QC
959
.U6
N381
2004

U.S. DEPARTMENT OF COMMERCE/ National Oceanic and Atmospheric Administration

OFCM

OFFICE OF THE FEDERAL COORDINATOR FOR
METEOROLOGICAL SERVICES AND SUPPORTING RESEARCH

National Winter Storms Operations Plan

FCM-P13-2004

GOES-8 Visible
25 December 2002 18:45 UTC

Washington, DC
December 2004

THE FEDERAL COMMITTEE FOR METEOROLOGICAL SERVICES AND SUPPORTING RESEARCH (FCMSSR)

VADM CONRAD C. LAUTENBACHER, JR., USN (RET.)
Chairman, Department of Commerce

DR. KATHIE OLSEN
Office of Science and Technology Policy

DR. RAYMOND MOTHA
Department of Agriculture

BRIG GEN DAVID L. JOHNSON, USAF (RET.)
Department of Commerce

MR. ALAN SHAFFER
Department of Defense

DR. ARISTIDES PATRINOS
Department of Energy

DR. PENROSE C. (PARNEY) ALBRIGHT
Science and Technology Directorate
Department of Homeland Security

DR. ROBERT M. HIRSCH
Department of the Interior

MR. RALPH BRAIBANTI
Department of State

MR. RANDOLPH LYON
Office of Management and Budget

MR. NORMAN FUJISAKI (Acting)
Department of Transportation

MR. DAVID MAURSTAD (Acting)
Federal Emergency Management Agency
Department of Homeland Security

DR. GHASSEM R. ASRAR
National Aeronautics and Space Administration

DR. MARGARET S. LEINEN
National Science Foundation

MR. PAUL MISENCIK
National Transportation Safety Board

MR. JOHN W. CRAIG
U.S. Nuclear Regulatory Commission

DR. GARY FOLEY
Environmental Protection Agency

MR. SAMUEL P. WILLIAMSON
Federal Coordinator

MR. JAMES B. HARRISON, Executive Secretary
Office of the Federal Coordinator for
Meteorological Services and Supporting Research

THE INTERDEPARTMENTAL COMMITTEE FOR METEOROLOGICAL SERVICES AND SUPPORTING RESEARCH (ICMSSR)

MR. SAMUEL P. WILLIAMSON, Chairman
Federal Coordinator

MR. THOMAS PUTERBAUGH
Department of Agriculture

MR. JOHN E. JONES, JR.
Department of Commerce

RADM STEVEN J. TOMASZESKI, USN
United States Navy
Department of Defense

BRIG GEN THOMAS E. STICKFORD, USAF
United States Air Force
Department of Defense

MR. RICKEY PETTY
Department of Energy

MS. NANCY SUSKI
Science and Technology Directorate
Department of Homeland Security

MR. LEWIS T. MOORE
Department of the Interior

MS. REGINA MCELROY
Federal Highway Administration
Department of Transportation

MS. LISA BEE
Federal Aviation Administration
Department of Transportation

DR. JONATHAN M. BERKSON
United States Coast Guard
Department of Homeland Security

MR. JEFFREY MACLURE
Department of State

DR. S. T. RAO
Environmental Protection Agency

MR. JOHN GAMBEL
Federal Emergency Management Agency
Department of Homeland Security

DR. RAMESH KAKAR
National Aeronautics and Space Administration

DR. JARVIS MOYERS
National Science Foundation

MR. DONALD E. EICK
National Transportation Safety Board

MS. LETA A. BROWN
U.S. Nuclear Regulatory Commission

MS. ERIN WUCHTE
Office of Management and Budget

MR. JAMES B. HARRISON, Executive Secretary
Office of the Federal Coordinator for
Meteorological Services and Supporting Research

QL
959
.U6
N381
2004

LIBRARY

FEB 03 2005

National Oceanic &
Atmospheric Administration
U.S. Dept. of Commerce

FEDERAL COORDINATOR FOR METEOROLOGICAL SERVICES AND SUPPORTING RESEARCH

8455 Colesville Road, Suite 1500
Silver Spring, Maryland 20910
301-427-2002
www.ofcm.gov

NATIONAL WINTER STORMS OPERATIONS PLAN

FCM-P13-2004

Washington, D.C.
December 2004

CHANGE AND REVIEW LOG

Use this page to record changes and notices of reviews.

Change Number	Page Numbers	Date Posted	Initial
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Changes are indicated by a vertical line in the margin next to the change.

Review Date	Comments	Initial

FOREWORD

This is the 27th edition of the *National Winter Storms Operations Plan* (NWSOP). The purpose of the plan is to coordinate the efforts of the Federal meteorological community to provide enhanced weather observations of severe winter storms that impact the coastal regions of the United States. The goal is to improve the accuracy and timeliness of severe winter storm forecast and warning services provided by the Nation's weather service organizations. These forecast and warning responsibilities are shared by the National Weather Service, within the Department of Commerce and the National Oceanic and Atmospheric Administration (NOAA), and the weather services of the United States Air Force and the United States Navy, within the Department of Defense. While the plan documents requirements for surface, upper air, and satellite observations of all types, it focuses on the coordination of requirements for aircraft weather reconnaissance observations provided by the Air Force Reserve Command's 53rd Weather Reconnaissance Squadron and NOAA's Aircraft Operations Center.

Within the organizational infrastructure of the Office of the Federal Coordinator for Meteorological Services and Supporting Research (OFCM), the Working Group for Hurricane and Winter Storms Operations and Research (WG/HWSOR) is responsible for maintaining the plan. Most of the chapters in this edition have minor updates or changes. The information on satellite observations in Chapter 3 has been extensively updated.

During January and February of 1998, winter storm missions were flown in the Northeast Pacific Ocean in support of an adaptive observing strategy experiment called NORPEX 98. Similar missions were successfully flown during 1999 and 2000 seasons and have resulted in a continuing requirement to conduct winter storm missions in the North Pacific Ocean east of the international date line. One of the primary reasons for publishing this new NWSOP edition is to document the current Atlantic and Gulf of Mexico, Alaskan, and Hawaiian winter storm flight tracks in Appendices F, G, and H, respectively, which have been extensively revised.

Samuel P. Williamson
Federal Coordinator for Meteorological
Services and Supporting Research

TABLE OF CONTENTS

CHANGE AND REVIEW LOG ii

FOREWORD iii

TABLE OF CONTENTS v

LIST OF FIGURES vii

LIST OF TABLES viii

CHAPTER 1 RESPONSIBILITIES OF COOPERATING AGENCIES 1-1

1.1 General 1-1
1.2 Responsibilities 1-1

CHAPTER 2 AIRCRAFT RECONNAISSANCE 2-1

2.1 General 2-1
2.2 Responsibilities 2-1
2.3 Operational Control of Aircraft 2-1
2.4 Reconnaissance Planning and Flight Notification 2-2
2.5 Reconnaissance Flights 2-5

CHAPTER 3 OTHER OBSERVATIONS 3-1

3.1 General 3-1
3.2 Satellite Observations 3-2
3.3 Automated Coastal Marine and Ocean Observations 3-8

CHAPTER 4 COMMUNICATIONS 4-1

4.1 Department of Commerce 4-1
4.2 Department of Defense (DOD) 4-1
4.3 U.S. Coast Guard 4-1

CHAPTER 5 PUBLICITY 5-1

5.1 News Media Releases 5-1
5.2 Distribution 5-1

APPENDIX A ABBREVIATIONS A-1

APPENDIX B DEFINITIONS B-1

APPENDIX C AIR TRAFFIC CONTROL CLEARANCE LETTER C-1

APPENDIX D ALTITUDE RESERVATION APPROVAL REQUEST D-1

APPENDIX E FORMAT FOR NHOP/NWSOP FLIGHT INFORMATION FOR INTERNATIONAL AND DOMESTIC NOTAM ISSUANCE.....E-1

APPENDIX F ATLANTIC AND GULF OF MEXICO FLIGHT TRACKS.....F-1

APPENDIX G ALASKAN FLIGHT TRACKS G-1

APPENDIX H HAWAIIAN FLIGHT TRACKS H-1

APPENDIX I OFFICIAL INTERAGENCY AGREEMENTS.....I-1

APPENDIX J RECCO FORM, CODE TABLES, AND REGULATIONS J-1

APPENDIX K TEMP DROP CODE..... K-1

APPENDIX L DISTRIBUTION L-1

LIST OF FIGURES

Number	Figures	Page
Figure 2-1.	Sample mission evaluation form	2-4
Figure 2-2.	National Winter Storms Operations Plan Coordination Request	2-6
Figure 2-3.	Winter Storm Plan of the Day (WSPOD) Format	2-7
Figure F-1. through Figure F-6.	Atlantic and Gulf of Mexico Flight Tracks	F-2 to F-7
Figure G-1 through Figure G-29	Alaskan Flight Tracks	G-2 to G-30
Figure H-1 through Figure H-26	Hawaiian Flight Tracks	H-2 to H-27
Figure J-1.	Reconnaissance code recording form	J-2
Figure K-1.	Example TEMP DROP Message	K-7

LIST OF TABLES

Number	Title	Page
Table 2-1.	Requirement for aircraft reconnaissance data	2-12
Table 3-1.	Satellites and Satellite Data Availability for the National Winter Storms Operations Plan	3-6
Table 3-2.	Moored buoy payload data	3-9
Table 3-3.	Data from a typical fixed C-MAN station	3-10
Table 4-1.	Reconnaissance organization communications capabilities	4-2
Table J-l.	Reconnaissance code tables	J-3
Table J-2.	Reconnaissance code regulations	J-5

CHAPTER 1

RESPONSIBILITIES OF COOPERATING AGENCIES

1.1 General.

1.1.1 National Weather Service (NWS). The National Weather Service (NWS) is responsible for issuing winter storm forecasts, watches, warnings, and advisories to the public and various special user groups. Its responsibilities are documented in *National Weather Service Policy Directive 10-5,* Public Weather Services, and in *NWS Instruction 10-513*, WFO Winter Weather Products Specification. For further details on NWSI 10-513, consult the NWS Directives web site at *www.nws.noaa.gov/directives/010/010.htm* and click on *10-513 WFO Winter Weather Products Specification*. The other files are regional supplements to this instruction.

1.1.2 U.S. Navy (USN). The U.S. Navy, through the Naval Meteorology and Oceanography Command (NAVMETOCCOM), is responsible for issuing gale, storm, high seas warnings, and winter weather forecasts for fleet operations and Navy shore installations and Marine Corps operations and installations, as elaborated in the NAVMETOCCOM Instruction 3140.1 series.

1.1.3 U.S. Air Force (USAF). The U.S. Air Force, through local and centralized weather units, is responsible for issuing military weather warning advisories and point warnings to all Air Force and Army (including Reserve and National Guard) installations, facilities, and operations related to winter storms for those hazardous phenomena specified in local agreements (such as Memorandum of Agreements or local regulations).

1.2 Responsibilities.

1.2.1 The Department of Commerce (DOC). The DOC, through the National Oceanic and Atmospheric Administration (NOAA), will:

- Provide basic surface, upper air, and radar observations from its network of stations making such observations.

- Provide additional observations, when required, making available all reports to any requesting agency.

- Provide basic analyses and forecasts through the National Centers for Environmental Prediction (NCEP), Camp Springs, Maryland.

- Provide products under the multitier concept from Weather Forecast Offices (WFO) which will provide outlooks, watches, warnings, and advisories, when appropriate.

- Provide advice on aircraft reconnaissance requirements forwarded through NCEP's Tropical Prediction Center/National Hurricane Center (TPC/NHC) to the Chief, Aerial Reconnaissance Coordination, All Hurricanes (CARCAH), from NCEP's Hydrometeorological Prediction Center (HPC) (the HPC is the central coordinating office for all winter storm reconnaissance requirements).

- Operate satellite systems capable of providing coverage of the coastal areas of the contiguous United States during the winter storm season.

- Coordinate with the National Aeronautics and Space Administration (NASA) to obtain pertinent meteorological data from NASA research and development experimental satellites.

- Coordinate with the Department of Defense (DOD) to obtain pertinent meteorological data from the Defense Meteorological Satellite Program.

- Provide satellite data for selected situations to authorized research facilities.

- Furnish aircraft from the NOAA Aircraft Operations Center (AOC) to support the following operational reconnaissance objectives:

  - The primary objective is to provide additional real-time meteorological data to operational forecasters in an attempt to improve the quality of forecasts associated with winter coastal storms.

  - The secondary objective is to provide the data and analyses to better understand the structure and dynamics of these winter storm systems.

- Provide oceanographic and meteorological surface data obtained from offshore buoy deployment, if possible, within existing facilities.

- Provide dissemination of weather observations to appropriate agencies.

1.2.2 The Department of Defense (DOD). The DOD will:

- Make available to NOAA agencies, through the Air Force Weather Agency (AFWA), basic surface, upper air, and radar observations from those DOD stations making such observations, pilot reports (PIREP), and aircraft reports (AIREP) that become available.

- Furnish to NWS, aircraft reconnaissance observations that are within its capabilities and in accordance with established reconnaissance priorities, and special observations detailed in Chapter 2 of this plan.

- Designate CARCAH as the point of contact for coordination with NCEP/HPC for aircraft reconnaissance required in support of this plan.

- Provide weather reconnaissance data monitor services to evaluate and disseminate reconnaissance reports.

- Provide satellite communications (SATCOM) access to relay reconnaissance reports from the aircraft to CARCAH.

- Provide USAF aeronautical station communications to relay reconnaissance reports from the aircraft to CARCAH.

- Provide warnings to all DOD facilities and military units of weather that threatens to impact their operations or damage their installations.

1.2.3 Department of Transportation (DOT).

1.2.3.1 The Federal Aviation Administration (FAA). The FAA will:

- Provide Air Traffic Control (ATC) services as appropriate to support this plan.

- Disseminate PIREPs and AIREPs.

- Provide hourly and special weather observations at selected terminal and flight service station locations.

1.2.3.2 The U.S. Coast Guard (USCG). The USCG will:

- Provide surface observations to NWS from its coastal facilities and vessels.

- Collect special weather observations from surface ships of opportunity and provide them to the NWS.

- Provide personnel, vessel, and communications support to the National Data Buoy Center for development, deployment, and operation of environmental data buoy systems.

CHAPTER 2

AIRCRAFT RECONNAISSANCE

2.1 General. All Department of Commerce (DOC) winter storm reconnaissance needs will be requested and provided in accordance with the procedures of this chapter. As currently defined, the winter storm season runs from 1 November through 15 April. The DOC has identified a requirement for, and the Department of Defense (DOD) maintains aircraft to support up to two operational weather reconnaissance sorties per day. In times of national emergency or war, some or all DOD reconnaissance resources may not be available to fulfill DOC needs.

2.2 Responsibilities.

2.2.1 DOD. The DOD, through the Air Force Reserve Command's 53rd Weather Reconnaissance Squadron (53 WRS), is responsible for providing operational aircraft for winter storm synoptic tracks in the Atlantic Ocean, Gulf of Mexico, and North Pacific Ocean east of the international date line in response to DOC needs. In order to respond to DOC Pacific Winter Storm requirements, the 53 WRS routinely deploys to either Elmendorf AFB, Alaska, or Hickham AFB, Hawaii, during the January and February time frame. The amount of time deployed on station is precoordinated with DOC prior to the winter storm season.

The Global Decision Support System (GDSS) JCS Priority Code for tasked, operational weather reconnaissance is **1A3** (IAW DOD Regulation 4500.9-R and Joint Publications 4-01 and 4-04). The Force Activity Designator (FAD)/Urgency of Need Designator (UND) Supply Priority Designator Determination code is **IIA2** (IAW Joint Publication 4-01 and Air Force Manual 23-110, Volume 2, Part 13, Attachment 3A-2.)

2.2.2 DOC. The DOC, through the NOAA Aircraft Operations Center (AOC), is responsible for aircraft operations that will be used in support of National Centers for Environmental Prediction/ Hydrometeorological Prediction Center (NCEP/HPC) or as backup for 53 WRS aircraft reconnaissance for an East Coast storm or storm threat. Additionally, NOAA AOC aircraft missions may be flown on West Coast storms and storms of research interest as requested by the NOAA line offices. All such flights will be listed by the Chief, Aerial Reconnaissance Coordination, All Hurricanes (CARCAH) in the Winter Storm Plan of the Day (WSPOD).

2.2.3 DOT. The DOT is responsible for providing air traffic control services to aircraft when within airspace controlled by the FAA. This includes offshore oceanic airspace. Detailed procedures for the expeditious handling of winter storm reconnaissance aircraft are outlined in paragraph 2.5, Reconnaissance Flights.

2.3 Operational Control of Aircraft. Operational control of aircraft flying winter storm reconnaissance missions will remain with the operating agencies of DOC or DOD, as appropriate.

2.4 Reconnaissance Planning and Flight Notification.

2.4.1 Requirements. NCEP/HPC will forward mission requirements to CARCAH for tasking in the WSPOD within the responsibilities stated above. The CARCAH will advise NCEP/HPC of mission availability or nonavailability and expected responsiveness of DOD and DOC assets. NCEP/HPC will be responsible for requesting all reconnaissance flights and will provide information as specified in paragraph 2.4.5. NCEP/HPC will also forward NWS mission requirements for the next 24-hour period (1100 UTC to 1100 UTC) and an outlook for the succeeding 24 hours to CARCAH not later than 1530 UTC each day. CARCAH will pass all tasking, amendments, and cancellations to the flying units.

2.4.2 Change to Requirements. Changes to mission requirements will be accepted by CARCAH based on the following guidelines:

- Early departures will not be requested.
- When notification is received more than 2 ½ hours prior to scheduled aircraft departure:
  - Changes to tracks normally will be limited to substitution of one track for another.
  - Departure delays of up to 6 hours will be acceptable in accordance with Air Force Instruction (AFI) 11-2C130 Volume 3, paragraph 3.4, Alerting Procedures.
  - Delays affecting missions operating under Altitude Reservation (ALTRV) procedures may cause cancellation of the ALTRV in accordance with "AVANA" procedures, FAA Order 7610.4, Special Military Operations.
  - When notification is received more than 4 hours prior to scheduled aircraft departure time, departure delay requests will be evaluated in accordance with appropriate flight management directives.

2.4.3 Cancellation of Requirements. Missions should be canceled prior to aircraft departure and as much in advance as possible to allow maximum resource conservation. Cancellation after departure may result in degradation of follow-on mission capability.

2.4.4 Satisfaction of Requirements.

2.4.4.1 Satisfied. Requirements are considered satisfied when an observation is or could have been taken (as in the case where aircraft are diverted from original track) at the specified location (control point) by the expiration time and a sufficient number of drops were accomplished to satisfy the customer's requirements.

2.4.4.2 Missed. Requirements are either satisfied as per paragraph 2.4.4.1 or they are considered missed.

2.4.4.3 Written Assessment. The requesting agency, NCEP/HPC and/or a WFSO, will provide CARCAH a written evaluation (Figure 2-1) of the weather reconnaissance mission any time its timeliness and quality are outstanding or substandard. Requirements levied as "resources permitting" will not be assessed for timeliness. These assessments should be mailed to CARCAH at:

CARCAH
National Hurricane Center
11691 SW 17th Street
Miami, FL 33165-2149

2.4.4.4 Reconnaissance Summaries. CARCAH will maintain seasonal reconnaissance summaries detailing missions actually flown to satisfy levied requirements.

2.4.5 Reconnaissance Winter Storm Plan of the Day (WSPOD).

2.4.5.1 Coordination. NCEP/HPC will coordinate with the appropriate National Weather Service (NWS) field offices as needed and provide WSPOD information (Figure 2-2.) to CARCAH by 1530 UTC for East Coast requirements and 1830 UTC for West Coast requirements. Direct discussion in weather situations is also encouraged between the Navy and NCEP with respect to storms or storm threats. The East Coast Navy point of contact is the Naval Atlantic Meteorology and Oceanography Center (NAVLANTMETOCCEN) through their Norfolk Command Duty Officer. NCEP/HPC will provide the following data to CARCAH when applicable:

- Track and flight level desired.
- Selected trackpoint (control point) and time the aircraft is required at the point.
- Dropsonde release points and special requirements.
- Expiration time of requirement (latest time at the control point when the mission requirement is regarded as satisfied).
- Succeeding day outlook (anticipated track, control point, control point time).

DATE

TO: CARCAH

FROM:

SUBJECT: MISSION _____ EVALUATION
(MISSION IDENTIFIER)

I. PUBLISHED REQUIREMENTS

1. CONTROL POINT AND TIME _____

2. FLIGHT TRACK

3. EXPIRATION TIME of REQUIREMENT _____

4. MISCELLANEOUS (DROP PSNS, ALTITUDES, etc.) _____

_____

II. RECONNAISSANCE MISSION PERFORMANCE

1. CONTROL PT TIME: _____ ON TIME _____ LATE _____ EARLY _____ MISSED

2. FLIGHT TRACK FLOWN: _____ COMPLETELY _____ PARTIALLY _____ OTHER

3. HORIZONTAL DATA COVERAGE: COMPLETE TIMELY ACCURATE

INCOMPLETE ____ UNTIMELY ____ INACCURATE

4. VERTICAL DATA COVERAGE: COMPLETE _____ TIMELY _____ ACCURATE

INCOMPLETE _____ UNTIMELY ____ INACCURATE

III. OVERALL MISSION EVALUATION

OUTSTANDING

UNSATISFACTORY ___ FOR: COMPLETENESS _____ ACCURACY ____ TIMELINESS

EQUIPMENT ____ PROCEDURES ____ OTHER

IV. REMARKS (BRIEF BUT SPECIFIC) _____

_____

V. REPLY BY ENDORSEMENT ____ YES ____ NO

(Forecaster's Signature)

Figure 2-1. Sample mission evaluation form.

2.4.5.2 Preparation. Using requirements stated by NCEP/HPC, CARCAH will prepare the WSPOD daily between November 1 and March 31, and at other times during the year as required. CARCAH will coordinate with DOD and DOC to effect maximum useful data from available resources. Format for the WSPOD is shown in Figure 2-3. The 53 WRS and NOAA AOC flight operations planners will plan tasked missions to meet Control Point/Control Time criteria and will fly the route in the most efficient direction possible. If a specific direction is desired (clockwise or counterclockwise), it should be indicated in the WSPOD; e.g., Track WSRP-P32 CW or Track WSRP-A64 CCW. Tasking agencies should <u>not</u> use the terminology "Reverse" indicated by an "R" when requesting a track.

2.4.5.3 Dissemination. The WSPOD will be made available in message form to all appropriate agencies, such as FAA, DOD, and NOAA, that provide support or control reconnaissance aircraft. The CARCAH will be responsible for disseminating the WSPOD as soon as possible after DOC requirements, including changes, are received. If there are no current day or succeeding-day reconnaissance requirements, a negative report, which covers the appropriate time frame, will be disseminated. Amendments will be disseminated as required. During the month of November, the WSPOD will be disseminated as a NOTE added to the Tropical Cyclone Plan of the Day (TCPOD). *NOTE: The WSPOD is disseminated under the header "MIAREPRPD" for AWIPS users and "NOUS42 KNHC" for AWDS users. The WSPOD can be accessed via Internet at www.hurricanehunters.com/wxdata.htm and clicking on Plan of the Day or via the Tropical Prediction Center/National Hurricane Center home page at www.nhc.noaa.gov--chick on aircraft reconnaissance and then on Plan of the Day.*

2.4.5.4 Responsiveness.

- Notification of reconnaissance requirements should be made early enough to allow 16 hours plus en route flying time to the control point.

- The succeeding day outlook portion of the WSPOD is designed to allow advance notification.

- When circumstances do not allow the appropriate notification lead time, the mission will be levied as "resource permitting."

2.5 <u>Reconnaissance Flights</u>.

2.5.1 General Storm Tracks.

2.5.1.1 Mission Track/Flight Plan Names. The nomenclature for winter storms aircraft reconnaissance is "Winter Storm Reconnaissance Program," and the tracks are labeled: "WSRP-A ##" for Atlantic Ocean and Gulf of Mexico tracks and "WSRP-P ##" for Pacific Ocean tracks. For example, a mission to be flown from Hawaii might be tasked as "Track WSRP-P 33." The tracks are published in appendices to this document.

