Life and Low Flying Avoidance Maps for the major airstrips in the Antarctic (e.g. Marsh, Marambio, Rothera, McMurdo).

A.3.3.6. Particularly avoid flying toward concentrations of birds immediately after take-off and avoid steep banking turns in flight as these significantly increase the amount of noise generated.

A.3.4. Timing of Aircraft Operations

A.3.4.1. Most native bird species breed at coastal locations in Antarctica between October and April each season. During the planning of aircraft operations near to concentrations of birds, consideration should be given to undertaking flying activities outside of the main breeding and/or molting periods.

A.3.4.2. Where aircraft operations are necessary to be close to concentrations of birds, the duration of flights should be the minimum necessary.

A.3.4.3. To minimize bird strikes, especially in coastal areas, avoid flying after dark between October and April. At this time of year, prions and petrels are active. These birds are nocturnal when breeding and are attracted by lights.

A.3.4.4. Aircraft operations should be delayed or cancelled if weather conditions (e.g. cloud base, winds) are such that the suggested minimum vertical and horizontal separation distances given in these guidelines cannot be maintained.

ATTACHMENT 4: SOUTH POLE CLEAN AIR SECTOR / NO FLY ZONE

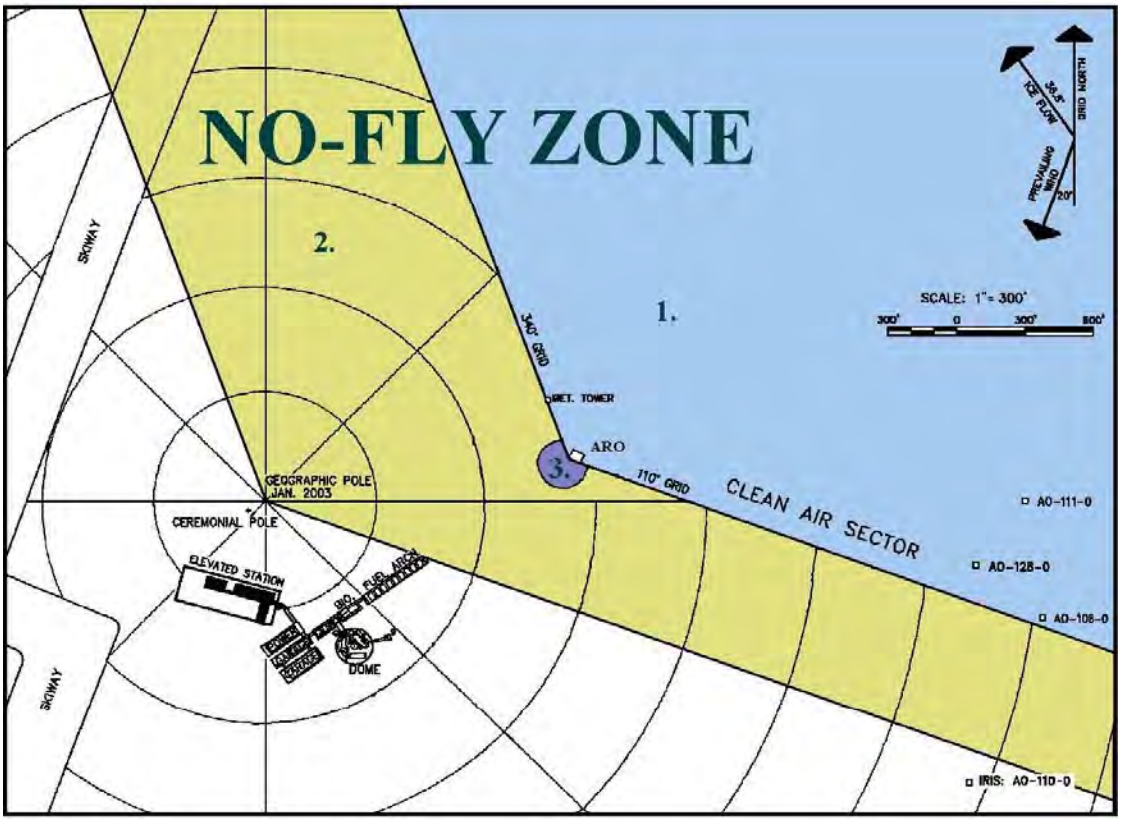


Figure A.4.1: Geographic coordinates for the No-Fly Zone (2) do not change, but the Clean Air Sector (1) and the De-Motorized Zone (3) "float" with the ARO building as the polar ice cap moves (grid) NW, approximately 10 meters (33 feet) per year.

A.4.1. Clean Air Sector (CAS)

A.4.1.1. The Clean Air Sector is a wedge-shaped area upwind (grid northeast) of the main station complex, defined by the following boundaries, measured from the Atmospheric Research Observatory (ARO).

A.4.1.1.1. A line extending grid 340 degrees from the SW corner of ARO - A line extending grid 110 degrees from the SW corner of ARO - 88° 40' South Latitude (150 kilometers/80 nautical miles NE of the station).

A.4.2. No-Fly Zone (NFZ)

A.4.2.1. To facilitate navigation around the Clean Air Sector, the National Science Foundation has established an additional "No-Fly Zone" extending 2 kilometers (6,000 feet) above the snow surface and defined by the following boundaries, measured from the Geographic South Pole.