NWSOP Coordinated Request for Aircraft Reconnaissance

_____ 1. No flight is desired or previously requested flight is cancelled.

_____ 2. A flight is requested.

A. Track Number and altitude

_____

B. Control point and control point time

_____

C. Expiration time (at control point)

_____

D. Specific instructions (such as dropsonde positions)

_____

_____

3. Succeeding day outlook.

_____ A. Negative

_____ B. Possible Track Number _____

Control point and time _____

4. Coordination (initials)

NCEP/HPC _____ 53 WRS _____

AOC _____ CARCAH _____

INSTRUCTIONS: Date and Time _____. Fill in appropriate spaces as required. Pass all requests, changes, or cancellations to CARCAH immediately.

Figure 2-2. National Winter Storms Operations Plan Coordination Request.

FM: CARCAH, NATIONAL HURRICANE CENTER, MIAMI, FL

TO: (AFRC/NOAA APPROVED ADDRESSEES)

SUBJECT: RECONNAISSANCE WINTER STORM PLAN OF THE DAY (WSPOD)
VALID _____Z (MONTH) TO _____ Z (MONTH) (YEAR)
WSPOD NUMBER.....(YR) -

1. FLIGHT ONE

A. _____ (TRACK/CONTROL POINT/TIME)

B. _____ (MISSION IDENTIFIER)

C. _____ (DEPARTURE POINT/ESTIMATED DEPARTURE TIME)

D. _____ (DROP POSITIONS)

E. _____ (ALTITUDE/EXPIRATION TIME)

F. _____ (REMARKS, if needed)

2. OUTLOOK FOR SUCCEEDING DAY

A. _____ (ANTICIPATED TRACK/CONTROL POINT/TIME)

B. _____ (REMARKS, if needed)

Figure 2-3. Winter Storm Plan of the Day (WSPOD) Format.

2.5.1.2 ATC Communications Backup. When 53 WRS or AOC flights are unable to contact ATC to request an en-route clearance, a clearance request may be relayed through the Chief, Aerial Reconnaissance Coordination, All Hurricanes (CARCAH) or the 53 WRS Mission Commander if the aircraft has the capability to communicate digitally through the satellite communications relay. This communications relay may only be used to preclude an emergency or safety-related situation. (See ATC Clearance procedures letter, Appendix C.)

2.5.1.3 Airborne Diversions. Within operational limitations and with prior FAA Air Route Traffic Control Center (ARTCC) approval, airborne diversions deemed advisable by the airborne meteorologist may be made from these tracks.

2.5.1.4 Permanent Changes to Tracks. Permanent changes to winter storm reconnaissance tracks must be coordinated with DOD, FAA, and DOC at least 30 days in advance of the implementation date.

2.5.2 Flight Plans. Flight plans for reconnaissance flights will be filed with the FAA as soon as practicable before departure time.

2.5.2.1 Prior Coordination. The 53 WRS Mission Commander or the AOC Operations Division, as appropriate, will contact the FAA Central Altitude Reservation Function (CARF) at the Air Traffic Control System Command Center (ATCSCC) and, if appropriate, submit an Altitude Reservation Approval Request (ALTRV APREQ) at least 12 hours prior to an NWSOP mission. Individual exceptions may be made to the 12-hour requirement on a case-by-case basis through coordination between the 53 WRS, AOC, and CARF. Include the following information in the APREQ (see sample APREQ, Appendix D):

- Mission call-sign.
- Track name/identifier.
- Estimated time over start ALTRV point.
- Location of dropsonde release points.
- Requested altitudes/flight levels.
- Any special requests or deviations from published routes.

(**Note**: If the track to be flown is not a published storm track, the ALTRV APREQ shall be submitted as far in advance as possible, in standard ALTRV format as specified in FAA Handbook 7610.4, Special Military Operations.)

2.5.2.1.1 The 53 WRS Mission Commander and the AOC Flight Operations Division will contact the National Operations Manager (NOM) at the ATCSCC as soon as possible prior to the NWSOP reconnaissance, surveillance, or research mission and provide the information specified in paragraph 2.5.2.1 (Prior Coordination) above. The ATCSCC will then coordinate this information with all FAA facilities impacted. In addition, the 53 WRS and/or AOC shall transmit via facsimile the information in Appendix E to the U.S. NOTAM office no later than 2 hours prior to departure or as soon as possible.

2.5.2.1.2 For Pacific Ocean NWSOP(WSRP-P) missions, 53 WRS or AOC officials may, upon receipt of tasking, coordinate directly with the affected ARTCC. An ALTRV APREQ may be submitted to CARF if the 53 WRS Mission Commander or the AOC Flight Operations Division deem it appropriate to increase the effectiveness of the flight planning process. When submitting an ALTRV APREQ, the procedures in paragraph 2.5.2.1 will be followed.

2.5.2.1.3 CARF will process the ALTRV APREQ and coordinate it with the impacted ATC facilities. The 53 WRS and AOC Project Officers shall coordinate with the agencies specified in FAA Order 7610.4 , Special Military Operations, Chapter 3, Section 5, Originator Responsibilities.

2.5.2.1.4 Tracks flown in support of the NWSOP shall be defined in appendices to the plan. Changes, additions, and deletions to these tracks shall be coordinated between the 53 WRS, AOC , NOAA, and the FAA. These tracks shall be reviewed annually, no later than 1 June.

2.5.2.1.5 The 53 WRS shall only use the call sign "Teal ##," and AOC shall only use "NOAA ##." ATC will provide TEAL and NOAA aircraft priority handling when specifically requested.

2.5.2.1.6 For NWSOP missions, 53 WRS crews may request one of five "discreet" Mode 3 Beacon Codes, as issued by the Department of Defense (DOD) Code Manager.

2.5.3 Flight Levels. Tracks are normally tasked for the 300 mb level (FL 310). If unable to maintain the tasked altitude for any reason, fly as close to the tasked level as possible. When operating under an Instrument Flight Regulation (IFR) flight plan, reconnaissance aircraft will fly only at Air Traffic Control (ATC) assigned altitudes and will accept altitude changes as directed by ATC.

2.5.4 Dropsonde Releases/Sensor Activations. During NWSOP missions, when in other than Class G airspace, dropsonde instrument releases from FL 190 or higher and sensor activation shall be coordinated with the appropriate ATC by advising of a pending drop or sensor activation at least 10 minutes prior to the event when in direct radio contact with ATC. When contact with ATC is via Aeronautical Radio, Incorporated (ARINC), event coordination shall be included with the position report prior to the point where the action will take place, unless all instrument release points have been previously relayed to the affected ATC center(s). EXAMPLE: "TEAL 63, SLATN at 1215, FL310, estimating FLANN at 1250. CHAMP next, Weather instrument release at FLANN."

2.5.4.1 Advisory Broadcasts. During NWSOP missions, commencing 5 minutes prior to release of dropsondes from FL190 or higher, the aircraft commander will broadcast in the blind on 121.5 MHZ and 243.0 MHZ to advise any traffic in the area of the pending drop.

2.5.4.2 Aircraft Commander Responsibilities. Aircraft commanders are the sole responsible party for all dropsonde releases or sensor activations. They are also responsible for

determining the content and duration of a broadcast, concerning a dropsonde release or sensor activation.

2.5.5 Air Traffic Control (ATC).

2.5.5.1 ATC Priority. If mission requirements dictate, crews may specifically request "Priority Handling" from ATC in accordance with FAA Order 7110.65, Air Traffic Control, paragraph 2-1-4.1. (See ATC Clearance Letter, Appendix C).

2.5.5.2 ATC Separation. The FAA will provide ATC services and separation from nonparticipating aircraft flying on instrument flight rules (IFR) to the 53 WRS and AOC aircraft operating in other than Class G airspace. Aircraft not flying on instrument flight rules may be operating near the storm environment; therefore, adherence to ATC clearances is mandatory for safety purposes.

2.5.5.2.1 It is the responsibility of the aircraft commander to remain clear of obstacles and nonparticipating aircraft when operating in Class G airspace.

2.5.5.2.2 The 53 WRS and AOC are responsible for ensuring that air traffic clearances and messages are relayed to/from the FAA in an accurate manner when those relays are initiated by the 53 WRS or AOC and are routed by some other means other than ARINC.

2.5.5.3 Assigned Altitudes. When storm aircraft cannot maintain assigned altitudes due to turbulence, ATC should be advised. Normal vertical separation of 1000 feet at flight level (FL) 290 and below and 2000 feet above FL 290 will be provided by ATC to aircraft operating in the storm area. Unless otherwise coordinated with ATC, the altitudes between storm-mission aircraft may be used by ATC for nonparticipating aircraft.

2.5.5.4 Military Clearance. For the east coast storms, the U.S. Navy through Commander in Chief, Atlantic Fleet Oceanic Aircraft Coordinator (CINCLANTFLT OAC) will review the WSPOD for each proposed flight to determine if clearance into a particular area will be required. Each mission will need to be coordinated with the regional controlling agencies for each warning area. The reconnaissance unit flying the mission will contact the appropriate clearance agencies prior to entry into any restricted airspace.

2.5.5.5 Coordination of Non-Standard Procedures. Any procedure desired by storm-mission commanders that is outside the above parameters must be coordinated with the appropriate ATC center.

2.5.6 Data Requirements. Data requirements are defined in Table 2-1. Data will be coded and transmitted in standard reconnaissance code (RECCO) for flight level observations (Appendix J) or World Meteorological Organization upper-level pressure, temperature, humidity, and wind report from a dropsonde released by carrier balloons or aircraft (WMO TEMP DROP) format for dropsonde soundings (Appendix K).

2.5.6.1 First Observation Remarks. A plain language remark stating the departure station (International Civil Aviation Organization (ICAO) four-letter identifier), time of departure, and estimated time of arrival (ETA) at the coordinates of the control point will be appended to the first observation.

EXAMPLE: URNT10 KNHC 051845
97779...TEXT...
RMK AF980 WSWSA TRACK 01 OB 01
DPTD KBIX 05/1800Z. ETA 36.9N 72.7W 06/0210Z.

2.5.6.2 Last Observation Remarks. A plain language remark stating ETA and intended arrival station (ICAO four-letter identifier), number of observations, and monitor that copied observations will be appended to the last observation.

EXAMPLE: URNT10 KNHC 060210
97779...TEXT...
RMK NOAA3 WSWSC TRACK 02 OB 23
ETA KMCF 06/0330Z. LAST REPORT OBS 01 THRU 23 TO KNHC.

2.5.6.3 Mission Identifiers. The identifiers issued by CARCAH will be based on the departure point and will include the aircraft number, track number, and a basin identifier--WSWSA for the Atlantic, WSWSE for the Eastern Pacific, and WSWSC for the Central Pacific.

Table 2-1. Requirement for aircraft reconnaissance data.

Data Required	Altitudes where data are required	Portion of environment where data are needed	Time and frequency of observations	Accuracy required
Synoptic data --pressure (heights), temperature, moisture, and winds--for national weather prediction and medium range forecasting.	At altitudes indicated in the WSPOD.	Throughout the marine portion of area as defined in Chapter 1.	**Dropsondes as specified in Plan of the Day (drop interval approximately 300 nm (550 km)). While over water, horizontal observations approximately every 20 minutes, at major turn points, and at the control point.	+/- 5 kt (2.5 m/s) (wind speed) +/- 10° (wind direction) +/- 1°C +/- 20m +/- 2 mb (200 Pa) Position within 20 nm (37 km)
Location and strength of radar echoes.	Any level.	All sectors.	When available.	

*Ocean wave heights and wave lengths will not be reported by USAF aircraft.
**Includes dropwindsondes. If a dropsonde fails or vertical data are otherwise unobtainable at a specified position, make another release as soon as possible.

CHAPTER 3

OTHER OBSERVATIONS

3.1 General. In addition to aerial reconnaissance data, the observational systems used in support of the *National Winter Storms Operations Plan* include land surface, ship, radar, buoy, upper air, and satellite data. The routine operations of these various data sources are detailed in the following Federal Meteorological Handbooks and plans:

- Federal Meteorological Handbook No. 1, *Surface Weather Observations and Reports*
- Federal Meteorological Handbook No. 2, *Surface Synoptic Codes*
- Federal Meteorological Handbook No. 3, *Rawinsonde and Pibal Observations*
- Federal Meteorological Handbook No. 11, *Doppler Radar (Parts A, B, C, and D)*
- *Operations of the National Weather Service*
- *Federal Plan for Environmental Data Buoys*
- The *GOES User's Guide* and operational amendments
- *The NOAA Polar Orbiter Data Users Guide*
- *National Operations Plan for Drifting Data Buoys*
- *The Coastal Marine Automated Network (C-MAN) NWS Users Guide*
- *Tide/Water Level Information Data and Evaluation System (TIDES) NWS Users Guide*

Procedures for obtaining special or non-routine observations required in support of winter storm detection and forecasting, while covered to some extent in these documents, are described in detail in *National Weather Service Operations Manual*, Chapter B-90, "Special Warning Program Observations." The chapter covers observational programs of several agencies involved. The only two observational programs that will be covered in any detail here are the two data sources that provide unique capabilities to support winter storm analysis and forecasting.

3.2 Satellite Observations.

3.2.1 Department of Commerce (DOC), National Oceanic and Atmospheric Administration (NOAA), National Environmental Satellite, Data, and Information Service (NESDIS).

3.2.1.1 Geostationary Operational Environmental Satellite (GOES). Using modern 3-axis stabilization for orbit control, GOES-12 at 75°W and GOES-10 at 135°W support the operational two-GOES constellation. Independent imager and sounder instruments eliminate the need to time share, yielding an increase in spatial coverage of image and sounder data at more frequent scanning intervals. The GOES also provides higher resolution and additional spectral channels than its predecessor, affording the hydrometeorological community improvements in detection, monitoring, and analysis of winter storms. From 135° W and 75° W, routine GOES satellite data coverage is extensive, stretching from the central Pacific through the Americas to the eastern Atlantic.

Routinely, each GOES schedule provides a view of the CONUS (GOES-10 view is termed PACUS) every 15 minutes. More frequent interval scans can be employed to support NOAA's warning programs, including the tracking of winter storms. Government agencies and the private sector have access to digital data transmissions directly from NOAAPORT or directly from GOES.

The current series of GOES satellites provide satellite data generated from full resolution, and imager and sounder data. Imagery at 1, 4, and 8 km resolution is available for daytime and nighttime applications. The increased resolution of the satellite imagery is a vast improvement from previous satellites. Visible data are available at 1 km resolution, "shortwave infrared" (channel 2 data) as well as the infrared channels 4 and 5 on GOES-10 are available at 4 km resolution, and water vapor (channel 3) is available at 8 km resolution on GOES-10 and 4 km on GOES-12. Channel 2 data are valuable for the detection of low clouds, fog, stratus, and surface hot spots; channel 5 data available on GOES-10, in combination with data from channels 2 and/or 4, are useful for detecting volcanic ash in the atmosphere. On GOES-12, channel 5 is replaced by a new 13.3μ channel 6 that detects the presence of CO_2. Channel 6 improves the measurement of the height of clouds and volcanic ash, thus improving computer model forecasts and ash warnings to the aviation community. The digital data may be enhanced to emphasize different features as desired. A suite of digital data and products is available to users in the National Weather Service (NWS), the National Environmental Satellite, Data, and Information Service (NESDIS), other Federal agencies, the academic community, and many private agencies, both national and international. These data are made available through NOAAPORT, McIDAS, the Internet, and other means such as local networks.

3.2.1.1.1 GOES-12. GOES-12, launched July 23, 2001, supports the GOES-East station at 75°W, serves NOAA operations including the HPC, WFOs, other Federal agencies, and the private sector. Various imager channels at higher resolutions are being utilized to monitor the intensification and movement winter storms. Retrievals from the GOES sounder are incorporated into NCEP's numerical models to improve model output. In addition, sounder data are being exploited to generate derived- product imagery; such as, total precipitable water, atmospheric stability indices, and surface and cloud temperatures.

3.2.1.1.2 GOES-9. GOES-9, launched May 2, 1995, was replaced by GOES-10 as the operational satellite located at 135°W due to an imminent failure of GOES-9. While some momentum wheel problems exist on GOES-9, it remains capable of performing operations. GOES-9 replaced the Japanese Meteorological Agency's (JMA) GMS-5 over the west Pacific in mid-2003. The GMS-5 satellite has outlived its designed lifetime and has no fuel on board to maintain its inclination. JMA and NESDIS agreed to replace GMS-5 with GOES-9 to continue imagery over the Pacific Ocean as well as eastern Asia, Japan, and Australia. This will be the first time sounder data from GOES is captured over much of the Pacific Ocean.

3.2.1.1.3 GOES-10. GOES-10, a clone of GOES-8, was launched on April 24, 1997, and supports the GOES-West station at 135°W. The spacecraft carries the same specified imager and sounder instruments as GOES-8 and GOES-9. GOES-10 was declared operational in July 1998 and was moved to 135°W. The routine scanning mode of GOES-10 provides coverage of the Northern and Southern Hemisphere eastern Pacific Ocean as well as the western United States. The GOES-West satellite also supports the missions of the HPC and WFOs, providing coverage of developing winter storms in the Pacific. The DOD and other Federal agencies are also supported.

3.2.1.1.4 GOES-11. GOES-11 was launched on May 3, 2000. GOES-11 is also a clone of GOES-8 and carries the same imager and instrumentation capabilities as GOES-8 and GOES-10. GOES-11 is stored on orbit until required to replace either of the operational satellites.

3.2.1.1.5 GOES-8. GOES-8 was launched on April 13, 1994. On May 5, 2004, GOES-8 was de-orbited after a decade of service and can no longer serve as a backup satellite.

3.2.1.1.6 GOES Scan Operations. The spacecraft routinely scans the United States every 15 minutes. A full disk image is scanned every 3 hours and takes nearly 30 minutes to complete. Forecasters view digital GOES data more frequently and with greater spatial resolution. The digital data provide the user with the flexibility to customize gridding and enhancement curves for the data. The GOES spacecraft were also designed for flexible scanning of the earth. Any variation of scan or sector coverage at regular time intervals can be scheduled in a 30-minute time frame. Rapid Scan Operations (RSO) and Super-Rapid Scan Operations (SRSO) are available on the current generation of satellites. RSO and SRSO allow for small sections of the earth to be scanned more frequently, at up to 1-minute intervals; however, by doing so, other portions of the earth are scanned with less regularity. Definitions of the GOES RSO and SRSO scanning coverage and scanning times can be found at *www.ssd.noaa.gov*, then "click on" GOES Satellite Operations, or go directly to *www.ssd.noaa.gov/PS/SATS/index.html*.

3.2.1.1.7 Requests for Special Satellite Sectors. Special RSO and SRSO GOES data on critical severe storm days may be requested via the NCEP Senior Duty Meteorologist (SDM). The SDM will coordinate operational requests through the NESDIS Satellite Services Division (SSD), Satellite Analysis Branch (SAB). The details of these procedures are described in the NESDIS/NWS Satellite Schedule Coordination and Dissemination Procedures Plan, which is available on the SSD web site (*www.ssd.noaa.gov/PS/SATS/satops/*) for National Weather Services users and selected other users such as CIRA.

3.2.1.1.8 GOES Imager and Sounder. GOES-10 and GOES-12 host an imager capable of detecting atmospheric temperature and moisture measurements in five spectral bands at high resolutions, including the new 3.9μ and 12.0μ (GOES-10) and 13.3μ (GOES-12) wavelengths. GOES-10 and GOES-12 also have the feature of transmitting these five spectral bands simultaneously, affording the user community continuous views of atmospheric measurements in various wavelengths, each with its own meteorological and hydrological applications. The five channels and respective resolutions are as follows:

- Channel 1 (Visible, 0.55 to 0.75 microns) - 1 kilometer resolution
- Channel 2 (Infrared, 3.8 to 4.0 microns) - 4 kilometer resolution
- Channel 3 (Water vapor, 6.5 to 7.0 microns) - 8 kilometer (GOES-10), 4 kilometer (GOES-12)
- Channel 4 (Infrared, 10.2 to 11.2 microns) - 4 kilometer resolution
- Channel 5 (Infrared, 11.5 to 12.5 microns) - 4 kilometer (GOES-10 only)
- Channel 6 (Infrared, 13.0 to 13.7 microns) - 8 kilometer (GOES-12 only)

The sounder on GOES-10 and GOES-12, consisting of 19 spectral channels, is used for measurements of atmospheric temperature and moisture profiles, surface and cloud-top temperature, and ozone distribution. Products derived from the sounder include precipitable water and the lifted index--a measure of atmospheric instability. Comparable to the imager, the sounder is capable of providing various scan coverages, such as full earth imagery, sectorized imagery, and local imagery. An independent sounder platform, governed under its own schedule, provides an expansion of sounder data coverage and an increase in the frequency of transmissions. GOES-10 and GOES-12 also carry vital subsystems; such as, the Solar X-Ray Imager (SXI), Space Environment Monitor (SEM), Data Collection System (DCS), Weather Facsimile (WEFAX), and Search and Rescue (SAR) operations.

3.2.1.1.9 GOES Products. Under the NESDIS support concept, satellite imagery, in support of the National Winter Storms Operations Plan, is distributed by the Environmental Satellite Distribution/Interactive Processing Center in Camp Springs, Maryland, to the national centers (NCEP), NWS Weather Forecast Field Offices (WFO), and to the Satellite Analysis Branch (SAB) and other NESDIS units. Data from the polar-orbiting satellites is available to SAB and the NCEP national centers, but not to NWS field sites.

NESDIS operates 24 hours a day to provide a myriad of satellite services and products to NCEP and NWS field sites. Internally at the NOAA Science Center, SAB meteorologists provide satellite interpretation and analyses to NCEP meteorologists, relating valuable information on present locations and intensities of winter storms, as well as the projected movement and development of these storms. In addition, snowfall estimates are derived from satellite signatures and reported to NCEP and the WFOs to assist forecasters in determining fall rates and projected accumulations. As conditions warrant, winter storm precipitation analyses and estimates are disseminated to the appropriate WFOs and River Forecast Centers (RFC) across the United States.

All WFOs have access to the digital GOES data stream through AWIPS workstations. The satellite data feed to AWIPS/NOAAPORT is performed at the Satellite Central Data Distribution Facility in Camp Springs, MD. A large amount of satellite data are also available on a number of web site servers, both government operated and in the private sector.

The principal GOES-10 and GOES-12 products (see Table 3-1) are half-hourly pictures with navigation and calibration files included. During daylight hours, 1, 2, 4, and 8 kilometer resolution visible fixed standard sectors are produced for AWIPS/NOAAPORT distribution. Equivalent infrared sectors (4 kilometer), including water vapor (4 or 8 kilometer), for all available channels are available 24 hours a day. Satellite raw and remapped imagery, with navigation and calibration, is available to McIDAS users within the NWS and NESDIS community. Using the 3.9μ and 10.7μ channels together, a low-level cloud/fog product is produced, which the WFOs now use routinely.

3.2.1.2 24-Hour Points of Contact.

- NCEP/NCO Senior Duty Forecaster (SDM)--301-763-8298
- NCEP/HPC Senior Branch Forecaster--301-763-8201
- NESDIS/SAB--301-763-8444

3.2.1.3 NOAA Polar-Orbiting Satellites. Two primary operational NOAA polar-orbiting satellites, NOAA-16 and NOAA-17, provide image coverage four times a day over a respective area in 6 spectral channels (only supports 5 channels at one time, with channel switching to support the 6th channel on NOAA-17). These satellites cross the U.S. twice per day at 12-hour intervals for each geographical area near the Equatorial crossing times listed in Table 3-1. NOAA-16 and NOAA-17 provide the same capabilities as previous NOAA satellites, except for the addition of an Advanced Microwave Sounder Unit (AMSU). Data are available via direct readout--high resolution picture transmission (HRPT) or automatic picture transmission (APT)--or central processing. The Air Force Weather Agency (AFWA), Offutt AFB, NE, receives global NOAA imagery data direct from central readout sites on a pass-by-pass basis. The Command and Data Acquisition (CDA) stations at Fairbanks, AL, and Wallops, VA, acquire recorded global area coverage data, and then route the data to NESDIS computer facilities in Suitland, MD, where the data are processed and distributed to the NOAA, the DOD, and private communities.

3.2.1.3.1 NOAA-15. NOAA-15 is used as a backup satellite. While NOAA-15 continues to provide continuous imagery and products, their use is secondary to the operational uses of NOAA-16 and NOAA-17 imagery and products. Also, some users continued to need NOAA-15 data after NOAA-17 became operational. These data include sounder-based derived products like rain rate and total precipitable water.

3.2.1.3.2 NOAA-16. NOAA-16 was launched on September 21, 2000, and is in full operational use with the same capabilities as NOAA-15.

3.2.1.3.3 NOAA-17. NOAA-17, launched June 24, 2002, is in full operational use with the same capabilities as NOAA-15 and NOAA-16.

3.2.2 Department of Defense (DOD) Defense Meteorological Satellite Program (DMSP). The DMSP constellation consists of at least three spacecraft placed in sun-synchronous orbits best suited to support military operations. In addition to the very high resolution visible and infrared imagery, DMSP provides a variety of remotely sensed terrestrial and space environmental data. A suite of microwave radiometers provides microwave imagery as well as surface characteristics and upper air temperature and moisture soundings. The DMSP data capabilities in the area of concern are provided in Table 3-1. Special requests for DMSP support will be addressed to CARCAH.

Table 3-1. Satellites and Satellite Data Availability for the National Winter Storms Operations Plan.

Geosynchronous Orbit

SATELLITE	TYPE OF DATA	LOCAL TIME	REMARKS
GOES-12 at 75°W GOES-10 at 135°W GOES-11 at 108°W (on orbit storage for GOES-10 or GOES-12) GOES-9 at 165°E (supporting JMA)	Multispectral Imager and Sounder 5 channels for the Imager 19 channels for the Sounder	Every 30 minutes, in Routine Scan Mode, provides 3 sectors with prescribed coverages: Northern Hemisphere (NH) or Extended NH, CONUS or PACUS, and Southern Hemisphere (SH). Exception is transmission of a full disk every 3 hours. Available Rapid Scan Operations (RSO) yield increased transmissions to 7.5 minute intervals to capture rapidly changing, dynamic weather events.	1. 1, 2, 4, and 8 km visible standard sectors. 2. 4 km equivalent resolution IR sectors. 3. Equivalent and full resolution IR enhanced imagery. 4. Full disk IR imagery every 3 hours. 5. 8 km resolution water vapor sectors. 6. Quantitative precipitation estimates, high density cloud and water vapor motion wind vectors, and experimental visible and sounder winds. 7. Operational moisture sounder data (precipitable water) in four levels for inclusion in NCEP numerical models. Other sounder products include: gradient winds, vertical temperature and moisture profiles, mid-level winds, and derived product imagery (precipitable water, lifted index, and surface skin temperature. 8. Tropical storm monitoring and derivation of intensity analysis. 9. Volcanic ash monitoring and dissemination of volcanic ash advisory statements. 10. Daily Northern Hemisphere snow cover analysis. 11. Twice daily fire and smoke analysis over specific areas within CONUS.

Table 3-1 (con't). Satellites and Satellite Data Availability for the National Winter Storms Operations Plan.

Polar Orbiting

SATELLITE	TYPE OF DATA	LOCAL TIME*	REMARKS
NOAA-17 NOAA-16 NOAA-15	AVHRR: GAC and LAC (recorded), HRPT and APT (direct readout) AMSU and HIRS	1025D/2225A 0225D/1425A 0620D/1820A	1. 1 k m resolution HRPT/ Local Area Coverage (LAC) data. 2. 4 km resolution APT/ Global Area Coverage (GAC) data. 3. Mapped imagery. 4. Unmapped imagery (all data types) at DMSP sites. 5. Sea-surface analysis. 6. Soundings. 7. Moisture profiles. 8. Remapped GAC sectors. 9. Sounding-derived products: total precipitable water, rain rate, and surface winds under sounding (NOAA-15). 10. Daily northern hemisphere snow cover analysis 11. Twice daily fire and smoke analysis over specific areas within CONUS.
DMSP F-12	OLS Imagery (direct only) SSM/I & SSM/T-1 (nonfunctional), SSM/T-2 (direct only)	0510D/1710A	1. 0.3 nm (regional) and 1.5 nm (global) resolution (visual and infrared) imagery available via stored data recovery through AFWA. 2. Regional coverage at 0.3 nm and 1.5 nm (visual and infrared) imagery available from numerous DOD tactical terminals. 3. SSM/T-1, SSM/T-2, and SSM/I data transmitted to NESDIS and FNMOC from AFWA.
DMSP F-13	OLS Imagery (recorded and direct), SSM/I, and SSM/T-1	0630D/1830A	
DMSP F-14	OLS Imagery (recorded and direct), SSM/I, SSM/T-1 (nonfunctional), and SSM/T-2	0710D/1910A	
DMSP F-15	OLS Imagery (recorded and direct), SSM/I, SSM/T-1 and SSM/T-2	0900D/2100A	
DMSP F-16	OLS Imagery (recorded and direct), SSM/I, SSM/T-1 and SSM/T-2	0810D/2010A Note: Times are accurate to +/- 5 minutes	

* Local time/equatorial crossing time/D = Daylight descending/A = Daylight ascending

3.3 Automated Coastal Marine and Ocean Observations.

3.3.1 Moored Data Buoys and Coastal Marine Automated Network.

3.3.1.1 Procedures. Moored buoy and Coastal Marine Automated Network (C-MAN) stations routinely acquire and transmit data every hour. Buoy observations include wind direction, speed, and peak 5-second wind; sea level pressure; air temperature; dew point temperature; sea surface temperature; significant wave height and dominant wave period; and wave energy spectra. Descriptions of the measurements from a typical moored buoy and C-MAN station are provided in Tables 3-2 and 3-3, respectively. Consult NDBC's web page at *www.ndbc.noaa.gov* to view the station locations, latest station operating status, and for site-specific information.

3.3.1.2 Communications. Data are transmitted by ultra-high frequency (UHF) communications via NOAA's GOES system to NESDIS, then relayed to the National Weather Service Telecommunications Gateway (NWSTG) for processing, including real-time quality control, and dissemination. Data from moored buoys are distributed in World Meteorological Organization (WMO) FM13-IX SHIP code. C-MAN observations are distributed in CMAN code which is a modified form of FM12-IX SYNOP code.

3.3.1.3 Point of Contact (Daytime). The NDBC Data Analyst can be reached at 228-688-3134.

3.3.2 Drifting Data Buoys.

3.3.2.1 Procedures. These buoys are deployed by ship or aircraft in data sparse areas. Their movement depends upon ocean currents and winds. Data available include position; sea level pressure; wind speed and direction; air temperature; and sea surface temperature. Although NWS does not routinely deploy drifting buoys, several are deployed each year in the North Pacific by Meteorological Service of Canada and their observations are available in real time.

3.3.2.2 Communications. Data are transmitted by UHF communications via NOAA polar-orbiting satellites to NESDIS ground receiving stations and then relayed to the U.S. Argos Global Processing Center in Largo, Maryland. Following processing and limited quality control at Service Argos, the observations are sent on to the NWSTG for dissemination. Drifting buoy observations are in FM18-IX BUOY code format.

Table 3-2. Moored buoy payload data.

PARAMETER	REPORTING RANGE	REPORTING RESOLUTION	SAMPLE INTERVAL	SAMPLE PERIOD	TOTAL SYSTEM ACCURACY
WIND SPEED	0 TO 62 m/s	0.1 m/s	1 s	8-10 min	±1 m/s or 10%
WIND DIRECTION	0 TO 360°	1°	1 s	8-10 min	±10°
PEAK WIND	0 TO 82 m/s	1 m/s	1 s	8-10 min	±1 m/s or 10%
AIR TEMPERATURE	-40 TO 50 °C	0.1 °C	90 s	8-10 min	±1 °C
BAROMETRIC PRESSURE	800 TO 1100 hPa	0.1 hPa	4 s	8-10 min	±1 hPa
SURFACE WATER TEMPERATURE	-7 TO 41 °C	0.1 °C	1 s	8-10 min	±1 °C
SIGNIFICANT WAVE HEIGHT	0 TO 35 m	0.1 m	0.39 s	20 min	±0.2 m or 5%
WAVE PERIOD	3 TO 30 s	0.1 s	0.39 s	20 min	±1 s
NONDIRECTIONAL WAVE SPECTRA	0.03 TO 0.40 Hz	0.01 Hz	0.39 s	20 min	—
SOLAR RADIATION*	0 TO 2150 W/m^2	0.5 W/m^2	1 s	8-10 min	±5%
DEW POINT TEMPERATURE*	-35 TO 30 °C	0.1 °C	1 s	8-10 min	±1 °C
PRECIPITATION RATE (ORG)*	0.5 TO 1600 mm/hr	1 mm	15 s	15 min	±5%
DIRECTIONAL WAVES*	0.03 TO 0.35 Hz	0.01 Hz	0.5 s	20 min	±5°
HORIZONTAL OCEAN CURRENTS (ADCP)*	0 TO 1000 cm/s	0.5 cm/s	1.5 s	20 min	±2 cm/s

*PARAMETER REPORTED ON SELECTED BUOYS

Table 3-3. Data from a typical fixed C-MAN station.

MEASURANDS (NOTE 1)	REPORTED DATA	REPORTING RANGE	REPORTING RESOLUTION	MINIMUM AVERAGING PERIOD (SELECTABLE)	TOTAL SYSTEM ACCURACY
WIND DIRECTION	TRUE WIND DIRECTION	0° – 360°	1.0°	2 min	±15° TRUE (±10° DESIRED)
WIND SPEED	AVG. WIND SPEED	0 – 120 kn	1.0 kn	2 min	±2.0 kn or 5%
	PEAK WIND GUST	0 – 160 kn	1.0 kn	(SELECTABLE)	±2.0 kn or 5%
WAVES	SIGNIFICANT WAVE HEIGHT ($H_{1/3}$)	0 – 49 m	0.5 m	(SELECTABLE)	0.5 m
	WAVE PERIOD (T)	2.5 – 5 s	1 s	(SELECTABLE)	±1 s
	PROBABLE MAXIMUM WAVE HEIGHT	0 – 49 m	0.5 m	(SELECTABLE)	0.5 m
BAROMETRIC PRESSURE	SEA LEVEL PRESSURE	900 – 1100 hPa	0.2 hPa	2 min	±1.0 hPa ABSOLUTE
AIR TEMPERATURE	AIR TEMPERATURE	-40 to +50 °C	0.1 °C	1 min	±1.0 °c
SEA SURFACE TEMPERATURE*	SEA SURFACE TEMPERATURE	-6 to +40 °C	0.5 °C	lmin	±1.0 °c
DEW POINT	DEW POINT TEMPERATURE	-35 to +30 °C	0.5 °C	1 min	-35 to -24°C: ±2 °C -23.5 to -1.5°C: ±1.5 °C -1.5 to +30 °C: ±1.0 °C
SECTOR VISIBILITY	VISIBILITY RANGE	0 – 8 statute mi		2 min	0 to 3 mi: ±10% 3 to 8 mi: ±1 mi
WATER LEVEL	WATER LEVEL	0 – 99.99 ft	0.01 ft	(PERIODICALLY RESET TO ZERO)	TBD
PRECIPIPITATION	CUMULATIVE PRECIPITATION	0 – 999 mm	1 mm	(PERIODICALLY RESET TO ZERO)	±1 mm or 4%

CHAPTER 4

COMMUNICATIONS

4.1 Department of Commerce.

4.1.1 National Weather Service (NWS). All communication systems of the NWS are used in support of the data collection and warning program given in the plan (see Table 4.1). These communication systems are described in the publication, *Operations of the National Weather Service.*

4.1.2 Aircraft Operations Center (AOC). The AOC may use the communications facilities of the Air Force described in Paragraphs 4.2.1 and 4.2.2.

4.2 Department of Defense (DOD).

4.2.1 U.S. Air Force. The Air Force's Automated Weather Distribution System (AWDS) will be used to collect and disseminate information on winter storms received from the National Weather Service. The AF's Automated Weather Network (AWN) will be used for the exchange of data between NOAA and the Air Force.

4.2.2 Weather Reconnaissance. Weather reconnaissance observations will be transmitted via satellite down link, checked for accuracy, and then entered into the AWN. When the aircraft-to-satellite data link is inoperative, observations will be transmitted using high frequency single sideband radio to CARCAH. A summary of reconnaissance communications capabilities by organization is listed in Table 4.1.

4.2.3 U.S. Navy. In the Atlantic, the primary means of dissemination for gale, storm, high seas warnings, other winter storm advisories, and special observations is via the Naval Atlantic Meteorology and Oceanography Center's unclassified *(https://WWW.NLMOC.NAVY.MIL)* and classified homepages. Data for the Pacific basin is posted on the Naval Pacific Meteorology and Oceanography Center's homepage at *https://WWW.NPMOC-SD.NAVY.MIL*. Both graphic and alphanumeric warnings are posted. *Note: As of 1 April 2004, access to the unclassified sites will only be granted to those possessing a valid DOD class 3 PKI certificate.* In addition, the Automated Digital Network (AUTODIN) is also used to distribute alphanumeric data, and gale, storm, and high seas graphics products are posted on the Joint Maritime Command Information System. The Fleet Numerical Meteorology and Oceanography Center/National Centers for Environmental Prediction Data Link (FNDL) will be used for exchange of data between NWS and the Navy.

4.3 U.S. Coast Guard. The Coast Guard operates activities that routinely collect and/or report meteorological data. Those units that collect and transmit (or report) data for this program are Coast Guard Communications facilities at Boston, MA; Chesapeake, VA; Miami, FL; New Orleans, LA; Kodiak, AK; Honolulu, HI; and San Francisco, CA. These facilities collect Automated Mutual Assistance Vessel Rescue (AMVER) messages from merchant vessels and METEO messages from merchant and Coast Guard vessels on a routine basis. The METEO data are then passed directly to the NCEP on the Coast Guard Data Network (CGDN).

Table 4-1. Reconnaissance organization communications capabilities.

STATION	ADDRESS	TELETYPE	TELEPHONE
Federal Coordinator for Meteorology (OFCM)	Suite 1500 8455 Colesville Rd. Silver Spring, MD 20910		DSN 851-1460 301-427-2002
CARCAH	National Hurricane Center 11691 SW 17th Street Miami, FL 33165-2149	A B	DSN 434-3420 305-229-4474
National Hurricane Center	11691 SW 17th Street Miami, FL 33165-2149	A B	305-229-4470
Alternate National Hurricane Center	NCEP/HPC Camp Springs, MD	A B	301-763-8201
Central Pacific Hurricane Center	P.O. Box 29879 Honolulu, HI	B	808-973-5284
Naval Atlantic Meteorology and Oceanography Center	NAVLANTMETOCCEN Norfolk, VA	A	DSN 564-7750/3770 757-444-7750/3770
Naval Pacific Meteorology and Oceanography Center	NAVPACMETOCCEN Pearl Harbor, HI	A	DSN 471-0004 808-471-0004
Aircraft Operations Center	AOC Tampa, FL		813-828-3310
Air Force Weather Agency	AFWA Offutt AFB, NE	A	DSN 271-2586 402-294-2586
FACSFAC VACAPES OAC	FACSFAC VACAPES, Oceana, VA		DSN 433-1233 757-433-1233
53 WRS	53 WRS 817 H Street - Suite 201 Keesler AFB, MS 39534-2453	A	DSN 597-5518/2409 601-377-5518/2409

A - AWDS

B - AWIPS

CHAPTER 5

PUBLICITY

5.1 <u>News Media Releases</u>. News media releases, other than warnings and advisories, for the purpose of informing the public of the operational and research activities of the Departments of Commerce, Defense, and Transportation should reflect the joint effort of these agencies by giving due credit to the participation of other agencies.

5.2 <u>Distribution</u>. Copies of these releases, along with any pertinent pictures, should be forwarded to the following agencies:

- NOAA Office of Public Affairs
  Herbert C. Hoover Building
  14th and Constitution Avenue, N.W.
  Washington, DC 20230

- Commander, Naval Meteorology and Oceanography Command
  1020 Balch Boulevard
  Stennis Space Center, MS 39529-5005

- Hq Air Force Reserve Command (AFRC/PA)
  Robins AFB, GA 31093

- Joint Staff Weather Officer
  The Joint Chiefs of Staff (J-3/DDGO-ROD)
  Pentagon Room 2D-921G
  Washington, DC 20318-3000

- Federal Aviation Administration (APA-300)
  800 Independence Avenue, S.W.
  Washington, DC 20591

- Federal Coordinator for Meteorology
  Suite 1500, 8455 Colesville Road
  Silver Spring, MD 20910

APPENDIX A

ABBREVIATIONS

-A-

AF	Air Force (U.S. Air Force)
AFB	Air Force Base
AFRC	Air Force Reserve Command
AFTN	Aeronautical Fixed Telecommunications Network
AFW	Air Force Weather
AFWA	Air Force Weather Agency
A/G	Air to Ground
AIRMET	Airmen's Meteorological Information Bulletin
AIREP	Aircraft Report
ALTRV APREQ	Altitude Reservation Approval Request
AMSU	Advanced Microwave Sounding Unit
AMVER	Automated Mutual Assistance Vessel
AOC	Aircraft Operations Center
APT	Automatic Picture Transmission
ARINC	Aeronautical Radio, Incorporated
ARTCC	Air Route Traffic Control Center
ATC	Air Traffic Control
AVHRR	Advanced Very High Resolution Radiometer
AWDS	Automated Weather Distribution System
AWIPS	Advanced Weather Interactive Processing System
AWN	Automated Weather Network

-C-

C	Celsius
CA	Commander, Atlantic Area (USCG)
CARCAH	Chief, Aerial Reconnaissance Coordination, All Hurricanes
CARF	Central Altitude Reservations Function
CDA	Command and Data Acquisition
CCGD	Commander, Coast Guard District
CG	Coast Guard
CINCLANTFLT	Commander-in-Chief, Atlantic Fleet
C-MAN	Coastal Marine Automated Network
CONUS	Continental United States
Class G Airspace	Uncontrolled airspace

-D-

DA	Daylight Ascending
DCS	Data Collection System
DMSP	Defense Meteorological Satellite Program
DOC	Department of Commerce
DOD	Department of Defense
DOT	Department of Transportation
DRSR	Direct Readout Scanning Radiometer
DSN	Defense Switched Network (AUTOVON)
DTG	Date Time Group

-E-

ESA	European Space Agency
ETA	Estimated Time of Arrival
ETD	Estimated Time of Departure

-F-

FAA	Federal Aviation Administration
FAD	Force Activity Designator
FCMSSR	Federal Committee for Meteorological Services and Supporting Research
FL	Flight Level
FNDL	Fleet Numerical Meteorology and Oceanography Center/ National Centers for Environmental Prediction Data Link
ft	Foot, Feet
FSS	Flight Service Station
FTS	Federal Telecommunications System

-G-

GAC	Global Area Coverage
GCCS	Global Command and Control System (USAF)
GDSS	Global Decision Support System
GMS	Geostationary Meteorological Satellite
GOES	Geostationary Operational Environmental Satellite

-H-

HF	High Frequency
HIRS	High-Resolution Infrared Radiation Sounder
hr	Hour
HPC	Hydrometeorological Prediction Center (NCEP)
HRPT	High Resolution Picture Transmission

-I-

ICAO	International Civil Aviation Organization
ICMSSR	Interdepartmental Committee for Meteorological Services and Supporting Research
IFR	Instrument Flight Rules

-J-

JCS	Joint Chiefs of Staff
JMA	Japanese Meteorological Agency
JMCIS	Joint Maritime Command Information System
JP	Joint Publication

-K-

km	Kilometer(s)
kPa	Kilopascal
kt	Knot(s)

-L-

LAC	Local Area Coverage
LF	Light Fine

-M-

m	meter(s)
M-3	METEOSAT-3
mb	millibar(s)--see kPa
METEO	Cable Address for Ships
METOC	Meteorology and Oceanography
mi	(statute) mile(s)
min	minute(s)
MIST	Meteorological Instrument Standard Terminal
mph	mile(s) per hour
MSD	Meteorological Services Division
m/s	meter(s) per second

-N-

NASA	National Aeronautics and Space Administration
NAVLANTMETOCCEN	Naval Atlantic Meteorology and Oceanography Center
NAVMETOCCOM	Naval Meteorology and Oceanography Command
NAVMETOCCOMDET	Naval Meteorology and Oceanography Command Detachment
NAVMETOCCOMFAC	Naval Meteorology and Oceanography Command Facility
NAVPACMETOCCEN	Naval Pacific Meteorology and Oceanography Center
NAWAS	National Warning System
NCEP	National Centers for Environmental Prediction
NDBC	National Data Buoy Center
NESDIS	National Environmental Satellite, Data, and Information Service
NHC	National Hurricane Center
nm	nautical mile(s)
NOAA	National Oceanic and Atmospheric Administration
NSSL	National Severe Storms Laboratory (NOAA)
NWSTG	National Weather Service Telecommunications Gateway

-O-

OAC	Oceanic Aircraft Coordinator (USN)
OFCM	Office of the Federal Coordinator for Meteorology
OLS	Operational Line Scan System
ONR	Office of Naval Research
OSV	Ocean Station Vessel

-P-

Pa	Pascal
PIREP	Pilot Report

-R-

RAREP	Radar Report
RECCO	Reconnaissance Code
RFC	River Forecast Center
RSO	Rapid Scan Operations

-S-

SAB	Satellite Analysis Branch
SAR	Search and Rescue

SARLANT	Search and Rescue Atlantic Circuit
SCAT	Satellite Cloudtop and Tropopause
SDM	Senior Duty Meteorologist (NCEP)
SEM	Space Environmental Monitor
SGDB	Satellite Global Database
SIGMET	Significant Meteorological Information
SSB	Single Sideband
SSC	Stennis Space Center
SSM/I	Special Sensor Microwave/Imagery
SSM/T-1	Special Sensor Microwave/Temperature
SSM/T-2	Special Sensor Microwave/Water Vapor
SRSO	Super-Rapid Scan Operations
SXI	Solar X-Ray Imager

-T-

TEAL	Call Sign for State Operated Reconnaissance Aircraft
TESS	Tactical Environmental Support System
TOVS	TIROS-N Operational Vertical Sounder
TPC	Tropical Prediction Center

-U-

UHF	Ultra High Frequency
UND	Urgency of Need Designator
USA	United States Army
USAF	United States Air Force
USCG	United States Coast Guard
USN	United States Navy
UTC	Universal Coordinated Time (Z)

-V-

VAS	VISSR Atmospheric Sounder
VISSR	Visible and Infrared Spin Scan Radiometer

-W-

WBC	Identifier for NCEP
WEFAX	Weather Facsimile
WG	Working Group
WG/HWSOR	Working Group for Hurricane and Winter Storms Operations and Research (OFCM)
WFO	Weather Forecast Office

WMO	World Meteorological Organization
WRS	Weather Reconnaissance Squadron
WS	Weather Squadron (USAF)
WSFO	Weather Service Forecast Office
WSO	Weather Service Office
WSPOD	Winter Storm Plan of the Day

-X-

XADC	Extended Atlantic Data Coverage

-Z-

Z	Zulu Time (UTC)

APPENDIX B

DEFINITIONS

Area of Concern. The geographic area of concern for the *National Winter Storms Operations Plan* covers the Gulf of Mexico and extends about 150 miles inland along the U.S. Gulf Coast. In the Atlantic, the area of concern ranges from latitudes 25°N to 48°N, west of longitude 55°W, extending about 150 miles inland along the eastern coast of the United States. It also includes the North Pacific Ocean east of the international date line.

Blizzard Warning. The NWS issues a Blizzard Warning to notify the public when blizzard conditions (sustained wind or frequent gusts of 35 mph or more accompanied by falling and/or blowing snow, frequently reducing visibility less than one-fourth mile for three hours or more) are occurring, imminent, or have a high probability of occurrence within the next 36 hours.

Due Regard. Operation wherein state operated aircraft assume responsibility for separation from all other aircraft without ATC assistance.

Freezing Rain (or Drizzle). Rain or drizzle that falls in liquid form but freezes upon impact with the ground or exposed objects. Small accumulations of ice can cause driving and walking difficulties while heavy accumulations produce extremely dangerous and damaging situations primarily by pulling down trees and utility lines.

Heavy Snow Warning. The NWS issues a Heavy Snow Warning to notify the public when heavy snow (four inches or more accumulation in 12 hours or six or more inches accumulation in 24 hours in most areas of the country, but some variation in the snowfall criterion is allowable on a regional basis) is occurring, imminent, or has a high probability of occurrence within the next 36 hours.

Ice Storm Warning. NWS issues an Ice Storm Warning to notify the public when significant ice accumulations (generally one-quarter inch or greater, but some variation in the ice accumulation criterion is allowable on a regional basis) are occurring, imminent, or have a high probability of occurrence within the next 36 hours and no other predominate winter weather element is expected to occur.