A.4.2.1.1. 20° West Longitude (Grid 340°) - 110° East Longitude (Grid 110°) - 88° 40’ South Latitude (150 kilometers/80 nautical miles NE of the station)

NOTE: Although the South Pole Skiway extends into the NFZ, use of the skiway is exempt from these NFZ guidelines. Additionally, USAP aircraft are permitted to enter the No-Fly Zone as necessary for official business (approaches / takeoffs / landings, NSF-directed missions, FAA checks, etc.) In all cases, pilots are asked to minimize potential contamination of the CAS.

A.4.3. De-Motorized Zone (DMZ)

A.4.3.1. The De-Motorized Zone (DMZ) is an additional, semi-circular area extending 50 meters (150 feet) downwind of the ARO building into which vehicle access is prohibited without authorization.

ATTACHMENT 5: GUIDELINES FOR AIRCRAFT OPERATIONAL PERIODS AT THE PEGASUS RUNWAY

A.5.1. The Pegasus runway was originally designed around supporting a flight mission period from about 15 January to late February. At the time of runway development, the most pressing airlift need was for access to wheeled aircraft during wind-down of the summer season (redeployment). It was always recognized that the Pegasus runway was very near its survivability limits during the last 3 weeks of December and the first half of January. It was originally demanded that the runway be carefully preserved, with no aircraft activity, during that critical time period.

A.5.2. Upon gaining a greater understanding of the robustness of the Pegasus runway, and as airlift needs and available resources have developed, it is now known that the aerodrome may reliably sustain year round activity, provided frequency of use, type of use, ice temperatures fluctuations, and compacted snow concrete conditions are considered and managed.

A.5.3. USAP is pursuing a single field operations approach at Pegasus airfield. If proven, such an approach may permit year-round operations at Pegasus without a requirement to build a Seasonal Sea Ice Runway each year, and/or maintain Williams Field skiway as an alternate. Until senior program leadership decides to fully adopt such an approach, the table listed herein provides operational guidelines for use of Pegasus.

A.5.4. The experiences gained in "stretching" the Pegasus runway operational period(s) beyond that originally envisioned established guidelines that, using current tools and practice, maximize wheeled aircraft access while ensuring long-term runway preservation. These guidelines are summarized in the following table.