Mission Identifier. The nomenclature assigned to winter storm aircraft reconnaissance missions for weather data identification. It comprises an agency-aircraft indicator followed by a CARCAH-assigned mission-system indicator.

Reconnaissance Aircraft Sortie. A flight that meets the requirements of the winter storm plan of the day.

Sleet. Sleet is a type of precipitation consisting of transparent or translucent pellets of ice, 5 mm or less in diameter. These pellets of ice usually bounce when hitting hard ground and make a sound upon impact. Heavy sleet is a relatively rare event defined as an accumulation of ice pellets covering the ground to a depth of ½ inch or more.

Winter Storm Outlook. This product may be issued when there is a good chance of a major winter storm beyond the point normally covered by a watch. The intent of an outlook is to provide information to those who need considerable lead time to prepare for the event.

Winter Storm Plan of the Day. A coordinated mission plan that tasks operational weather reconnaissance requirements during the next 1100Z to 1100Z day; describes reconnaissance flights committed to satisfy operational requirements and identifies possible reconnaissance requirements for the succeeding 24-hour period.

Winter Storm Warning. The NWS issues a Winter Storm Warning to notify the public when more than one predominate winter weather hazard (i.e., heavy snow and blowing snow, snow and ice, snow and sleet, sleet and ice, or snow, sleet and ice) is occurring, imminent, or has a very high probability of occurrence within the next 36 hours and is expected to meet or exceed locally defined 12 and/or 24 hour warning criteria for at least one of the precipitation elements.

Winter Storm Watch. The NWS issues a Winter Storm Watch when conditions are favorable for a hazardous winter weather event to develop in the next 12 to 48 hours, but its occurrence, location, and/or timing is uncertain. It is intended to provide enough lead time so those who need to set their plans in motion can do so. The watch will cover the possible occurrence of the following elements, either separately or in combination: heavy snow, significant accumulations of freezing rain, and/or heavy sleet. Some event specific watches are issued when only one predominate winter weather hazard is expected. The event specific watches are: Blizzard Watch, Lake Effect Snow Watch, and Wind Chill Watch.

Winter Weather Advisories. Event-specific advisories are used to describe conditions that do not constitute a serious enough hazard to warrant a warning for the general public but; nevertheless, pose a significant threat to specified users. They are highlighted in forecasts and statements. These types of advisories include snow, blowing snow, lake effect snow, wind chill, and freezing rain.

APPENDIX C

DEPARTMENT OF THE AIR FORCE
UNITED STATES AIR FORCE RESERVE COMMAND

15 October 2000

MEMORANDUM FOR CARCAH

FROM: 53 WRS/DON (228) 377-2929 (Lt Col Katz)

SUBJECT: Air Traffic Control Clearances

CARCAH (alternate CARCAH/53WRS Operations) is authorized to relay Air Traffic Control (ATC) clearances to 53WRS aircraft using satellite communications (SATCOM). References for this authority are the Federal Aviation Administration/Air Force Reserve (FAA/AFRC) Memorandum of Agreement, SUBJECT: METEOROLOGICAL RECONNAISSANCE FLIGHTS, and the National Hurricane Operations Plan, paragraph 5.5.4 entitled Air Traffic Control Clearances.

PROCEDURES:

1. Clearance Request by TEAL Aircraft

   - Air Crews will send a SATCOM message to CARCAH and will provide the following information: present position and altitude/flight level, estimate to next navigation checkpoint and route of flight/altitude desired. Include any additional pertinent information. Use the following format:

     Please contact Houston ARTCC with the following clearance request:
     TEAL 40 PRESENTLY AT 25N 97W, ESTIMATE COKER 1430Z, LEVEL FIVE THOUSAND FT RQST DCT DOLPH DCT LEV DCT BIX, FL180.

     NOTE: If mission conditions warrant, crews may request Priority Handling. Use the following format:

     TEAL 40 PRESENTLY OVER LULIS FL180B190. RQST DCT 25N 92W, THEN FLT PLN RTE RQST PRIORITY HANDLING DUE TO NHOP MISSION TIMING TO HURRICANE FIRPO.

   - CARCAH will contact the appropriate ATC Center (see attachment for phone numbers) and speak to the Oceanic Supervisor (primary) or Military Missions Coordinator (secondary). Calls to these numbers are generally automatically recorded. When the clearance is issued to CARCAH, CARCAH must transmit the clearance to the aircraft verbatim, since it may differ from the requested clearance. CARCAH must preface the clearance with the words, "ATC clears..." such as in the example:

     ATC CLEARS TEAL 40 TO KEESLER AFB VIA DIRECT COKER DIRECT DOLPH DIRECT LEV DIRECT. CLIMB AND MAINTAIN FL180. CONTACT HOUSTON CENTER ON 123.4 CROSSING 26 DEGREES NORTH.

2. Clearances Relay Request from ATC

   - ATC Centers may contact CARCAH (305-229-4474) or alternate CARCAH/53WRS Operations (228) 377-2409 to request a message relay to a TEAL aircraft. CARCAH will then relay the message or clearance, as appropriate.

//signed//
ROBERT A. KATZ, Lt Col, USAF
Airspace Manager

Attachment: ATC Phone Numbers

AIR TRAFFIC CONTROL PHONE NUMBERS

	OCEANIC SUPERVISOR	MISSIONS COORDINATOR
BOSTON ARTCC	N/A	(603) 879-6666 (DSN 881-1635)
HONOLULU ARTCC	(808) 739-7600 FAX (808) 739-7604	(808) 739-7605
HOUSTON ARTCC	(281) 230-5552 FAX (281) 230-5561	(281) 230-5563 (DSN 885-1491)
JACKSONVILLE ARTCC	(904) 549-1549 (GULF OF MEXICO) FAX (904) 549-1843 -1547 (ATLANTIC, S. OF JAX, All Altitudes) -1546 (ATLANTIC, N. OF JAX, FL240/BELOW) -1545 (ATLANTIC, N. OF JAX, ABOVE FL240)	(904)549-1542 (DSN 434-3744)
OAKLAND ARTCC	(501) 745-3342 / 3000 (SWITCHBOARD) FAX (510) 745-3411	(510) 745-3334 (DSN 730-1595)
MIAMI ARTCC	(305) 716-1781 (GULF OF MEXICO) FAX (305) 716-1511 (305) 716-1784 (ATLANTIC) (305) 716-1784 (BAHAMAS & SOUTH) (305) 716-1782 (BAHAMAS & NORTH)	(305) 716-1589 (DSN 434-1910)
NEW YORK ARTCC	(631) 468-1496	(516) 468-1429 (DSN 881-3730) FAX (631) 468-1428
PIARCO Control	(868) 669-4852 FAX (868) 669-4529	(868) 669-4806 (Chief Controller)
SAN JUAN ARTCC	(787) 253-8664/8665 FAX (787) 253-8685	(787) 253-8650 (Weekdays only)
WASHINGTON ARTCC	N/A	(703) 771-3472 (DSN 937-1420) FAX (703) 771-3590
ATC SYSTEM COMMAND CENTER		(703) 904-4525
CARF		(703) 904-4426 (DSN 725-3331)

APPENDIX D

DEPARTMENT OF THE AIR FORCE
UNITED STATES AIR FORCE RESERVE COMMAND

28 November 2000

MEMORANDUM FOR FAA/CARF

FROM: 53 WRS/DON

SUBJECT: Altitude Reservation Approval Request

ALTRV APREQ CORONET COAST 04

A. TEAL 02

B. WC130/I

C. KBIX

D. ((PR FL250 [ALTRV BEGINS] SIE 0000 DCT CLMB FL290B310 PREPI 0015 OWENZ 0020 LVLOFF BY BERGH 0030 A300 CHAMP 0050 G437 MERCI 0120 A700 [3240N 7436W 0205] TROUT 0250 AR5 DINNS 0405 [ALTRV ENDS] IFPFP

E. KBIX

F. ETD ALTRV BEGINS OVER SIE AT 29 NOV/2245Z. AVANA 2345Z

G. TAS 250KTS/300KTS
PROJECT OFFICER: MAJ MADDOX DSN 597-5518
ALTERNATE PROJECT OFFICER: LT COL KATZ DSN 597-2929

ADDITIONAL INFORMATION: WX RECON MISSION IN SUPPORT OF NWS AND NWSOP. DROPSONDE RELEASE POINTS OWENZ CHAMP MERCI 3240N 7436W TROUT. AIRCREW WILL ADJUST AIRSPEED TO REACH CONTROL POINT MERCI AT 30 NOV/0000Z PLUS/MINUS 30 MINUTES. THE FOLLOWING IFPFP ROUTINGS ARE FOR INFO ONLY AND DO NOT CONSTITUTE AN ATC CLRNC OR PART OF THIS ALTRV REQ: KBIX DCT SJI J37 SPA DCT RDU J209 TYI DCT SWL DCT SIE (ALTRV). REQ: JA DCT TAY J2 SJI DCT BIX LAND (KBIX). NOTE: AFTER CROSSING 3240N 7436W CREW MAY BE RELEASED AND WILL END ALTRV AND REQ CLRNC TO KBIX. REQ ALTRV APVL FAX TO (601) 377-1923.

ROBERT A. KATZ, Lt Col, USAFR
Airspace Manager

SAMPLE SAMPLE

(ROUTING MAY BE INCORRECT)
(USE AS REFERENCE FOR FORMAT ONLY - SEE FAA Handbook 7610.4)

APPENDIX E

FORMAT FOR NHOP/NWSOP FLIGHT INFORMATION FOR INTERNATIONAL AND DOMESTIC NOTAM ISSUANCE

Flight information shall be sent to the NOTAM office via facsimile to (703) 904-4437 for dissemination as an International and Domestic NOTAM in the following format (Note: The request is made for a "Domestic NOTAM," which will then automatically makes its way into the international NOTAM system):

Header

Request a Domestic NOTAM be Issued

A. **Affected Center(s)**. This field will include all affected ARTCCs in 3-letter identifier format; e.g., ZNY, ZOA, ZAN. Synoptic track flights will probably utilize more than one ARTCC, and any adjacent ARTCC should be included when the flight track is within 100 miles of the adjacent center's airspace. Flights that are flying in the storm environment will utilize the ARTCC whose airspace is mostly affected.

B. **Start Time (YYMMDDZZZZ)**. For example, 0006011600. This time would correspond to the entry time on a reconnaissance track or time at the storm fix latitude/longitude.

C. **Ending Time (YYMMDDZZZZ)**. This would be the completion time of reconnaissance track or the time exiting the storm environment.

E.* **Text**. This field is free form and should include the following information: route of flight for the mission portion (latitude/longitude, fixes, airways), type of activity (laser, dropsonde, etc.), frequency/location of deployment, broadcast frequencies, any other pertinent information that may concern other flights.

F. **Lower Altitude (during mission)**. Use "Surface" since the dropsonde is the "reason" for the NOTAM as much or more so than the aircraft altitude.

G. **Upper Altitude (during mission)**. For example, FL450.

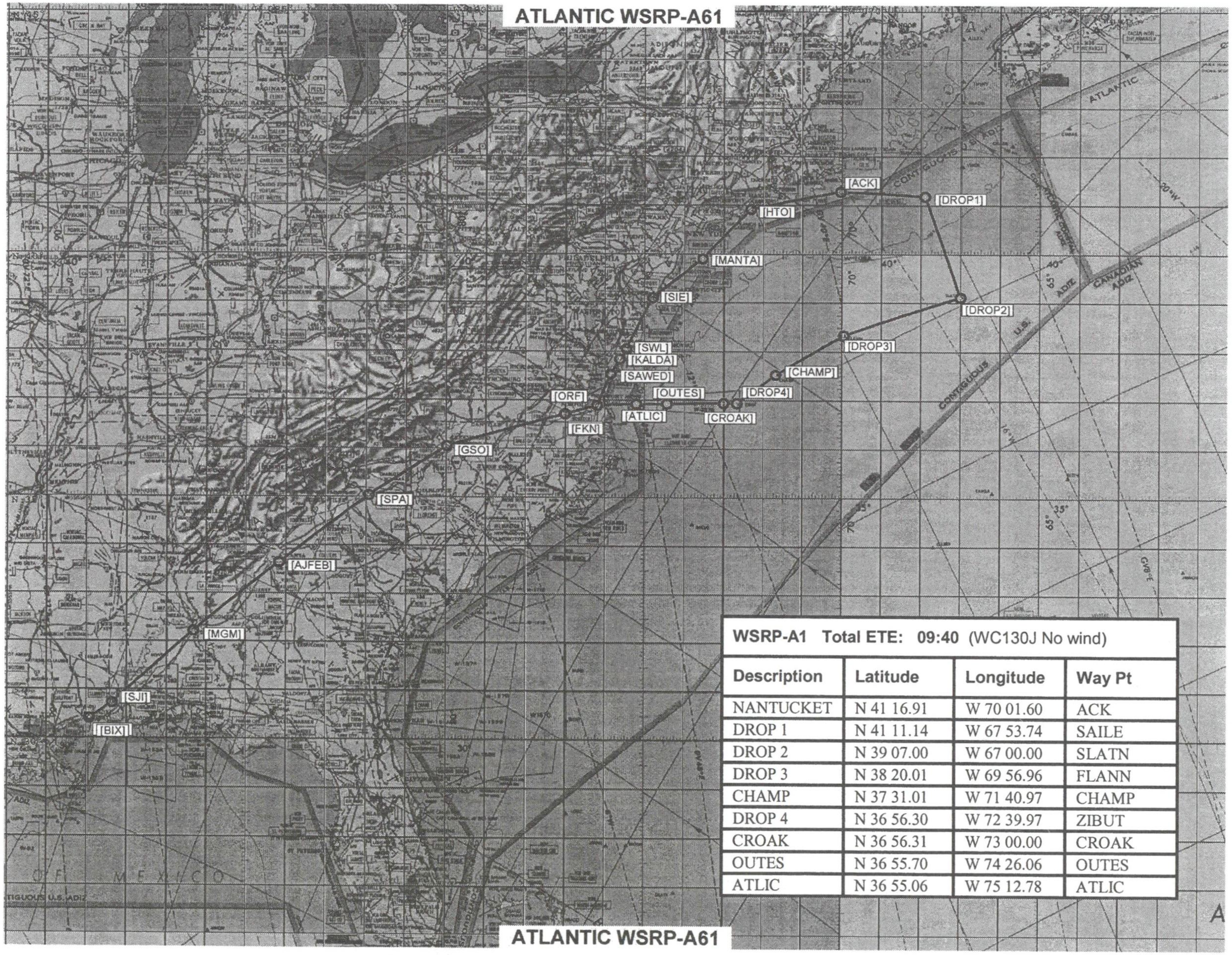
If only one altitude is to be used, then F and G may be combined. If altitude is going to vary throughout the mission, utilize "see text" and the information can be inserted there and the altitudes may be explained in field E.

* Note that there is no paragraph "D". It is reserved for FAA use.

NOTES:
1. Include a unit/agency phone number and point of contact for possible questions from the NOTAM office.
2. Only ICAO approved contractions may be used.
3. Using this format will help ensure timely and accurate information dissemination.

APPENDIX F
ATLANTIC AND GULF OF MEXICO
FLIGHT TRACKS

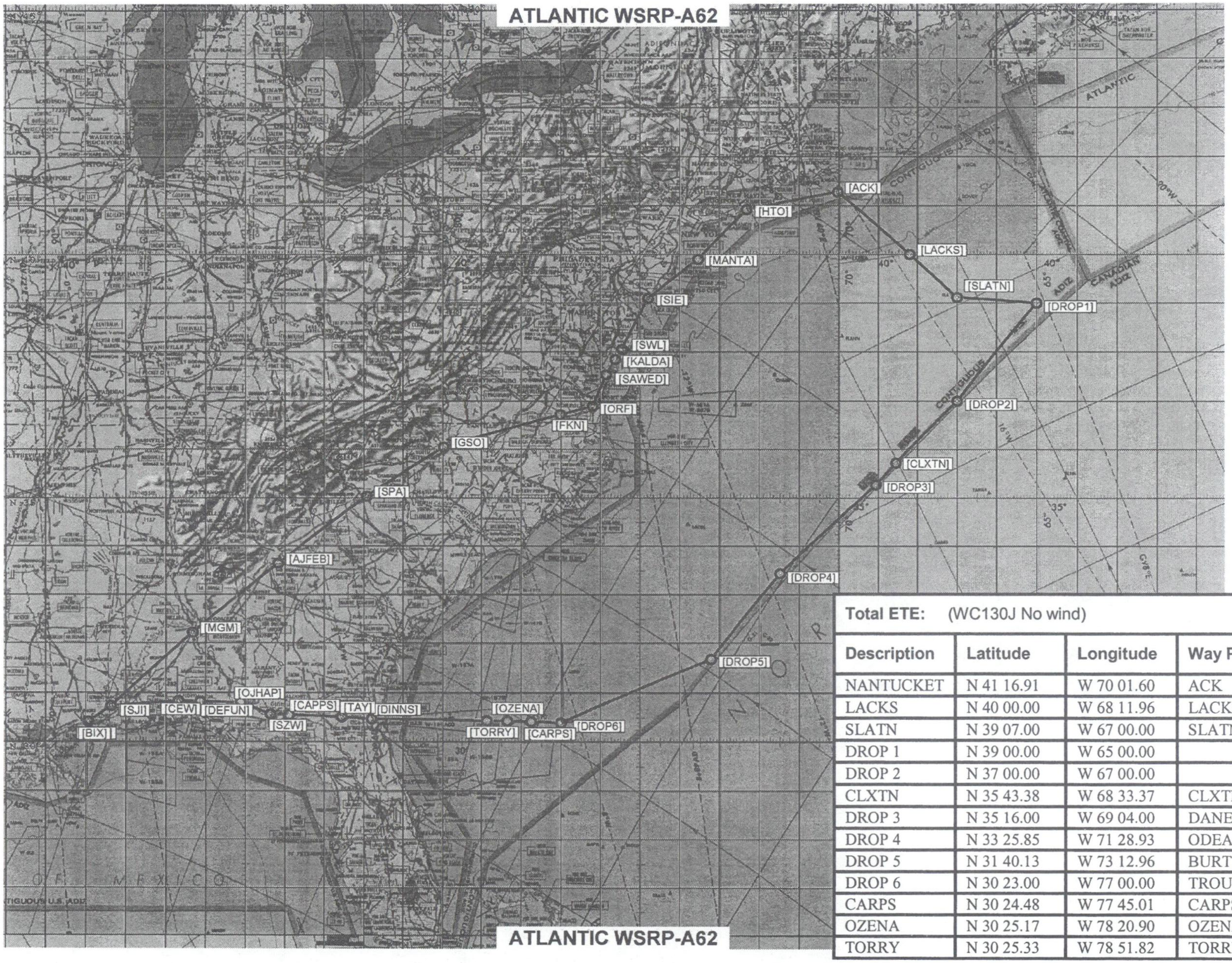
Note: The 53 WRS and NOAA AOC flight operations planners will plan tasked missions to meet Control Point/Control Time criteria and will fly the route in the most efficient direction possible. If a specific direction is desired (clockwise or counterclockwise), it should be indicated in the WSPOD; e.g., Track WSRP-P32 CW or Track WSRP-A64 CCW. Tasking agencies should not use the terminology "Reverse" indicated by an "R" when requesting a track.



WSRP-A1 Total ETE: 09:40 (WC130J No wind)

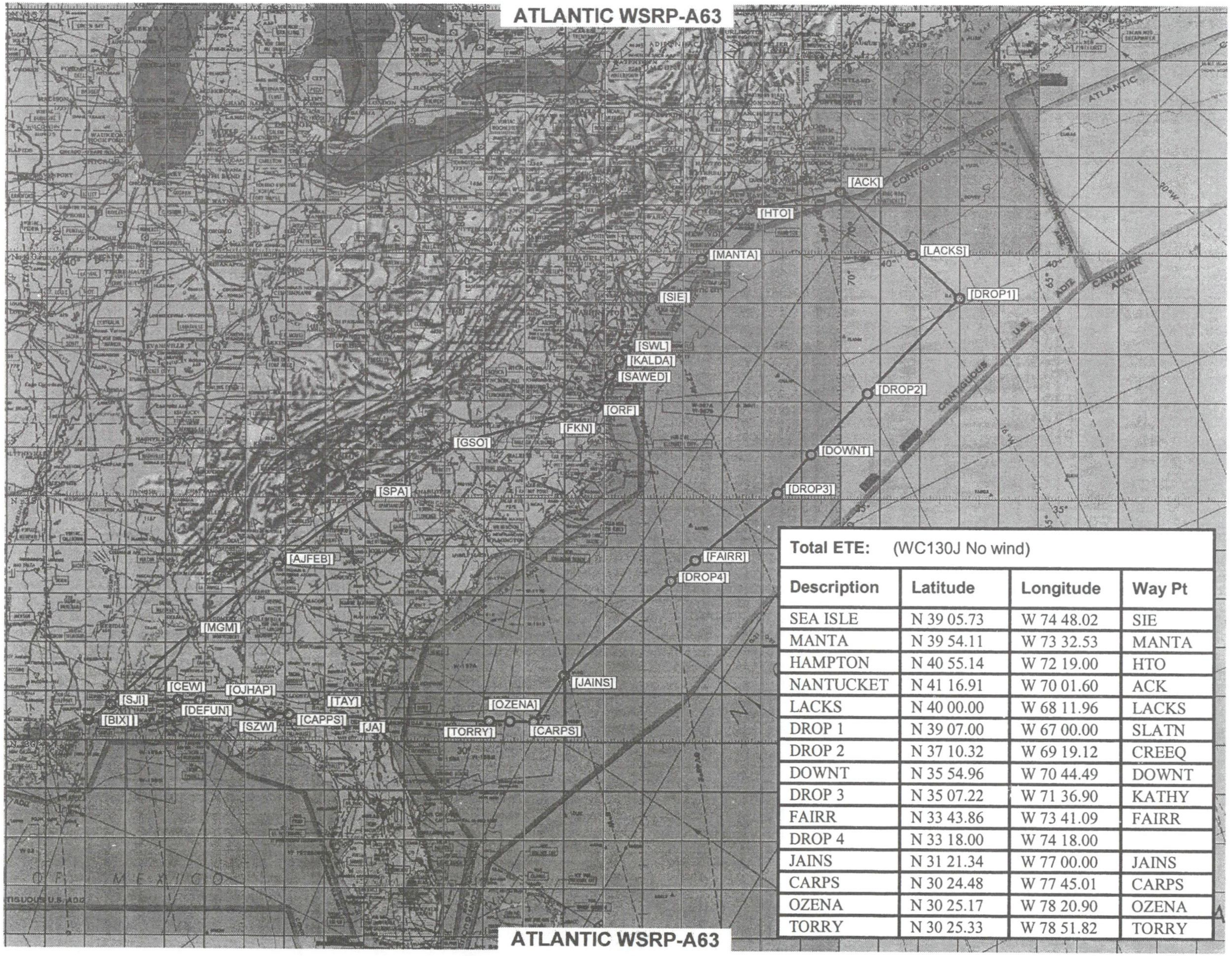
Description	Latitude	Longitude	Way Pt
NANTUCKET	N 41 16.91	W 70 01.60	ACK
DROP 1	N 41 11.14	W 67 53.74	SAILE
DROP 2	N 39 07.00	W 67 00.00	SLATN
DROP 3	N 38 20.01	W 69 56.96	FLANN
CHAMP	N 37 31.01	W 71 40.97	CHAMP
DROP 4	N 36 56.30	W 72 39.97	ZIBUT
CROAK	N 36 56.31	W 73 00.00	CROAK
OUTES	N 36 55.70	W 74 26.06	OUTES
ATLIC	N 36 55.06	W 75 12.78	ATLIC

Figure F-1. Atlantic Flight Track WSRP-A61.



Total ETE: (WC130J No wind)			
Description	**Latitude**	**Longitude**	**Way Pt**
NANTUCKET	N 41 16.91	W 70 01.60	ACK
LACKS	N 40 00.00	W 68 11.96	LACKS
SLATN	N 39 07.00	W 67 00.00	SLATN
DROP 1	N 39 00.00	W 65 00.00	
DROP 2	N 37 00.00	W 67 00.00	
CLXTN	N 35 43.38	W 68 33.37	CLXTN
DROP 3	N 35 16.00	W 69 04.00	DANER
DROP 4	N 33 25.85	W 71 28.93	ODEAL
DROP 5	N 31 40.13	W 73 12.96	BURTT
DROP 6	N 30 23.00	W 77 00.00	TROUT
CARPS	N 30 24.48	W 77 45.01	CARPS
OZENA	N 30 25.17	W 78 20.90	OZENA
TORRY	N 30 25.33	W 78 51.82	TORRY

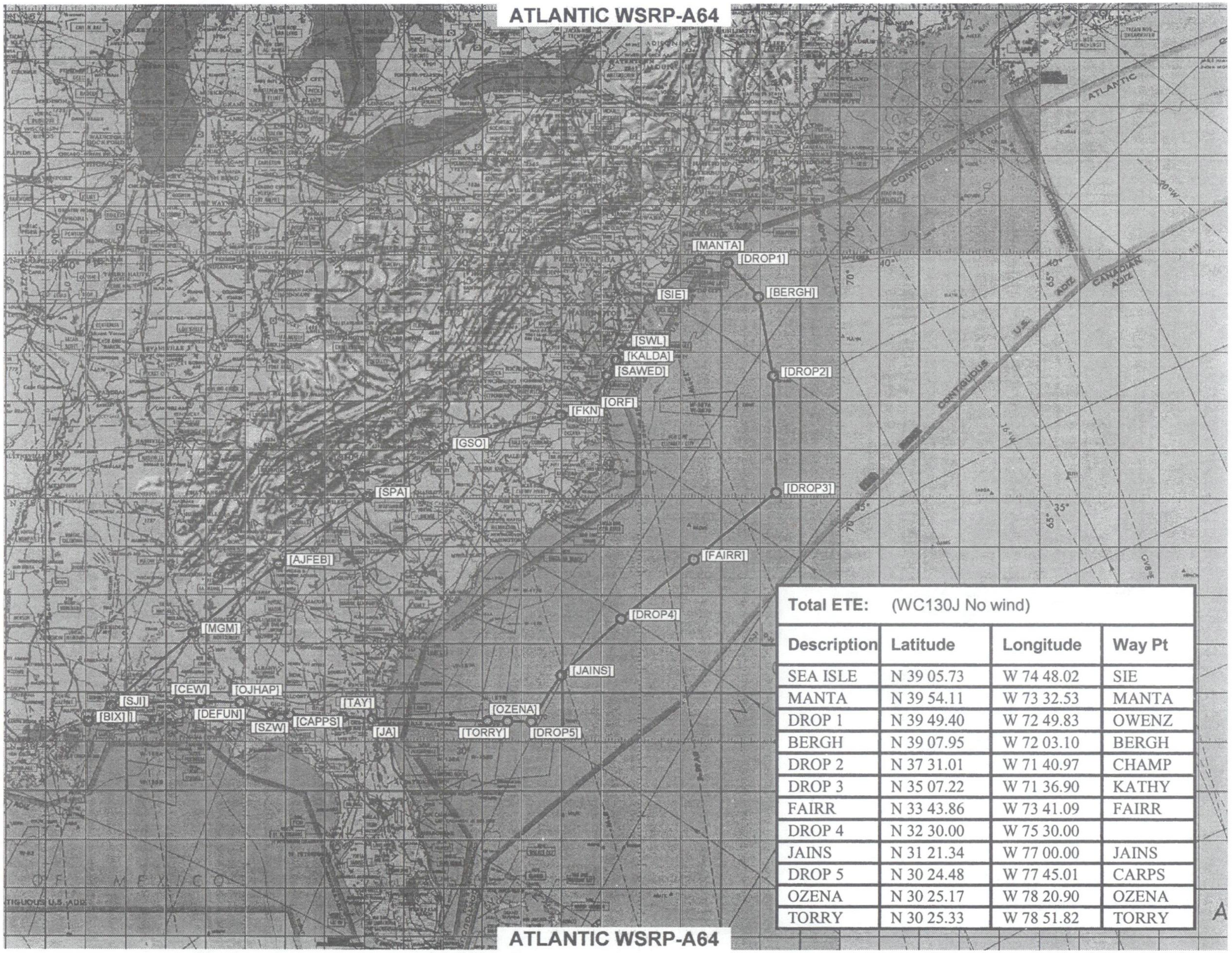
Figure F-2. Atlantic Flight Track WSRP-A62.



Total ETE: (WC130J No wind)

Description	Latitude	Longitude	Way Pt
SEA ISLE	N 39 05.73	W 74 48.02	SIE
MANTA	N 39 54.11	W 73 32.53	MANTA
HAMPTON	N 40 55.14	W 72 19.00	HTO
NANTUCKET	N 41 16.91	W 70 01.60	ACK
LACKS	N 40 00.00	W 68 11.96	LACKS
DROP 1	N 39 07.00	W 67 00.00	SLATN
DROP 2	N 37 10.32	W 69 19.12	CREEQ
DOWNT	N 35 54.96	W 70 44.49	DOWNT
DROP 3	N 35 07.22	W 71 36.90	KATHY
FAIRR	N 33 43.86	W 73 41.09	FAIRR
DROP 4	N 33 18.00	W 74 18.00	
JAINS	N 31 21.34	W 77 00.00	JAINS
CARPS	N 30 24.48	W 77 45.01	CARPS
OZENA	N 30 25.17	W 78 20.90	OZENA
TORRY	N 30 25.33	W 78 51.82	TORRY

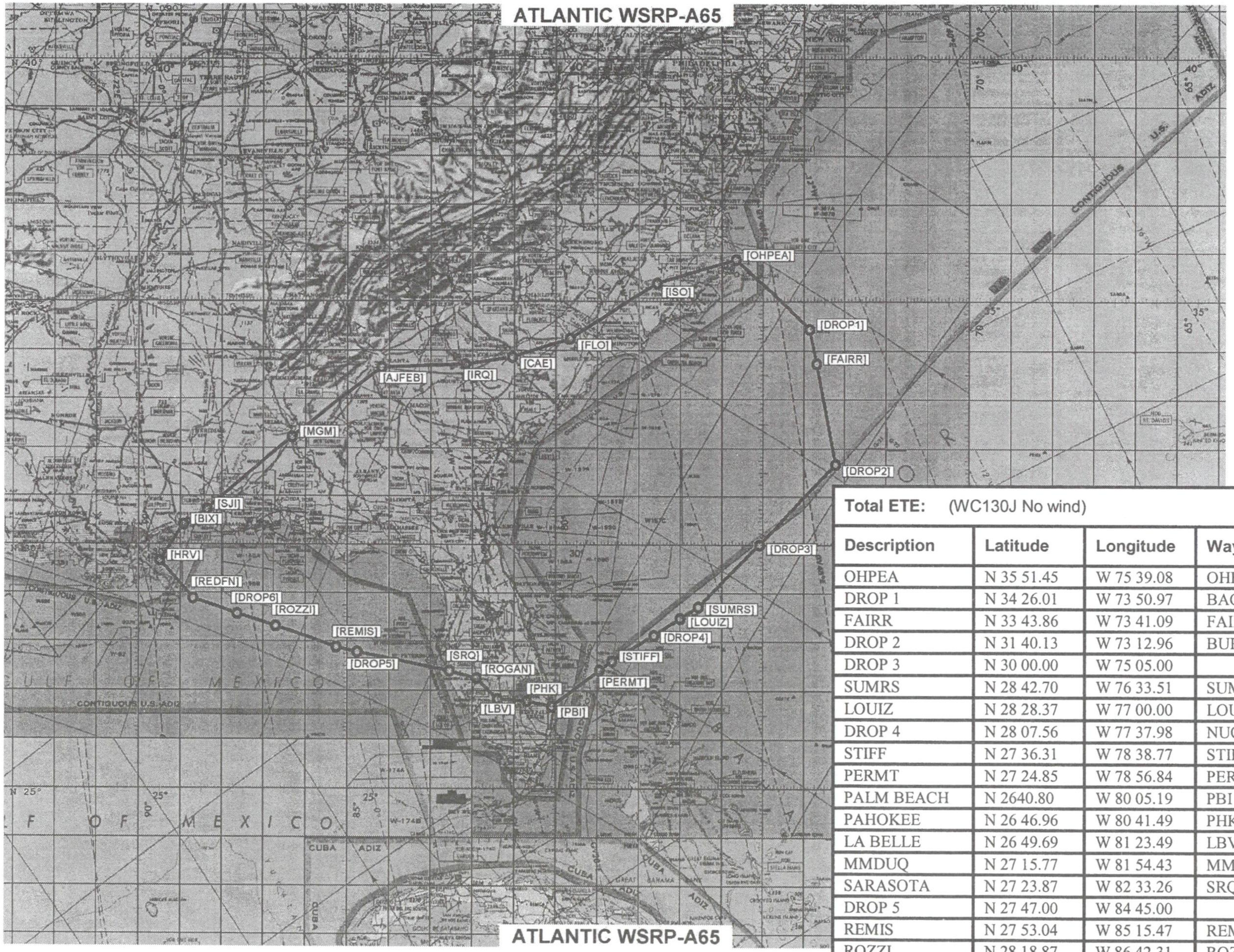
Figure F-3. Atlantic Flight Track WSRP-A63.



Total ETE: (WC130J No wind)

Description	Latitude	Longitude	Way Pt
SEA ISLE	N 39 05.73	W 74 48.02	SIE
MANTA	N 39 54.11	W 73 32.53	MANTA
DROP 1	N 39 49.40	W 72 49.83	OWENZ
BERGH	N 39 07.95	W 72 03.10	BERGH
DROP 2	N 37 31.01	W 71 40.97	CHAMP
DROP 3	N 35 07.22	W 71 36.90	KATHY
FAIRR	N 33 43.86	W 73 41.09	FAIRR
DROP 4	N 32 30.00	W 75 30.00	
JAINS	N 31 21.34	W 77 00.00	JAINS
DROP 5	N 30 24.48	W 77 45.01	CARPS
OZENA	N 30 25.17	W 78 20.90	OZENA
TORRY	N 30 25.33	W 78 51.82	TORRY

Figure F-4. Atlantic Flight Track WSRP-A64.



Total ETE: (WC130J No wind)

Description	Latitude	Longitude	Way Pt
OHPEA	N 35 51.45	W 75 39.08	OHPEA
DROP 1	N 34 26.01	W 73 50.97	BACUS
FAIRR	N 33 43.86	W 73 41.09	FAIRR
DROP 2	N 31 40.13	W 73 12.96	BURTT
DROP 3	N 30 00.00	W 75 05.00	
SUMRS	N 28 42.70	W 76 33.51	SUMRS
LOUIZ	N 28 28.37	W 77 00.00	LOUIZ
DROP 4	N 28 07.56	W 77 37.98	NUCAR
STIFF	N 27 36.31	W 78 38.77	STIFF
PERMT	N 27 24.85	W 78 56.84	PERMT
PALM BEACH	N 2640.80	W 80 05.19	PBI
PAHOKEE	N 26 46.96	W 80 41.49	PHK
LA BELLE	N 26 49.69	W 81 23.49	LBV
MMDUQ	N 27 15.77	W 81 54.43	MMDUQ
SARASOTA	N 27 23.87	W 82 33.26	SRQ
DROP 5	N 27 47.00	W 84 45.00	
REMIS	N 27 53.04	W 85 15.47	REMIS
ROZZI	N 28 18.87	W 86 42.31	ROZZI
DROP 6	N 28 34.00	W 87 38.42	
REDFN	N 28 52.98	W 88 42.11	REDFN

Figure F-5. Atlantic Flight Track WSRP-A65.

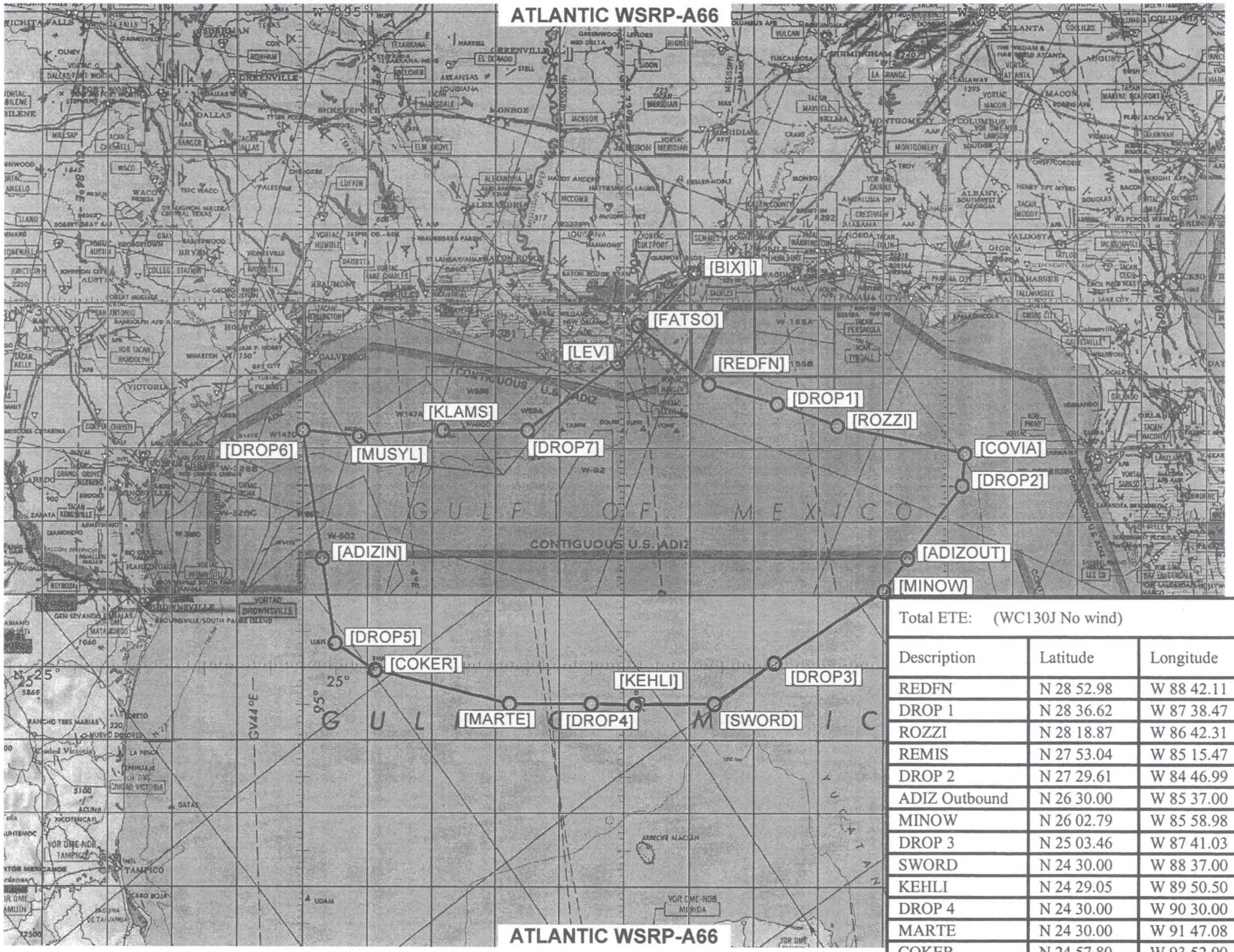
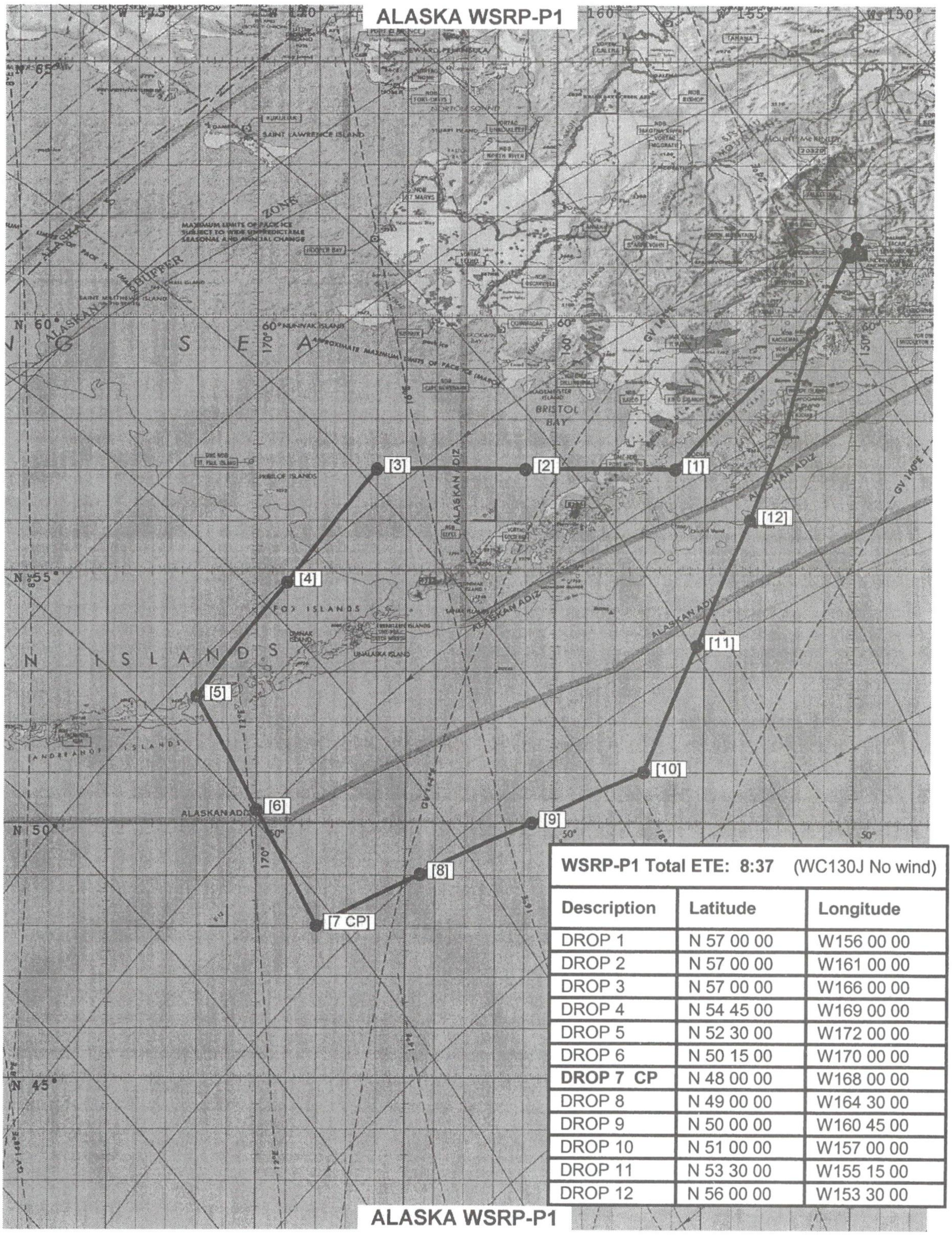


Figure F-6. Atlantic Flight Track WSRP-A66.

Total ETE: (WC130J No wind)			
Description	Latitude	Longitude	Way Pt
REDFN	N 28 52.98	W 88 42.11	REDFN
DROP 1	N 28 36.62	W 87 38.47	NEPTA
ROZZI	N 28 18.87	W 86 42.31	ROZZI
REMIS	N 27 53.04	W 85 15.47	REMIS
DROP 2	N 27 29.61	W 84 46.99	CIGAR
ADIZ Outbound	N 26 30.00	W 85 37.00	
MINOW	N 26 02.79	W 85 58.98	MINOW
DROP 3	N 25 03.46	W 87 41.03	ELIOM
SWORD	N 24 30.00	W 88 37.00	SWORD
KEHLI	N 24 29.05	W 89 50.50	KEHLI
DROP 4	N 24 30.00	W 90 30.00	
MARTE	N 24 30.00	W 91 47.08	MARTE
COKER	N 24 57.80	W 93 52.90	COKER
DROP 5	N 25 20.00	W 94 30.00	
ADIZ Inbound	N 26 30.00	W 94 42.00	
DROP 6	N 28 15.00	W 95 00.00	
MUSYL	N 28 10.23	W 94 07.75	MUSYL
KLAMS	N 28 15.00	W 92 49.66	KLAMS
DROP 7	N 28 15.00	W 91 30.00	
LEEVILLE	N 29 10.51	W 90 06.24	LEV

APPENDIX G
ALASKAN FLIGHT TRACKS

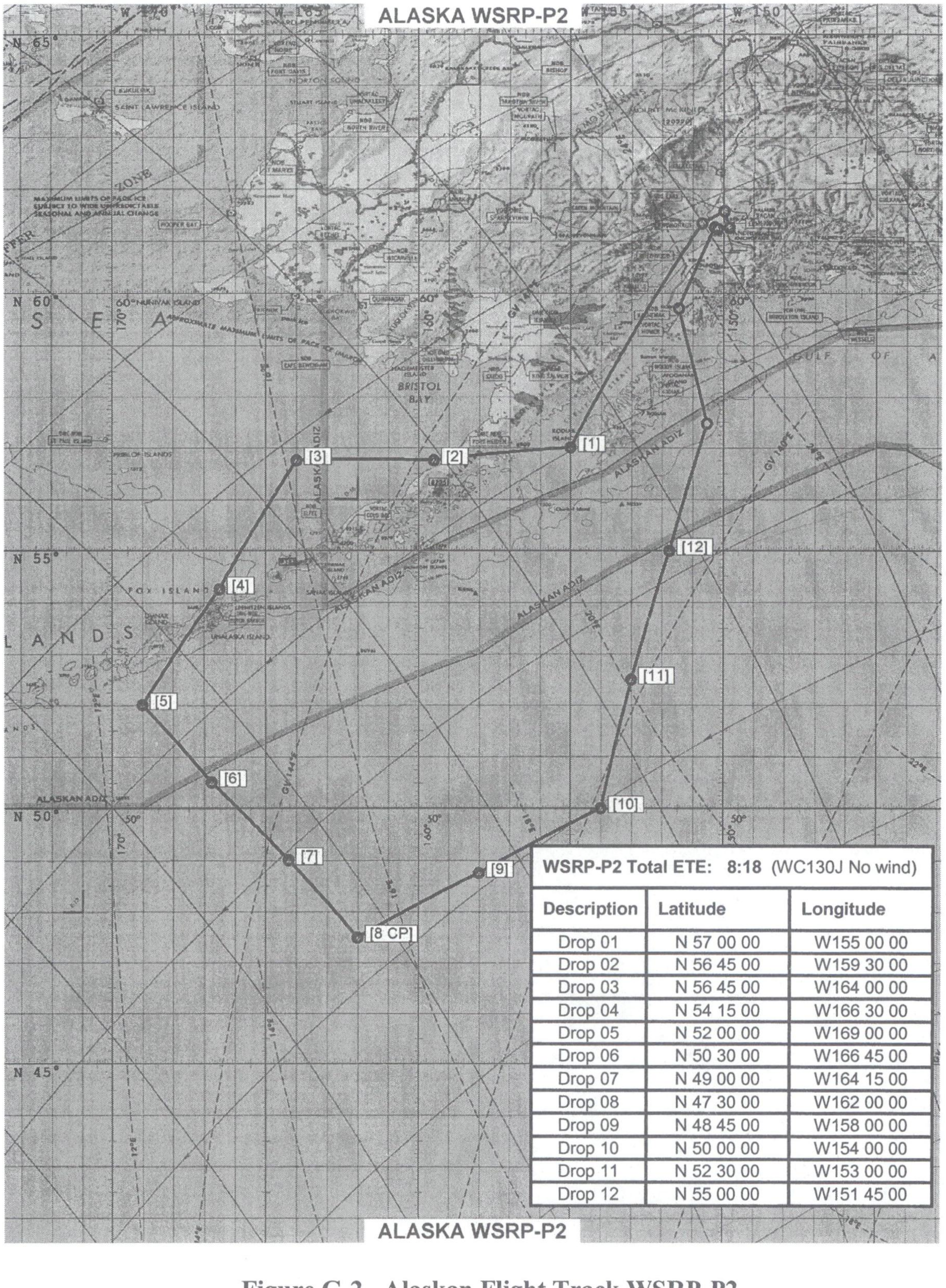
Note: The 53 WRS and NOAA AOC flight operations planners will plan tasked missions to meet Control Point/Control Time criteria and will fly the route in the most efficient direction possible. If a specific direction is desired (clockwise or counterclockwise), it should be indicated in the WSPOD; e.g., Track WSRP-P32 CW or Track WSRP-A64 CCW. Tasking agencies should not use the terminology "Reverse" indicated by an "R" when requesting a track.