Table A.5.1. Aircraft Operational Periods

Aircraft	Time Period	Condition	Comments
C-17	Late August	Normal (WINFLY)	
	September	Extended Season	Pegasus can physically support this with minimal consequences.
	October – 15 November	Contingency	Could be required if sea ice can't support early season runway; Pegasus can physically support this with moderate consequences.
	15 November thru 25 December	Contingency	Could be required if an early demise of sea ice runway; Pegasus can physically support this only with constrained mission requirements and considerable maintenance attention.
	25 December thru end February	Normal	With accelerated construction (starting in October instead of November) opening date can be moved to 5 December.
	March - April	Extended Season	Pegasus can physically support this with minimal consequences.
	May thru August	Emergency	Pegasus can physically support this with minimal consequences.
(L)C-130	Late August	Contingency (WINFLY)	Pegasus can physically support this with constrained mission requirements and considerable maintenance attention.
	September	Extended Season	Pegasus can physically support this with constrained mission requirements and considerable maintenance attention.
	October – 1 November	Emergency	Could be required if sea ice runway or Williams Field can't support flights; Pegasus can physically support this only with major constraints on mission operation and significant runway maintenance attention. Likely short-term damage to runway.
	1 November thru 15 January	Emergency	Pegasus runway is known from prior experience to suffer major melt damage from (L)C-130 operations during this time period. In an emergency, the runway can physically support a minimum of flights with major constraints on mission operation. Significant short-term damage and likely long-term damage will occur.
	15 January thru end February	Contingency	Could be required by LC-130 if Williams Field is closed; could be required by C-130 if C-17 is unavailable. Pegasus can physically support this with moderate consequences.
	March - April	Extended Season	Pegasus can physically support this with moderate consequences.
	March thru August	Emergency	Pegasus can physically support this with minimal consequences.

ATTACHMENT 6: MID-SEASON OPERATION OF WHEELED HERCULES AIRCRAFT (WHEN APPLICABLE)

A.6.1. McMurdo area airfield operations have settled into a seasonal rotation that matches the USAP's airlift assets with the environmental limitations of the three runway complexes as shown in table A.6.1.

Table A.6.1. Airfield Seasonal Rotations

Site	Operational Period	Aircraft Serviced	Issues
Pegasus Runway	Late August for 1-2 weeks	C-17	None
	Early to mid December thru late February	C-17	Pegasus is very heat and contamination sensitive in December. Annual runway maintenance/construction is required in December, limiting aircraft operating windows.
Sea Ice Runway	Early October thru early to mid December	C-17; C-130; LC-130 (on wheels)	Variations in seasonal conditions can make runway closing occur anytime between early and mid December
Williams Field Skiway	Ski-Alternate only -- early to mid December thru late February	LC-130 (on skis)	Williams Field is somewhat heat and contamination sensitive in December. Williams Field requires annual maintenance/construction in December each year.

A.6.2. Because seasonal conditions govern the demise of the sea ice runway, and the principal variables involved (air and ice temperature, ice thickness, and surface contamination) are not yet predictable with any reliability, pre-season planning for mid-season airlift cannot be precise. Thus, on-site monitoring and decision making usually dictate when the sea ice runway closes and flight operations switch to the other airfields. Because the runway change event involves a great deal of carefully coordinated labor and has the potential to negatively (irretrievably) impact flight production, it is important to make the right decision at the right time.

A.6.3. The rate of sea ice temperature increase in late November and early December 2006 is the highest seen in the last 20 years. This has caused the bearing capacity of the sea ice runway to drop rapidly, forcing the C-17 to land at weights that are well below optimum. C-17 operations may move to the Pegasus runway in late November, which is on the order of a week earlier than typically planned. The sea ice runway, though warming, usually continues to have ample bearing capacity for multiple Hercules aircraft and thus remain open for those operations.

A.6.4. Warm air and sea ice temperatures, together with an increasingly dirty ice surface, suggested that the sea ice runway complex could very suddenly show massive surface melt. To avoid an emergency, perhaps mid-week, move of LC-130 operations from the sea ice runway to the Williams Field skiway, the move may be executed several days, perhaps even a week earlier than originally planned, so as to result in no loss of aircraft missions or payload capacity.