WSRP-P1 Total ETE: 8:37 (WC130J No wind)

Description	Latitude	Longitude
DROP 1	N 57 00 00	W156 00 00
DROP 2	N 57 00 00	W161 00 00
DROP 3	N 57 00 00	W166 00 00
DROP 4	N 54 45 00	W169 00 00
DROP 5	N 52 30 00	W172 00 00
DROP 6	N 50 15 00	W170 00 00
DROP 7 CP	N 48 00 00	W168 00 00
DROP 8	N 49 00 00	W164 30 00
DROP 9	N 50 00 00	W160 45 00
DROP 10	N 51 00 00	W157 00 00
DROP 11	N 53 30 00	W155 15 00
DROP 12	N 56 00 00	W153 30 00

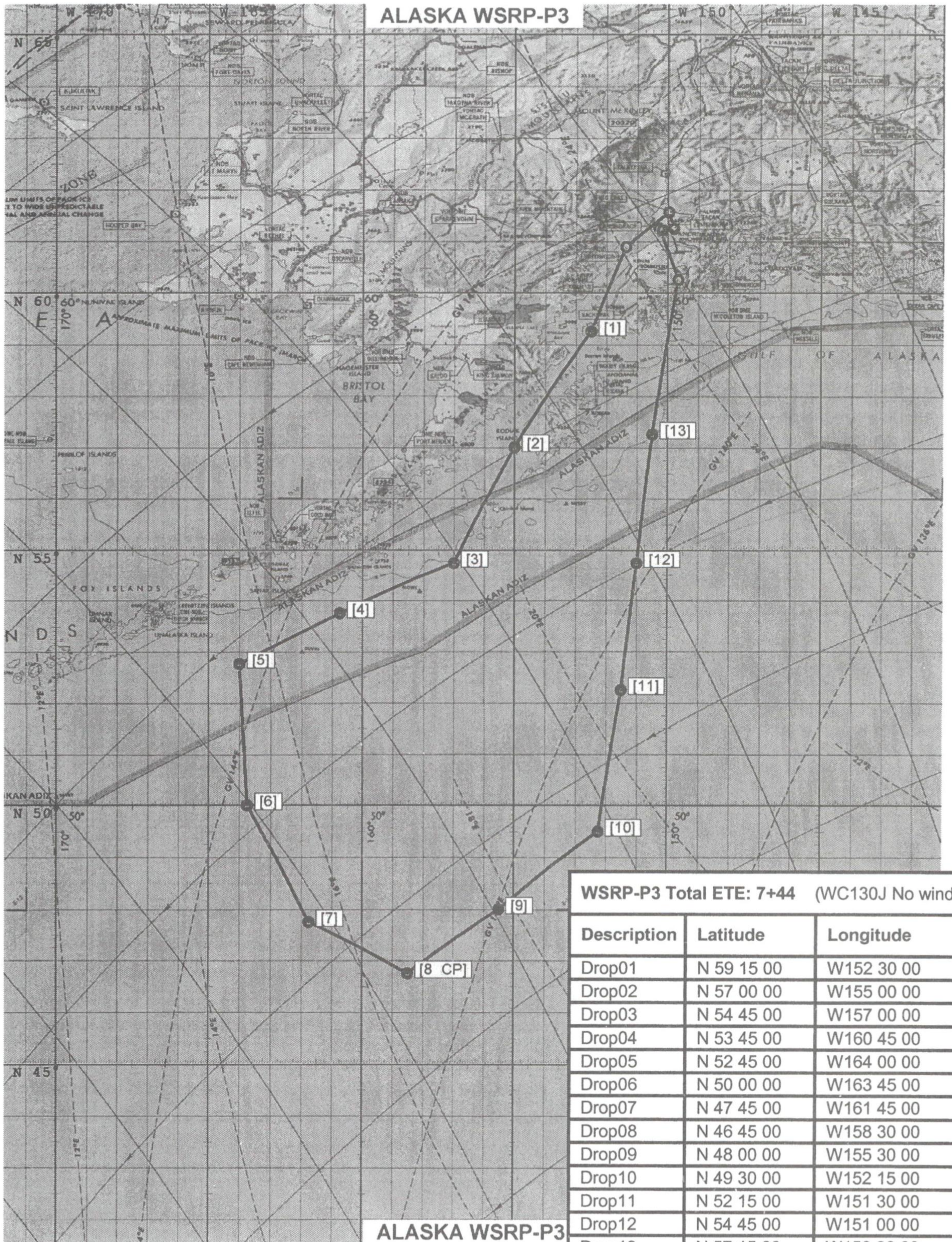
Figure G-1. Alaskan Flight Track WSRP-P1.



WSRP-P2 Total ETE: 8:18 (WC130J No wind)

Description	Latitude	Longitude
Drop 01	N 57 00 00	W155 00 00
Drop 02	N 56 45 00	W159 30 00
Drop 03	N 56 45 00	W164 00 00
Drop 04	N 54 15 00	W166 30 00
Drop 05	N 52 00 00	W169 00 00
Drop 06	N 50 30 00	W166 45 00
Drop 07	N 49 00 00	W164 15 00
Drop 08	N 47 30 00	W162 00 00
Drop 09	N 48 45 00	W158 00 00
Drop 10	N 50 00 00	W154 00 00
Drop 11	N 52 30 00	W153 00 00
Drop 12	N 55 00 00	W151 45 00

Figure G-2. Alaskan Flight Track WSRP-P2.



WSRP-P3 Total ETE: 7+44 (WC130J No wind)

Description	Latitude	Longitude
Drop01	N 59 15 00	W152 30 00
Drop02	N 57 00 00	W155 00 00
Drop03	N 54 45 00	W157 00 00
Drop04	N 53 45 00	W160 45 00
Drop05	N 52 45 00	W164 00 00
Drop06	N 50 00 00	W163 45 00
Drop07	N 47 45 00	W161 45 00
Drop08	N 46 45 00	W158 30 00
Drop09	N 48 00 00	W155 30 00
Drop10	N 49 30 00	W152 15 00
Drop11	N 52 15 00	W151 30 00
Drop12	N 54 45 00	W151 00 00
Drop13	N 57 15 00	W150 30 00

Figure G-3. Alaskan Flight Track WSRP-P3.

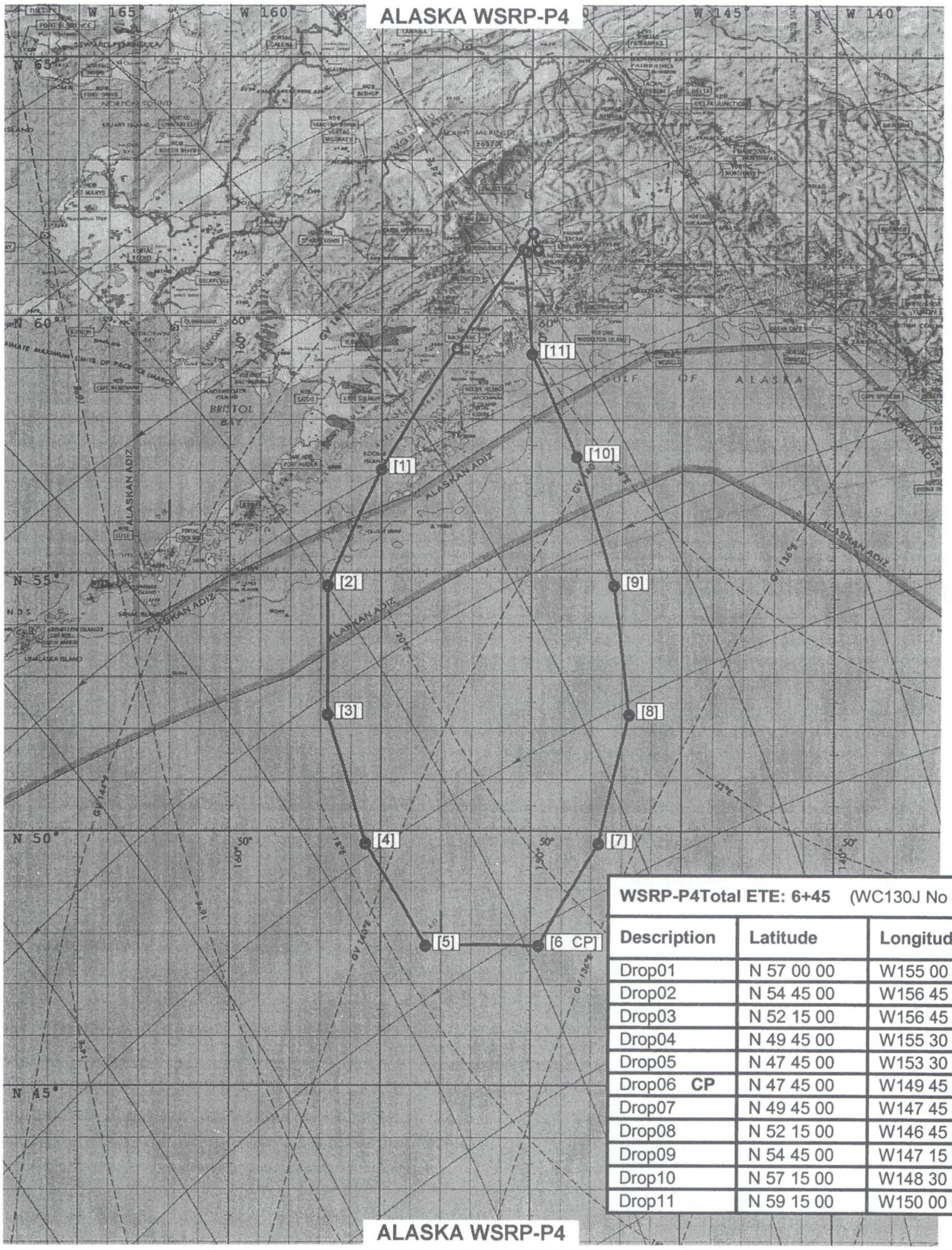
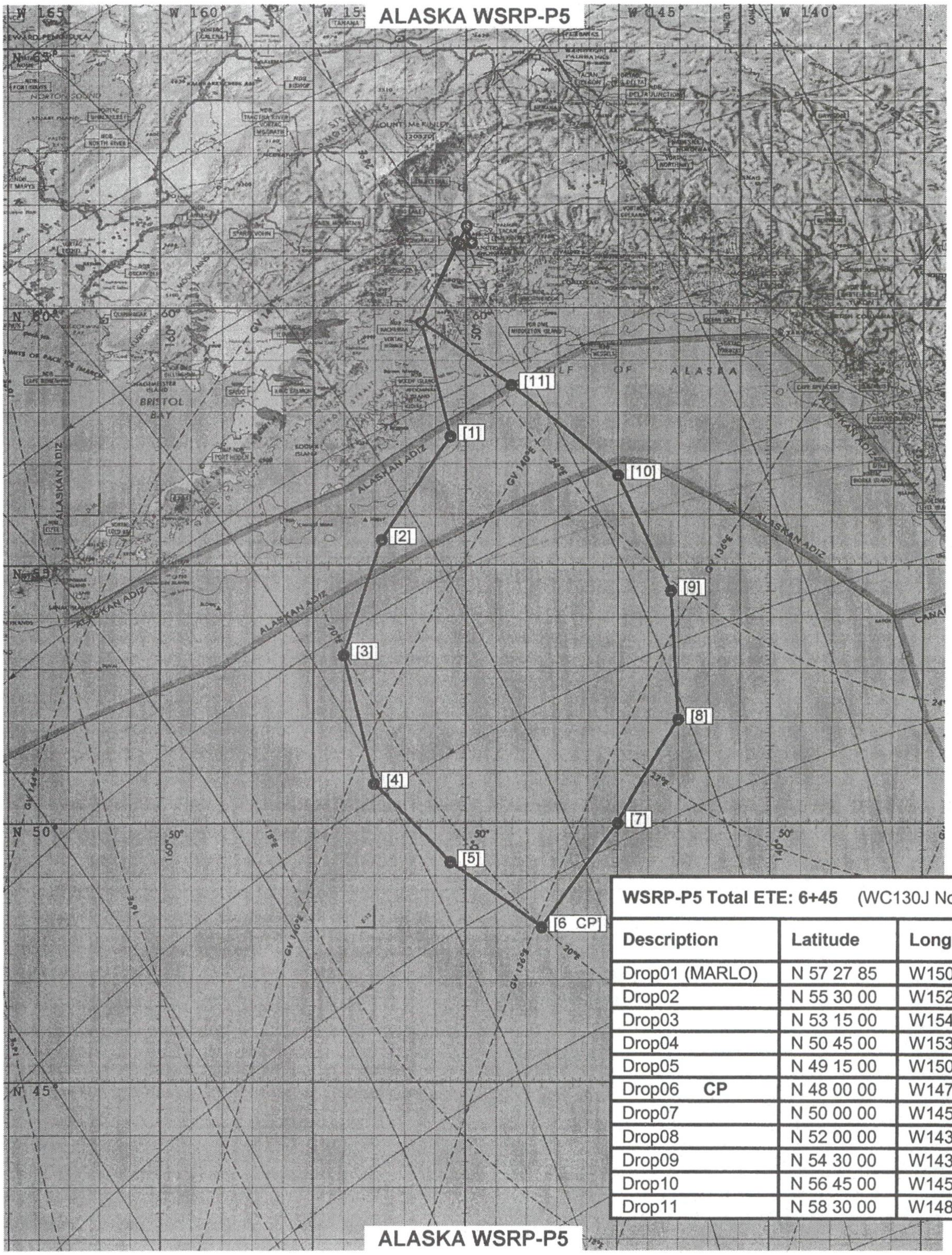


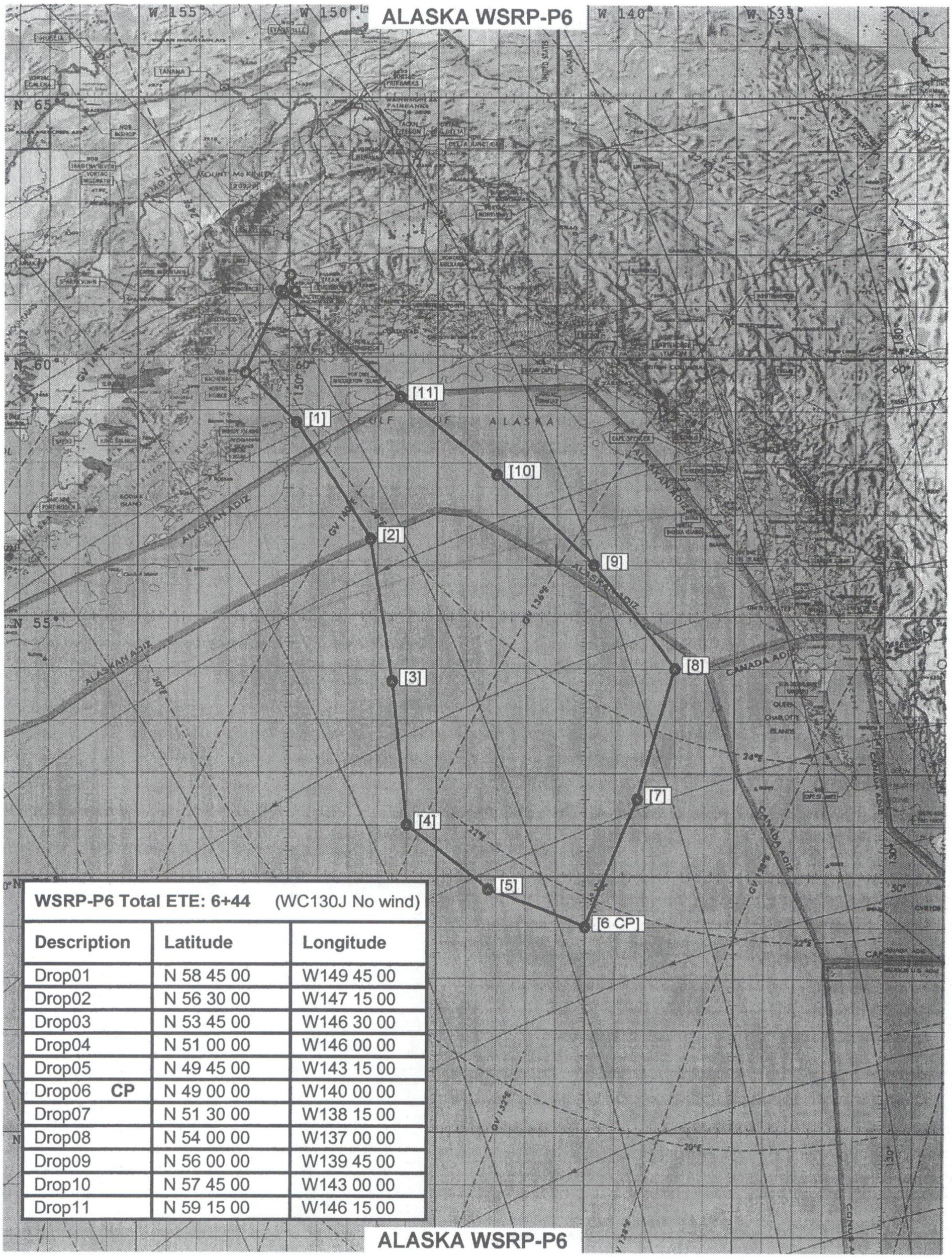
Figure G-4. Alaskan Flight Track WSRP-P4.



WSRP-P5 Total ETE: 6+45 (WC130J No wind)

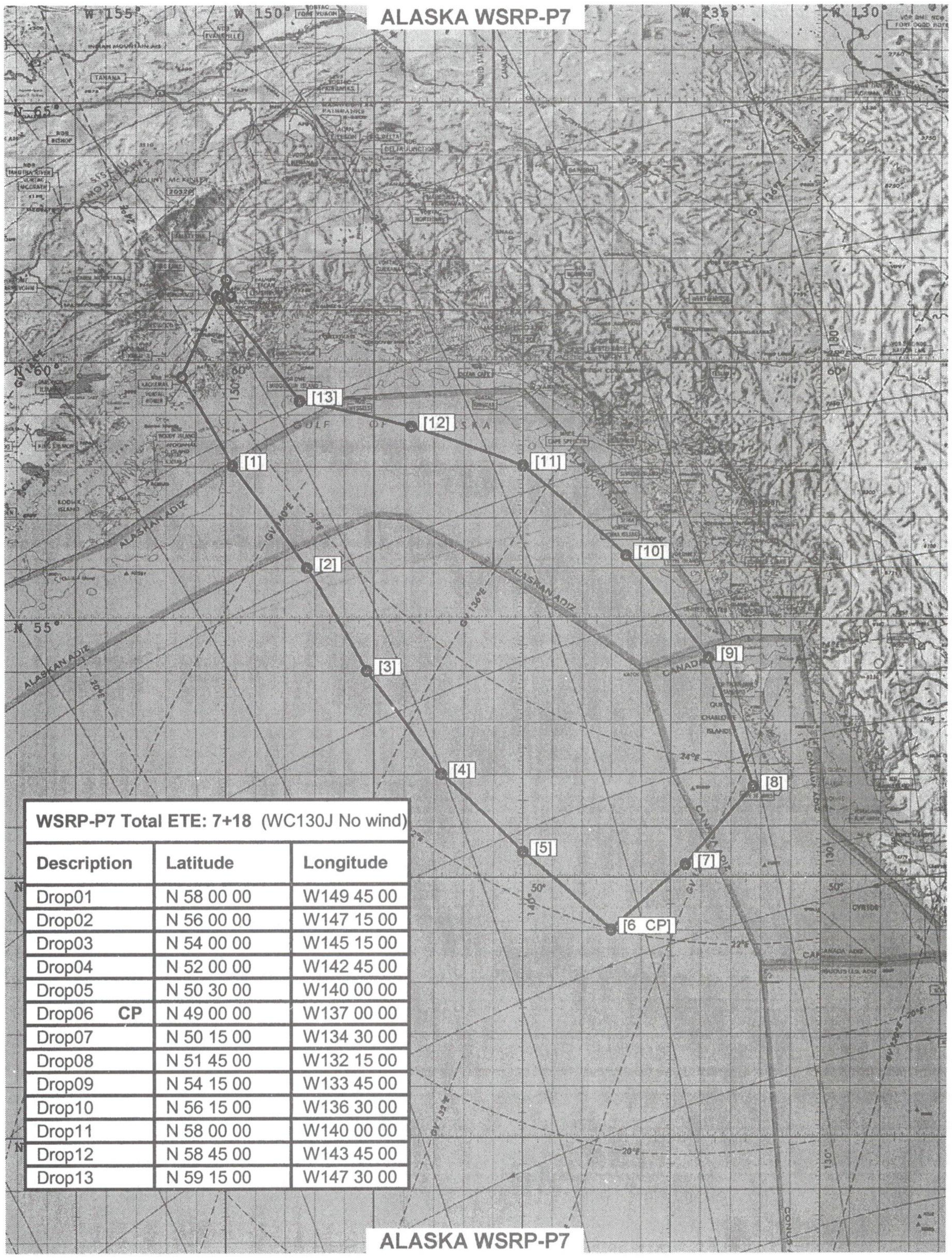
Description	Latitude	Longitude
Drop01 (MARLO)	N 57 27 85	W150 31 86
Drop02	N 55 30 00	W152 45 00
Drop03	N 53 15 00	W154 00 00
Drop04	N 50 45 00	W153 00 00
Drop05	N 49 15 00	W150 30 00
Drop06 **CP**	N 48 00 00	W147 30 00
Drop07	N 50 00 00	W145 00 00
Drop08	N 52 00 00	W143 00 00
Drop09	N 54 30 00	W143 15 00
Drop10	N 56 45 00	W145 00 00
Drop11	N 58 30 00	W148 30 00

Figure G-5. Alaskan Flight Track WSRP-P5.



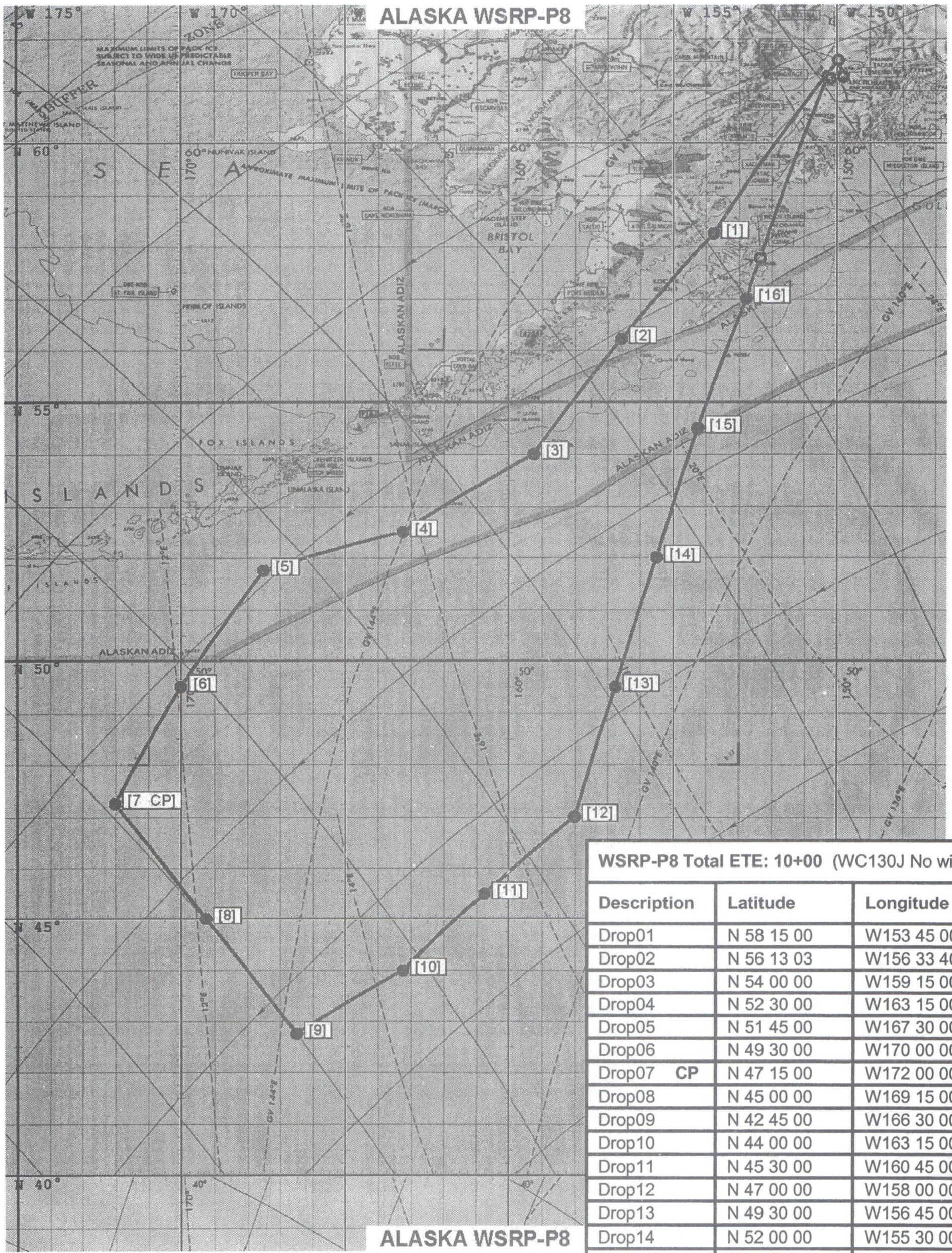
Description	Latitude	Longitude
Drop01	N 58 45 00	W149 45 00
Drop02	N 56 30 00	W147 15 00
Drop03	N 53 45 00	W146 30 00
Drop04	N 51 00 00	W146 00 00
Drop05	N 49 45 00	W143 15 00
Drop06 **CP**	N 49 00 00	W140 00 00
Drop07	N 51 30 00	W138 15 00
Drop08	N 54 00 00	W137 00 00
Drop09	N 56 00 00	W139 45 00
Drop10	N 57 45 00	W143 00 00
Drop11	N 59 15 00	W146 15 00

Figure G-6. Alaskan Flight Track WSRP-P6.



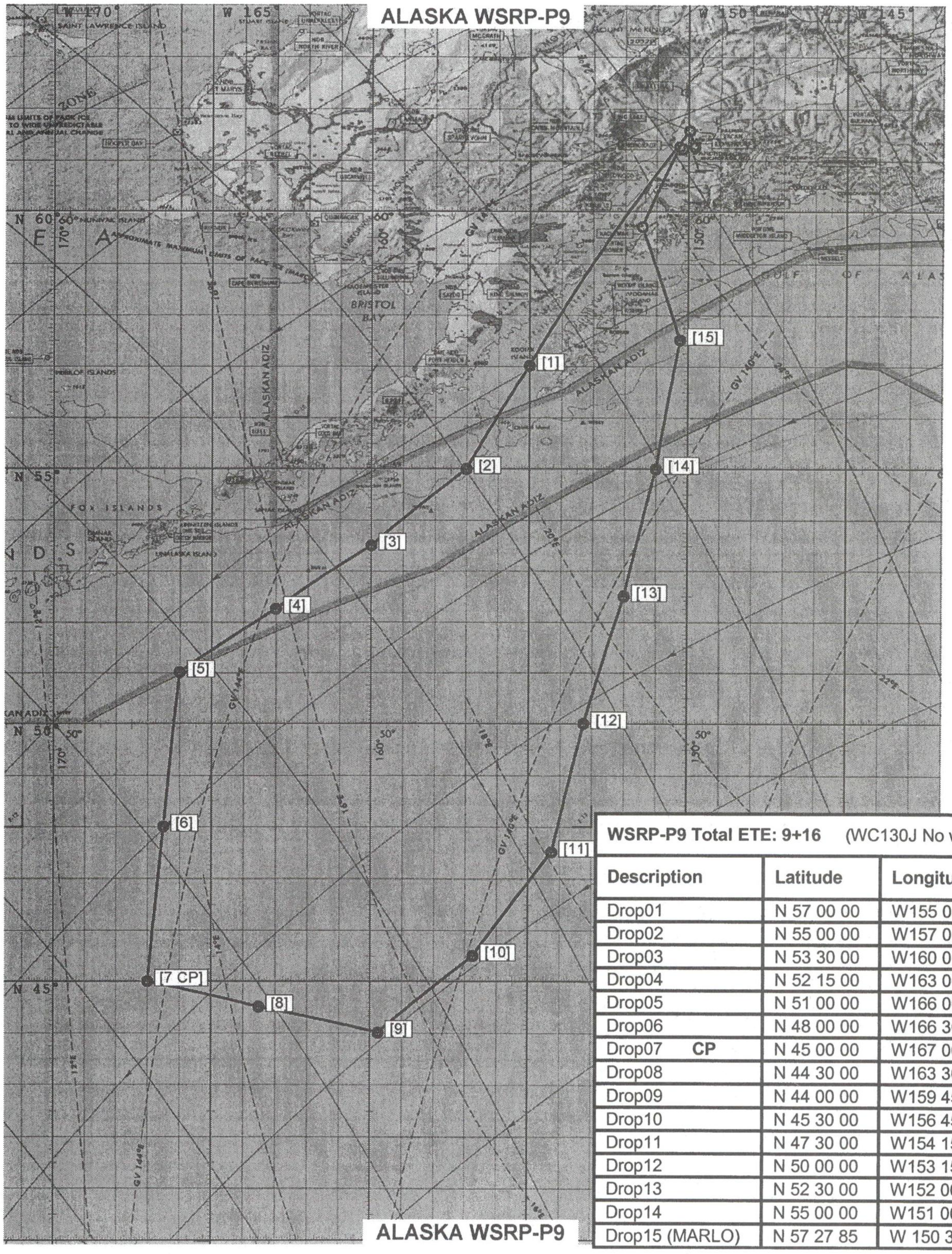
Description	Latitude	Longitude
Drop01	N 58 00 00	W149 45 00
Drop02	N 56 00 00	W147 15 00
Drop03	N 54 00 00	W145 15 00
Drop04	N 52 00 00	W142 45 00
Drop05	N 50 30 00	W140 00 00
Drop06 **CP**	N 49 00 00	W137 00 00
Drop07	N 50 15 00	W134 30 00
Drop08	N 51 45 00	W132 15 00
Drop09	N 54 15 00	W133 45 00
Drop10	N 56 15 00	W136 30 00
Drop11	N 58 00 00	W140 00 00
Drop12	N 58 45 00	W143 45 00
Drop13	N 59 15 00	W147 30 00

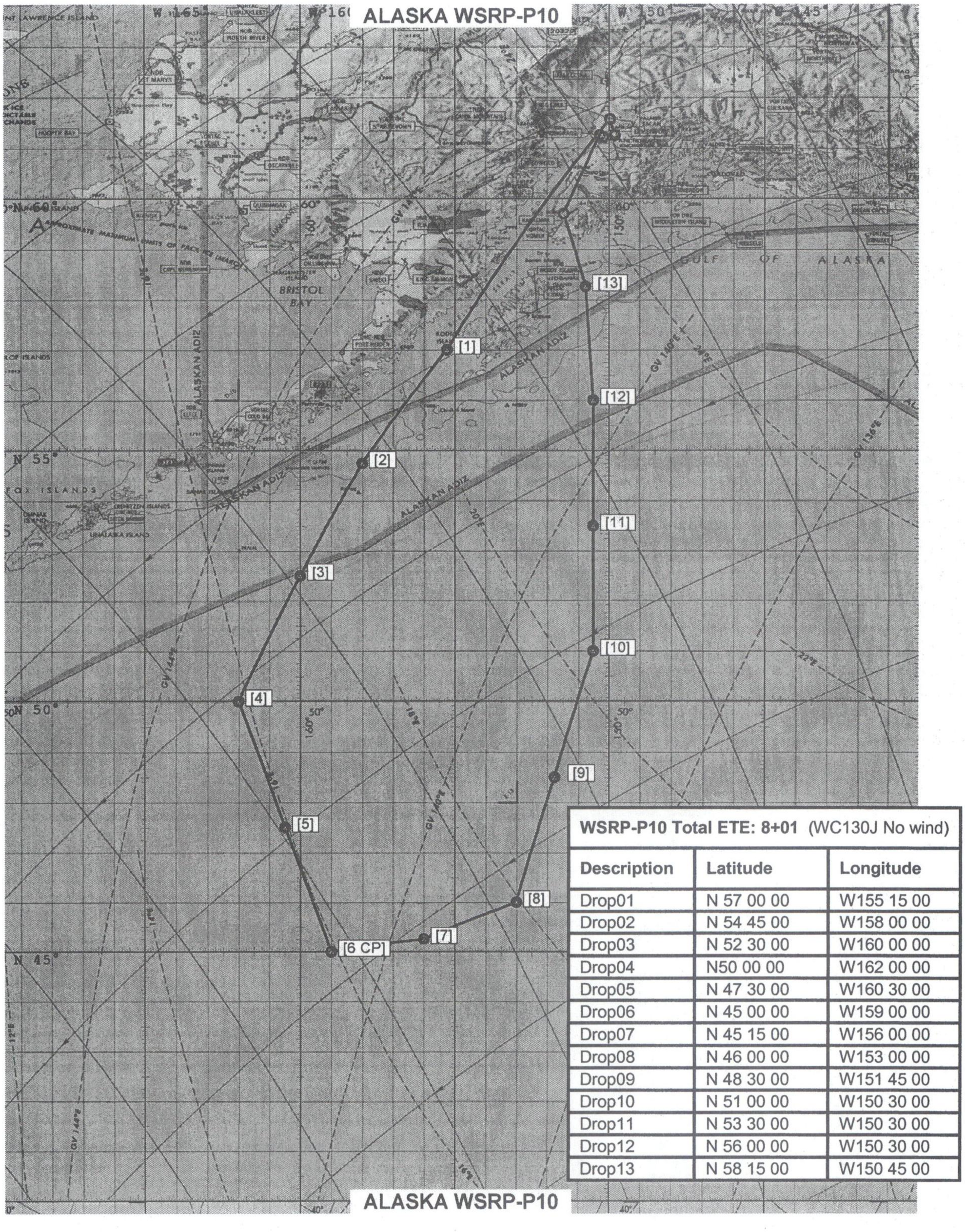
Figure G-7. Alaskan Flight Track WSRP-P7.



WSRP-P8 Total ETE: 10+00 (WC130J No wind)		
Description	**Latitude**	**Longitude**
Drop01	N 58 15 00	W153 45 00
Drop02	N 56 13 03	W156 33 40
Drop03	N 54 00 00	W159 15 00
Drop04	N 52 30 00	W163 15 00
Drop05	N 51 45 00	W167 30 00
Drop06	N 49 30 00	W170 00 00
Drop07 **CP**	N 47 15 00	W172 00 00
Drop08	N 45 00 00	W169 15 00
Drop09	N 42 45 00	W166 30 00
Drop10	N 44 00 00	W163 15 00
Drop11	N 45 30 00	W160 45 00
Drop12	N 47 00 00	W158 00 00
Drop13	N 49 30 00	W156 45 00
Drop14	N 52 00 00	W155 30 00
Drop15	N 54 30 00	W154 15 00
Drop19	N 57 00 00	W152 45 00

Figure G-8. Alaskan Flight Track WSRP-P8.