A.6.5. Historically, the sea ice runway is still adequate for C-130 operations in early Dec. However, the simultaneous operation of three runways during this seasonal period is very unattractive, since a number of equipment and labor resources are stretched too thin in this scenario (e.g., ARFF). Ideally, all flight operations would only take place at the Pegasus runway (wheeled aircraft) and Williams Field (ski aircraft). The two-airfield arrangement works well for the US aircraft involved, but becomes difficult when considering the RNZAF C-130 flights, which typically begin on 20 November and are scheduled to continue until 21 December.

A.6.6. Both the characteristics of the C-130 and the operating pattern of the RNZAF flights to McMurdo make basing of the Hercules at Pegasus quite problematic.

A.6.6.1. The C-130 produces a great deal of particulate contamination that becomes deposited on the snow/ice surface of all areas where it operates. This “soot” is dark in color and causes radiative heat absorbsion, hastening damaging melting.

A.6.6.2. The RNZAF currently operate in a “remain overnight” (RON) mode, meaning that the C-130 is parked at the Pegasus complex for approximately 20 hours during each mission evolution. This means:

A.6.6.2.1. The aircraft becomes a large heat sink for solar radiation and thus convective and radiative heat transfer to the ice/snow in the immediate vicinity of the parked aircraft.

A.6.6.2.2. Unless parked at the primary fueling/load-unload site, the C-130 will be within the clear zone of the runway, effectively closing the runway for the duration of parking for each of its missions.

A.6.6.2.3. If parked at the primary fueling/load-unload apron position, the C-130 will impart the deleterious effects listed above (heat and engine soot) to this critical site.

A.6.6.3. The C-130 requires fuel in McMurdo to make its return flight to Christchurch. Unlike the sea ice runway and Williams Field, a ready source of fuel is not available at Pegasus (it is “trucked” in tank sleds from Williams Field). Thus, increased fuel delivery will be necessitated by C-130 operations at Pegasus.

A.6.6.4. Cargo and passenger movement from Pegasus runway requires considerable time. This is essentially a fixed "cost" only loosely linked to the quantity of cargo and passengers (thus a larger burden for a C-130 than for a C-17).

A.6.6.5. Short-term and long-term (future seasons) viability of the Pegasus runway will remain a very high priority for USAP. The utility of the Pegasus runway has incredible value and should only be knowingly compromised in a dire situation. Therefore, it is recommended that the RNZAF C-130 continue to utilize the sea ice runway (with a minimum of infrastructure) until physical conditions force the runway's closure. At that time, any remaining planned RNZAF C-130 missions should be postponed until at least after the 14th of January, when both the summer solstice (solar peak) and air temperature peak have passed.

ATTACHMENT 7

AIRFIELD STATUS UPDATE EXAMPLE

1. Change to current date and time.
2. Ensure all changes are done in red.
3. Email updated form to atc.chs@usap.gov and Macctr@usap.gov
4. Any questions please contact Mac Center at ext. 2446 or ROF (720)568-2660 or (843)218-7156.

Airfield Status Information
06 MARCH 1608L
Pegasus Field Status Information

Pegasus White Ice Runway 33/15	OPEN
Runway Dimensions	220' X 10,000'
1000ft Overrun Departure End Runway 33	OPEN
Runway Surface Conditions	LOOSE SNOW – Loose Snow Depth 0" To 1/4"
Runway Condition Reading (RCR)	9.8- Reported at 1550L
Pegasus White Ice Runway Fuel Pit	OPEN
Approach Lights: RWY 33	OPERATIONAL
Strobe Lights: RWY 33	OPERATIONAL
Runway End Identifier Lights (REIL): RWY 33	OPERATIONAL
Precision Approach Path Indicator (PAPI): RWY 33	OPERATIONAL
MLS RWY 33	OPERATIONAL
Pegasus Skiway 26/08	CLOSED
Skiway Dimensions	
Skiway Surface Conditions	
Fuel Pits 1-4	CLOSED
Approach Lights: SWY 26	NON-OPERATIONAL
Strobes: SWY 26	NON-OPERATIONAL
Runway End Identifier Lights (REIL): SWY26	NON-OPERATIONAL
Precision Approach Path Indicator (PAPI): SWY26	NON-OPERATIONAL
MLS SWY 26	NON-OPERATIONAL
Aerodrome Information	
TACAN - ZPG – Channel 80	OPERATIONAL
Aerodrome Status	OPERATIONAL
Aerospace Ground Equipment	
See Daily ARFF report for ARFF vehicle status for Pegasus Field	
GPU (Power Cart)	8
Air Start Cart (Huffer)	1
Heaters	15
Nitrogen Cart	2
B-5 Maintenance Stand	1
LOX Cart	1
C-17 Tow Bar	1

- Due to warm weather the White Ice Runway, Skiway & Ramps are susceptible to severe damage unless all aircraft follow airfield restrictions when arriving, departing & operating at Pegasus Airfield. The underlying issue for *most* of the restrictions is solar overheating of the runway surface due to exhaust particulates & the thermal mass of stationary aircraft.
- General Restrictions for All Aircraft & All Areas
  - Follow Me vehicle available on request; contact Mac Center or Pegasus Tower to request Follow Me a minimum of 100 miles from airfield.
  - C-17 approved for ERO (engine running onload/offload operations), all other aircraft must shutdown engines upon arrival in parking.
  - Take all practical measures to minimize exhaust & thermal damage to airfield surfaces:
- Minimize taxi times & braking.
- Shutdown symmetrical engines on arrival (when practical).
- Taxi with flaps up.
- Any other measures that limit thermal & contaminant impact to airfield surfaces.
  - Ground operation of engines should be kept to the minimum practical for safe operations.
  - Minimize ground time of aircraft when remaining overnight.
  - If transient aircraft require extended time on ramp, personnel should be available to relocate aircraft to prevent surface damage due to thermal heating.
  - Maintenance engine runs will be accomplished in designated areas with exhaust directed off all airfield areas.
  - Refer to NZCM NOTAM for information regarding transportation of specific hazardous materials due to electromagnetic radiation hazard.
  - Until further notice during C-17 operations, a crane to the height of 100 feet will be located at Pegasus Field Town site. When not in use the boom will be lowered.

- Runway 15/33
  - Arrivals shall be to Rwy 15 & departures shall be from Rwy 33 to the maximum extent possible to limit the number of passes on the runway.
  - All 180 degree turns must be completed in the overrun section, departure end RWY 33.
  - Do not remain stationary on runway.
  - Do not enter the runway area until ready for immediate departure.
  - When entering or exiting, the ramp/runway make sure all turns are gradual turns to enter or leave the ramp/runway to prevent slippage of the nose wheel or main gear.
  - LC-130 runway operations:
- Minimize use of runway; use only when weather or mechanical issues dictate. Normal operations should use Pegasus Skiway.
- LC-130 Aircraft shall operate on wheels on runway 15/33 and ramp1 during all operations.
- Runway available for aircraft emergencies, weather diverts or as required by flight manuals.
- Taxi across Ramp 1 (C-17 parking ramp) on wheels until reaching the "Ski Transition Area" and then transition to skis for remainder of taxi to LC-130 parking area.

- Taxiway Bravo Closed UFN. For Rwy 15/33 access taxi on Grid North edge of Ramp 1, on wheels only.
- Rwy 33 3000' left side marker and 5000' right side marker are broken.

- Ramp 1 (East Ramp or Grid West) on Town Site side of Pegasus Airfield
- Will be used for all C-17 & transient flights; Marshaller always required for parking.

[i] *"Design, Construction, Maintenance, and Evaluation of the McMurdo Sound Sea Ice Runway for Heavy Wheeled Aircraft Operations"*, dated 19 July 2006

[ii] The ETL can be viewed at http://www.afcesa.af.mil/userdocuments/publications/ETL/ETL%2006-7.pdf website.