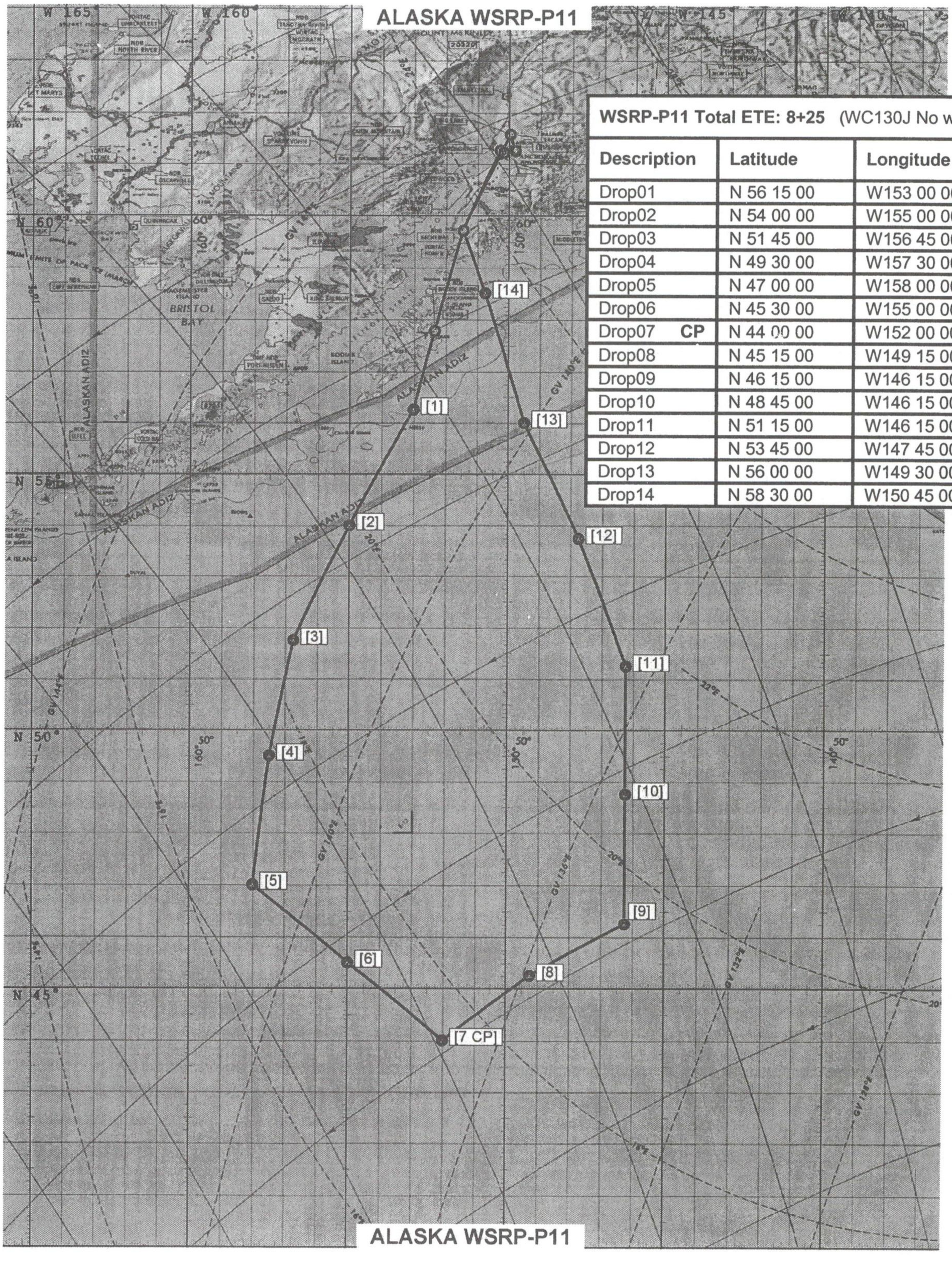

ALASKA WSRP-P9
W 170°
W 165°
W 150°
W 145°
N 60°
N 55°
N 50°
N 45°
SAINT LAWRENCE ISLAND
ZONE
NEW ST MARYS
NEW MARSHALL
NEW HOOPER BAY
NEW CHEFORNAK
NEW KWIGILLINGOK
NEW KING SALMON
NEW CAPE NEWENHAM
NEW KOLIGANEK
NEW NAPASKIAK
NEW PORT HEIDEN
NEW SAND POINT
NEW KING COVE
NEW CHIGNIK
NEW KARLUK
NEW OLD HARBOR
NEW AKHIOK
NEW LARSEN BAY
NEW AKUTAN
NEW NIKOLSKI
NEW NIKOLAI
NEW MEDFRA
NEW TANANA
NEW GALENA
NEW RUSSIAN MISSION
NEW MARSHALL
NEW HOLY CROSS
NEW ANVIK
NEW GRAYLING
NEW EAGLE
NEW TELIDA
NEW NORTHWAY
NEW TANACROSS
NEW TOK
NEW GULKANA
NEW MANLEY HOT SPRINGS
NEW MINCHUMINA
NEW NENANA
NEW MCGRATH
NEW NORTH RIVER
NEW TYONEK
NEW SKWENTNA
NEW TALKEETNA
NEW CANTWELL
NEW HEALY
NEW MCKINLEY PARK
NEW NORTHWAY
NEW TANACROSS
NEW TOK
NEW GULKANA
NEW MANLEY HOT SPRINGS
NEW MINCHUMINA
NEW NENANA
NEW MCGRATH
NEW NORTH RIVER
NEW TYONEK
NEW SKWENTNA
NEW TALKEETNA
NEW CANTWELL
NEW HEALY
NEW MCKINLEY PARK
MOUNT MC KINLEY
20320
ALASKAN ADIZ
GV 140°E
GV 144°E
GV 148°E
GV 152°E
GV 156°E
GV 160°E
GV 164°E
GV 168°E
GV 172°E
GV 176°E
GV 180°E
GV 184°E
GV 188°E
GV 192°E
GV 196°E
GV 200°E
GV 204°E
GV 208°E
GV 212°E
GV 216°E
GV 220°E
GV 224°E
GV 228°E
GV 232°E
GV 236°E
GV 240°E
GV 244°E
GV 248°E
GV 252°E
GV 256°E
GV 260°E
GV 264°E
GV 268°E
GV 272°E
GV 276°E
GV 280°E
GV 284°E
GV 288°E
GV 292°E
GV 296°E
GV 300°E
GV 304°E
GV 308°E
GV 312°E
GV 316°E
GV 320°E
GV 324°E
GV 328°E
GV 332°E
GV 336°E
GV 340°E
GV 344°E
GV 348°E
GV 352°E
GV 356°E
GV 360°E
GV 364°E
GV 368°E
GV 372°E
GV 376°E
GV 380°E
GV 384°E
GV 388°E
GV 392°E
GV 396°E
GV 400°E
GV 404°E
GV 408°E
GV 412°E
GV 416°E
GV 420°E
GV 424°E
GV 428°E
GV 432°E
GV 436°E
GV 440°E
GV 444°E
GV 448°E
GV 452°E
GV 456°E
GV 460°E
GV 464°E
GV 468°E
GV 472°E
GV 476°E
GV 480°E
GV 484°E
GV 488°E
GV 492°E
GV 496°E
GV 500°E
GV 504°E
GV 508°E
GV 512°E
GV 516°E
GV 520°E
GV 524°E
GV 528°E
GV 532°E
GV 536°E
GV 540°E
GV 544°E
GV 548°E
GV 552°E
GV 556°E
GV 560°E
GV 564°E
GV 568°E
GV 572°E
GV 576°E
GV 580°E
GV 584°E
GV 588°E
GV 592°E
GV 596°E
GV 600°E
GV 604°E
GV 608°E
GV 612°E
GV 616°E
GV 620°E
GV 624°E
GV 628°E
GV 632°E
GV 636°E
GV 640°E
GV 644°E
GV 648°E
GV 652°E
GV 656°E
GV 660°E
GV 664°E
GV 668°E
GV 672°E
GV 676°E
GV 680°E
GV 684°E
GV 688°E
GV 692°E
GV 696°E
GV 700°E
GV 704°E
GV 708°E
GV 712°E
GV 716°E
GV 720°E
GV 724°E
GV 728°E
GV 732°E
GV 736°E
GV 740°E
GV 744°E
GV 748°E
GV 752°E
GV 756°E
GV 760°E
GV 764°E
GV 768°E
GV 772°E
GV 776°E
GV 780°E
GV 784°E
GV 788°E
GV 792°E
GV 796°E
GV 800°E
GV 804°E
GV 808°E
GV 812°E
GV 816°E
GV 820°E
GV 824°E
GV 828°E
GV 832°E
GV 836°E
GV 840°E
GV 844°E
GV 848°E
GV 852°E
GV 856°E
GV 860°E
GV 864°E
GV 868°E
GV 872°E
GV 876°E
GV 880°E
GV 884°E
GV 888°E
GV 892°E
GV 896°E
GV 900°E
GV 904°E
GV 908°E
GV 912°E
GV 916°E
GV 920°E
GV 924°E
GV 928°E
GV 932°E
GV 936°E
GV 940°E
GV 944°E
GV 948°E
GV 952°E
GV 956°E
GV 960°E
GV 964°E
GV 968°E
GV 972°E
GV 976°E
GV 980°E
GV 984°E
GV 988°E
GV 992°E
GV 996°E
GV 1000°E
GV 1004°E
GV 1008°E
GV 1012°E
GV 1016°E
GV 1020°E
GV 1024°E
GV 1028°E
GV 1032°E
GV 1036°E
GV 1040°E
GV 1044°E
GV 1048°E
GV 1052°E
GV 1056°E
GV 1060°E
GV 1064°E
GV 1068°E
GV 1072°E
GV 1076°E
GV 1080°E
GV 1084°E
GV 1088°E
GV 1092°E
GV 1096°E
GV 1100°E
GV 1104°E
GV 1108°E
GV 1112°E
GV 1116°E
GV 1120°E
GV 1124°E
GV 1128°E
GV 1132°E
GV 1136°E
GV 1140°E
GV 1144°E
GV 1148°E
GV 1152°E
GV 1156°E
GV 1160°E
GV 1164°E
GV 1168°E
GV 1172°E
GV 1176°E
GV 1180°E
GV 1184°E
GV 1188°E
GV 1192°E
GV 1196°E
GV 1200°E
GV 1204°E
GV 1208°E
GV 1212°E
GV 1216°E
GV 1220°E
GV 1224°E
GV 1228°E
GV 1232°E
GV 1236°E
GV 1240°E
GV 1244°E
GV 1248°E
GV 1252°E
GV 1256°E
GV 1260°E
GV 1264°E
GV 1268°E
GV 1272°E
GV 1276°E
GV 1280°E
GV 1284°E
GV 1288°E
GV 1292°E
GV 1296°E
GV 1300°E
GV 1304°E
GV 1308°E
GV 1312°E
GV 1316°E
GV 1320°E
GV 1324°E
GV 1328°E
GV 1332°E
GV 1336°E
GV 1340°E
GV 1344°E
GV 1348°E
GV 1352°E
GV 1356°E
GV 1360°E
GV 1364°E
GV 1368°E
GV 1372°E
GV 1376°E
GV 1380°E
GV 1384°E
GV 1388°E
GV 1392°E
GV 1396°E
GV 1400°E
GV 1404°E
GV 1408°E
GV 1412°E
GV 1416°E
GV 1420°E
GV 1424°E
GV 1428°E
GV 1432°E
GV 1436°E
GV 1440°E
GV 1444°E
GV 1448°E
GV 1452°E
GV 1456°E
GV 1460°E
GV 1464°E
GV 1468°E
GV 1472°E
GV 1476°E
GV 1480°E
GV 1484°E
GV 1488°E
GV 1492°E
GV 1496°E
GV 1500°E
GV 1504°E
GV 1508°E
GV 1512°E
GV 1516°E
GV 1520°E
GV 1524°E
GV 1528°E
GV 1532°E
GV 1536°E
GV 1540°E
GV 1544°E
GV 1548°E
GV 1552°E
GV 1556°E
GV 1560°E
GV 1564°E
GV 1568°E
GV 1572°E
GV 1576°E
GV 1580°E
GV 1584°E
GV 1588°E
GV 1592°E
GV 1596°E
GV 1600°E
GV 1604°E
GV 1608°E
GV 1612°E
GV 1616°E
GV 1620°E
GV 1624°E
GV 1628°E
GV 1632°E
GV 1636°E
GV 1640°E
GV 1644°E
GV 1648°E
GV 1652°E
GV 1656°E
GV 1660°E
GV 1664°E
GV 1668°E
GV 1672°E
GV 1676°E
GV 1680°E
GV 1684°E
GV 1688°E
GV 1692°E
GV 1696°E
GV 1700°E
GV 1704°E
GV 1708°E
GV 1712°E
GV 1716°E
GV 1720°E
GV 1724°E
GV 1728°E
GV 1732°E
GV 1736°E
GV 1740°E
GV 1744°E
GV 1748°E
GV 1752°E
GV 1756°E
GV 1760°E
GV 1764°E
GV 1768°E
GV 1772°E
GV 1776°E
GV 1780°E
GV 1784°E
GV 1788°E
GV 1792°E
GV 1796°E
GV 1800°E
GV 1804°E
GV 1808°E
GV 1812°E
GV 1816°E
GV 1820°E
GV 1824°E
GV 1828°E
GV 1832°E
GV 1836°E
GV 1840°E
GV 1844°E
GV 1848°E
GV 1852°E
GV 1856°E
GV 1860°E
GV 1864°E
GV 1868°E
GV 1872°E
GV 1876°E
GV 1880°E
GV 1884°E
GV 1888°E
GV 1892°E
GV 1896°E
GV 1900°E
GV 1904°E
GV 1908°E
GV 1912°E
GV 1916°E
GV 1920°E
GV 1924°E
GV 1928°E
GV 1932°E
GV 1936°E
GV 1940°E
GV 1944°E
GV 1948°E
GV 1952°E
GV 1956°E
GV 1960°E
GV 1964°E
GV 1968°E
GV 1972°E
GV 1976°E
GV 1980°E
GV 1984°E
GV 1988°E
GV 1992°E
GV 1996°E
GV 2000°E
GV 2004°E
GV 2008°E
GV 2012°E
GV 2016°E
GV 2020°E
GV 2024°E
GV 2028°E
GV 2032°E
GV 2036°E
GV 2040°E
GV 2044°E
GV 2048°E
GV 2052°E
GV 2056°E
GV 2060°E
GV 2064°E
GV 2068°E
GV 2072°E
GV 2076°E
GV 2080°E
GV 2084°E
GV 2088°E
GV 2092°E
GV 2096°E
GV 2100°E
GV 2104°E
GV 2108°E
GV 2112°E
GV 2116°E
GV 2120°E
GV 2124°E
GV 2128°E
GV 2132°E
GV 2136°E
GV 2140°E
GV 2144°E
GV 2148°E
GV 2152°E
GV 2156°E
GV 2160°E
GV 2164°E
GV 2168°E
GV 2172°E
GV 2176°E
GV 2180°E
GV 2184°E
GV 2188°E
GV 2192°E
GV 2196°E
GV 2200°E
GV 2204°E
GV 2208°E
GV 2212°E
GV 2216°E
GV 2220°E
GV 2224°E
GV 2228°E
GV 2232°E
GV 2236°E
GV 2240°E
GV 2244°E
GV 2248°E
GV 2252°E
GV 2256°E
GV 2260°E
GV 2264°E
GV 2268°E
GV 2272°E
GV 2276°E
GV 2280°E
GV 2284°E
GV 2288°E
GV 2292°E
GV 2296°E
GV 2300°E
GV 2304°E
GV 2308°E
GV 2312°E
GV 2316°E
GV 2320°E
GV 2324°E
GV 2328°E
GV 2332°E
GV 2336°E
GV 2340°E
GV 2344°E
GV 2348°E
GV 2352°E
GV 2356°E
GV 2360°E
GV 2364°E
GV 2368°E
GV 2372°E
GV 2376°E
GV 2380°E
GV 2384°E
GV 2388°E
GV 2392°E
GV 2396°E
GV 2400°E
GV 2404°E
GV 2408°E
GV 2412°E
GV 2416°E
GV 2420°E
GV 2424°E
GV 2428°E
GV 2432°E
GV 2436°E
GV 2440°E
GV 2444°E
GV 2448°E
GV 2452°E
GV 2456°E
GV 2460°E
GV 2464°E
GV 2468°E
GV 2472°E
GV 2476°E
GV 2480°E
GV 2484°E
GV 2488°E
GV 2492°E
GV 2496°E
GV 2500°E
GV 2504°E
GV 2508°E
GV 2512°E
GV 2516°E
GV 2520°E
GV 2524°E
GV 2528°E
GV 2532°E
GV 2536°E
GV 2540°E
GV 2544°E
GV 2548°E
GV 2552°E
GV 2556°E
GV 2560°E
GV 2564°E
GV 2568°E
GV 2572°E
GV 2576°E
GV 2580°E
GV 2584°E
GV 2588°E
GV 2592°E
GV 2596°E
GV 2600°E
GV 2604°E
GV 2608°E
GV 2612°E
GV 2616°E
GV 2620°E
GV 2624°E
GV 2628°E
GV 2632°E
GV 2636°E
GV 2640°E
GV 2644°E
GV 2648°E
GV 2652°E
GV 2656°E
GV 2660°E
GV 2664°E
GV 2668°E
GV 2672°E
GV 2676°E
GV 2680°E
GV 2684°E
GV 2688°E
GV 2692°E
GV 2696°E
GV 2700°E
GV 2704°E
GV 2708°E
GV 2712°E
GV 2716°E
GV 2720°E
GV 2724°E
GV 2728°E
GV 2732°E
GV 2736°E
GV 2740°E
GV 2744°E
GV 2748°E
GV 2752°E
GV 2756°E
GV 2760°E
GV 2764°E
GV 2768°E
GV 2772°E
GV 2776°E
GV 2780°E
GV 2784°E
GV 2788°E
GV 2792°E
GV 2796°E
GV 2800°E
GV 2804°E
GV 2808°E
GV 2812°E
GV 2816°E
GV 2820°E
GV 2824°E
GV 2828°E
GV 2832°E
GV 2836°E
GV 2840°E
GV 2844°E
GV 2848°E
GV 2852°E
GV 2856°E
GV 2860°E
GV 2864°E
GV 2868°E
GV 2872°E
GV 2876°E
GV 2880°E
GV 2884°E
GV 2888°E
GV 2892°E
GV 2896°E
GV 2900°E
GV 2904°E
GV 2908°E
GV 2912°E
GV 2916°E
GV 2920°E
GV 2924°E
GV 2928°E
GV 2932°E
GV 2936°E
GV 2940°E
GV 2944°E
GV 2948°E
GV 2952°E
GV 2956°E
GV 2960°E
GV 2964°E
GV 2968°E
GV 2972°E
GV 2976°E
GV 2980°E
GV 2984°E
GV 2988°E
GV 2992°E
GV 2996°E
GV 3000°E
GV 3004°E
GV 3008°E
GV 3012°E
GV 3016°E
GV 3020°E
GV 3024°E
GV 3028°E
GV 3032°E
GV 3036°E
GV 3040°E
GV 3044°E
GV 3048°E
GV 3052°E
GV 3056°E
GV 3060°E
GV 3064°E
GV 3068°E
GV 3072°E
GV 3076°E
GV 3080°E
GV 3084°E
GV 3088°E
GV 3092°E
GV 3096°E
GV 3100°E
GV 3104°E
GV 3108°E
GV 3112°E
GV 3116°E
GV 3120°E
GV 3124°E
GV 3128°E
GV 3132°E
GV 3136°E
GV 3140°E
GV 3144°E
GV 3148°E
GV 3152°E
GV 3156°E
GV 3160°E
GV 3164°E
GV 3168°E
GV 3172°E
GV 3176°E
GV 3180°E
GV 3184°E
GV 3188°E
GV 3192°E
GV 3196°E
GV 3200°E
GV 3204°E
GV 3208°E
GV 3212°E
GV 3216°E
GV 3220°E
GV 3224°E
GV 3228°E
GV 3232°E
GV 3236°E
GV 3240°E
GV 3244°E
GV 3248°E
GV 3252°E
GV 3256°E
GV 3260°E
GV 3264°E
GV 3268°E
GV 3272°E
GV 3276°E
GV 3280°E
GV 3284°E
GV 3288°E
GV 3292°E
GV 3296°E
GV 3300°E
GV 3304°E
GV 3308°E
GV 3312°E
GV 3316°E
GV 3320°E
GV 3324°E
GV 3328°E
GV 3332°E
GV 3336°E
GV 3340°E
GV 3344°E
GV 3348°E
GV 3352°E
GV 3356°E
GV 3360°E
GV 3364°E
GV 3368°E
GV 3372°E
GV 3376°E
GV 3380°E
GV 3384°E
GV 3388°E
GV 3392°E
GV 3396°E
GV 3400°E
GV 3404°E
GV 3408°E
GV 3412°E
GV 3416°E
GV 3420°E
GV 3424°E
GV 3428°E
GV 3432°E
GV 3436°E
GV 3440°E
GV 3444°E
GV 3448°E
GV 3452°E
GV 3456°E
GV 3460°E
GV 3464°E
GV 3468°E
GV 3472°E
GV 3476°E
GV 3480°E
GV 3484°E
GV 3488°E
GV 3492°E
GV 3496°E
GV 3500°E
GV 3504°E
GV 3508°E
GV 3512°E
GV 3516°E
GV 3520°E
GV 3524°E
GV 3528°E
GV 3532°E
GV 3536°E
GV 3540°E
GV 3544°E
GV 3548°E
GV 3552°E
GV 3556°E
GV 3560°E
GV 3564°E
GV 3568°E
GV 3572°E
GV 3576°E
GV 3580°E
GV 3584°E
GV 3588°E
GV 3592°E
GV 3596°E
GV 3600°E
GV 3604°E
GV 3608°E
GV 3612°E
GV 3616°E
GV 3620°E
GV 3624°E
GV 3628°E
GV 3632°E
GV 3636°E
GV 3640°E
GV 3644°E
GV 3648°E
GV 3652°E
GV 3656°E
GV 3660°E
GV 3664°E
GV 3668°E
GV 3672°E
GV 3676°E
GV 3680°E
GV 3684°E
GV 3688°E
GV 3692°E
GV 3696°E
GV 3700°E
GV 3704°E
GV 3708°E
GV 3712°E
GV 3716°E
GV 3720°E
GV 3724°E
GV 3728°E
GV 3732°E
GV 3736°E
GV 3740°E
GV 3744°E
GV 3748°E
GV 3752°E
GV 3756°E
GV 3760°E
GV 3764°E
GV 3768°E
GV 3772°E
GV 3776°E
GV 3780°E
GV 3784°E
GV 3788°E
GV 3792°E
GV 3796°E
GV 3800°E
GV 3804°E
GV 3808°E
GV 3812°E
GV 3816°E
GV 3820°E
GV 3824°E
GV 3828°E
GV 3832°E
GV 3836°E
GV 3840°E
GV 3844°E
GV 3848°E
GV 3852°E
GV 3856°E
GV 3860°E
GV 3864°E
GV 3868°E
GV 3872°E
GV 3876°E
GV 3880°E
GV 3884°E
GV 3888°E
GV 3892°E
GV 3896°E
GV 3900°E
GV 3904°E
GV 3908°E
GV 3912°E
GV 3916°E
GV 3920°E
GV 3924°E
GV 3928°E
GV 3932°E
GV 3936°E
GV 3940°E
GV 3944°E
GV 3948°E
GV 3952°E
GV 3956°E
GV 3960°E
GV 3964°E
GV 3968°E
GV 3972°E
GV 3976°E
GV 3980°E
GV 3984°E
GV 3988°E
GV 3992°E
GV 3996°E
GV 4000°E
GV 4004°E
GV 4008°E
GV 4012°E
GV 4016°E
GV 4020°E
GV 4024°E
GV 4028°E
GV 4032°E
GV 4036°E
GV 4040°E
GV 4044°E
GV 4048°E
GV 4052°E
GV 4056°E
GV 4060°E
GV 4064°E
GV 4068°E
GV 4072°E
GV 4076°E
GV 4080°E
GV 4084°E
GV 4088°E
GV 4092°E
GV 4096°E
GV 4100°E
GV 4104°E
GV 4108°E
GV 4112°E
GV 4116°E
GV 4120°E
GV 4124°E
GV 4128°E
GV 4132°E
GV 4136°E
GV 4140°E
GV 4144°E
GV 4148°E
GV 4152°E
GV 4156°E
GV 4160°E
GV 4164°E
GV 4168°E
GV 4172°E
GV 4176°E
GV 4180°E
GV 4184°E
GV 4188°E
GV 4192°E
GV 4196°E
GV 4200°E
GV 4204°E
GV 4208°E
GV 4212°E
GV 4216°E
GV 4220°E
GV 4224°E
GV 4228°E
GV 4232°E
GV 4236°E
GV 4240°E
GV 4244°E
GV 4248°E
GV 4252°E
GV 4256°E
GV 4260°E
GV 4264°E
GV 4268°E
GV 4272°E
GV 4276°E
GV 4280°E
GV 4284°E
GV 4288°E
GV 4292°E
GV 4296°E
GV 4300°E
GV 4304°E
GV 4308°E
GV 4312°E
GV 4316°E
GV 4320°E
GV 4324°E
GV 4328°E
GV 4332°E
GV 4336°E
GV 4340°E
GV 4344°E
GV 4348°E
GV 4352°E
GV 4356°E
GV 4360°E
GV 4364°E
GV 4368°E
GV 4372°E
GV 4376°E
GV 4380°E
GV 4384°E
GV 4388°E
GV 4392°E
GV 4396°E
GV 4400°E
GV 4404°E
GV 4408°E
GV 4412°E
GV 4416°E
GV 4420°E
GV 4424°E
GV 4428°E
GV 4432°E
GV 4436°E
GV 4440°E
GV 4444°E
GV 4448°E
GV 4452°E
GV 4456°E
GV 4460°E
GV 4464°E
GV 4468°E
GV 4472°E
GV 4476°E
GV 4480°E
GV 4484°E
GV 4488°E
GV 4492°E
GV 4496°E
GV 4500°E
GV 4504°E
GV 4508°E
GV 4512°E
GV 4516°E
GV 4520°E
GV 4524°E
GV 4528°E
GV 4532°E
GV 4536°E
GV 4540°E
GV 4544°E
GV 4548°E
GV 4552°E
GV 4556°E
GV 4560°E
GV 4564°E
GV 4568°E
GV 4572°E
GV 4576°E
GV 4580°E
GV 4584°E
GV 4588°E
GV 4592°E
GV 4596°E
GV 4600°E
GV 4604°E
GV 4608°E
GV 4612°E
GV 4616°E
GV 4620°E
GV 4624°E
GV 4628°E
GV 4632°E
GV 4636°E
GV 4640°E
GV 4644°E
GV 4648°E
GV 4652°E
GV 4656°E
GV 4660°E
GV 4664°E
GV 4668°E
GV 4672°E
GV 4676°E
GV 4680°E
GV 4684°E
GV 4688°E
GV 4692°E
GV 4696°E
GV 4700°E
GV 4704°E
GV 4708°E
GV 4712°E
GV 4716°E
GV 4720°E
GV 4724°E
GV 4728°E
GV 4732°E
GV 4736°E
GV 4740°E
GV 4744°E
GV 4748°E
GV 4752°E
GV 4756°E
GV 4760°E
GV 4764°E
GV 4768°E
GV 4772°E
GV 4776°E
GV 4780°E
GV 4784°E
GV 4788°E
GV 4792°E
GV 4796°E
GV 4800°E
GV 4804°E
GV 4808°E
GV 4812°E
GV 4816°E
GV 4820°E
GV 4824°E
GV 4828°E
GV 4832°E
GV 4836°E
GV 4840°E
GV 4844°E
GV 4848°E
GV 4852°E
GV 4856°E
GV 4860°E
GV 4864°E
GV 4868°E
GV 4872°E
GV 4876°E
GV 4880°E
GV 4884°E
GV 4888°E
GV 4892°E
GV 4896°E
GV 4900°E
GV 4904°E
GV 4908°E
GV 4912°E
GV 4916°E
GV 4920°E
GV 4924°E
GV 4928°E
GV 4932°E
GV 4936°E
GV 4940°E
GV 4944°E
GV 4948°E
GV 4952°E
GV 4956°E
GV 4960°E
GV 4964°E
GV 4968°E
GV 4972°E
GV 4976°E
GV 4980°E
GV 4984°E
GV 4988°E
GV 4992°E
GV 4996°E
GV 5000°E
GV 5004°E
GV 5008°E
GV 5012°E
GV 5016°E
GV 5020°E
GV 5024°E
GV 5028°E
GV 5032°E
GV 5036°E
GV 5040°E
GV 5044°E
GV 5048°E
GV 5052°E
GV 5056°E
GV 5060°E
GV 5064°E
GV 5068°E
GV 5072°E
GV 5076°E
GV 5080°E
GV 5084°E
GV 5088°E
GV 5092°E
GV 5096°E
GV 5100°E
GV 5104°E
GV 5108°E
GV 5112°E
GV 5116°E
GV 5120°E
GV 5124°E
GV 5128°E
GV 5132°E
GV 5136°E
GV 5140°E
GV 5144°E
GV 5148°E
GV 5152°E
GV 5156°E
GV 5160°E
GV 5164°E
GV 5168°E
GV 5172°E
GV 5176°E
GV 5180°E
GV 5184°E
GV 5188°E
GV 5192°E
GV 5196°E
GV 5200°E
GV 5204°E
GV 5208°E
GV 5212°E
GV 5216°E
GV 5220°E
GV 5224°E
GV 5228°E
GV 5232°E
GV 5236°E
GV 5240°E
GV 5244°E
GV 5248°E
GV 5252°E
GV 5256°E
GV 5260°E
GV 5264°E
GV 5268°E
GV 5272°E
GV 5276°E
GV 5280°E
GV 5284°E
GV 5288°E
GV 5292°E
GV 5296°E
GV 5300°E
GV 5304°E
GV 5308°E
GV 5312°E
GV 5316°E
GV 5320°E
GV 5324°E
GV 5328°E
GV 5332°E
GV 5336°E
GV 5340°E
GV 5344°E
GV 5348°E
GV 5352°E
GV 5356°E
GV 5360°E
GV 5364°E
GV 5368°E
GV 5372°E
GV 5376°E
GV 5380°E
GV 5384°E
GV 5388°E
GV 5392°E
GV 5396°E
GV 5400°E
GV 5404°E
GV 5408°E
GV 5412°E
GV 5416°E
GV 5420°E
GV 5424°E
GV 5428°E
GV 5432°E
GV 5436°E
GV 5440°E
GV 5444°E
GV 5448°E
GV 5452°E
GV 5456°E
GV 5460°E
GV 5464°E
GV 5468°E
GV 5472°E
GV 5476°E
GV 5480°E
GV 5484°E
GV 5488°E
GV 5492°E
GV 5496°E
GV 5500°E
GV 5504°E
GV 5508°E
GV 5512°E
GV 5516°E
GV 5520°E
GV 5524°E
GV 5528°E
GV 5532°E
GV 5536°E
GV 5540°E
GV 5544°E
GV 5548°E
GV 5552°E
GV 5556°E
GV 5560°E
GV 5564°E
GV 5568°E
GV 5572°E
GV 5576°E
GV 5580°E
GV 5584°E
GV 5588°E
GV 5592°E
GV 5596°E
GV 5600°E
GV 5604°E
GV 5608°E
GV 5612°E
GV 5616°E
GV 5620°E
GV 5624°E
GV 5628°E
GV 5632°E
GV 5636°E
GV 5640°E
GV 5644°E
GV 5648°E
GV 5652°E
GV 5656°E
GV 5660°E
GV 5664°E
GV 5668°E
GV 5672°E
GV 5676°E
GV 5680°E
GV 5684°E
GV 5688°E
GV 5692°E
GV 5696°E
GV 5700°E
GV 5704°E
GV 5708°E
GV 5712°E
GV 5716°E
GV 5720°E
GV 5724°E
GV 5728°E
GV 5732°E
GV 5736°E
GV 5740°E
GV 5744°E
GV 5748°E
GV 5752°E
GV 5756°E
GV 5760°E
GV 5764°E
GV 5768°E
GV 5772°E
GV 5776°E
GV 5780°E
GV 5784°E
GV 5788°E
GV 5792°E
GV 5796°E
GV 5800°E
GV 5804°E
GV 5808°E
GV 5812°E
GV 5816°E
GV 5820°E
GV 5824°E
GV 5828°E
GV 5832°E
GV 5836°E
GV 5840°E
GV 5844°E
GV 5848°E
GV 5852°E
GV 5856°E
GV 5860°E
GV 5864°E
GV 5868°E
GV 5872°E
GV 5876°E
GV 5880°E
GV 5884°E
GV 5888°E
GV 5892°E
GV 5896°E
GV 5900°E
GV 5904°E
GV 5908°E
GV 5912°E
GV 5916°E
GV 5920°E
GV 5924°E
GV 5928°E
GV 5932°E
GV 5936°E
GV 5940°E
GV 5944°E
GV 5948°E
GV 5952°E
GV 5956°E
GV 5960°E
GV 5964°E
GV 5968°E
GV 5972°E
GV 5976°E
GV 5980°E
GV 5984°E
GV 5988°E
GV 5992°E
GV 5996°E
GV 6000°E
GV 6004°E
GV 6008°E
GV 6012°E
GV 6016°E
GV 6020°E
GV 6024°E
GV 6028°E
GV 6032°E
GV 6036°E
GV 6040°E
GV 6044°E
GV 6048°E
GV 6052°E
GV 6056°E
GV 6060°E
GV 6064°E
GV 6068°E
GV 6072°E
GV 6076°E
GV 6080°E
GV 6084°E
GV 6088°E
GV 6092°E
GV 6096°E
GV 6100°E
GV 6104°E
GV 6108°E
GV 6112°E
GV 6116°E
GV 6120°E
GV 6124°E
GV 6128°E
GV 6132°E
GV 6136°E
GV 6140°E
GV 6144°E
GV 6148°E
GV 6152°E
GV 6156°E
GV 6160°E
GV 6164°E
GV 6168°E
GV 6172°E
GV 6176°E
GV 6180°E
GV 6184°E
GV 6188°E
GV 6192°E
GV 6196°E
GV 6200°E
GV 6204°E
GV 6208°E
GV 6212°E
GV 6216°E
GV 6220°E
GV 6224°E
GV 6228°E
GV 6232°E
GV 6236°E
GV 6240°E
GV 6244°E
GV 6248°E
GV 6252°E
GV 6256°E
GV 6260°E
GV 6264°E
GV 6268°E
GV 6272°E
GV 6276°E
GV 6280°E
GV 6284°E
GV 6288°E
GV 6292°E
GV 6296°E
GV 6300°E
GV 6304°E
GV 6308°E
GV 6312°E
GV 6316°E
GV 6320°E
GV 6324°E
GV 6328°E
GV 6332°E
GV 6336°E
GV 6340°E
GV 6344°E
GV 6348°E
GV 6352°E
GV 6356°E
GV 6360°E
GV 6364°E
GV 6368°E
GV 6372°E
GV 6376°E
GV 6380°E
GV 6384°E
GV 6388°E
GV 6392°E
GV 6396°E
GV 6400°E
GV 6404°E
GV 6408°E
GV 6412°E
GV 6416°E
GV 6420°E
GV 6424°E
GV 6428°E
GV 6432°E
GV 6436°E
GV 6440°E
GV 6444°E
GV 6448°E
GV 6452°E
GV 6456°E
GV 6460°E
GV 6464°E
GV 6468°E
GV 6472°E
GV 6476°E
GV 6480°E
GV 6484°E
GV 6488°E
GV 6492°E
GV 6496°E
GV 6500°E
GV 6504°E
GV 6508°E
GV 6512°E
GV 6516°E
GV 6520°E
GV 6524°E
GV 6528°E
GV 6532°E
GV 6536°E
GV 6540°E
GV 6544°E
GV 6548°E
GV 6552°E
GV 6556°E
GV 6560°E
GV 6564°E
GV 6568°E
GV 6572°E
GV 6576°E
GV 6580°E
GV 6584°E
GV 6588°E
GV 6592°E
GV 6596°E
GV 6600°E
GV 6604°E
GV 6608°E
GV 6612°E
GV 6616°E
GV 6620°E
GV 6624°E
GV 6628°E
GV 6632°E
GV 6636°E
GV 6640°E
GV 6644°E
GV 6648°E
GV 6652°E
GV 6656°E
GV 6660°E
GV 6664°E
GV 6668°E
GV 6672°E
GV 6676°E
GV 6680°E
GV 6684°E
GV 6688°E
GV 6692°E
GV 6696°E
GV 6700°E
GV 6704°E
GV 6708°E
GV 6712°E
GV 6716°E
GV 6720°E
GV 6724°E
GV 6728°E
GV 6732°E
GV 6736°E
GV 6740°E
GV 6744°E
GV 6748°E
GV 6752°E
GV 6756°E
GV 6760°E
GV 6764°E
GV 6768°E
GV 6772°E
GV 6776°E
GV 6780°E
GV 6784°E
GV 6788°E
GV 6792°E
GV 6796°E
GV 6800°E
GV 6804°E
GV 6808°E
GV 6812°E
GV 6816°E
GV 6820°E
GV 6824°E
GV 6828°E
GV 6832°E
GV 6836°E
GV 6840°E
GV 6844°E
GV 6848°E
GV 6852°E
GV 6856°E
GV 6860°E
GV 6864°E
GV 6868°E
GV 6872°E
GV 6876°E
GV 6880°E
GV 6884°E
GV 6888°E
GV 6892°E
GV 6896°E
GV 6900°E
GV 6904°E
GV 6908°E
GV 6912°E
GV 6916°E
GV 6920°E
GV 6924°E
GV 6928°E
GV 6932°E
GV 6936°E
GV 6940°E
GV 6944°E
GV 6948°E
GV 6952°E
GV 6956°E
GV 6960°E
GV 6964°E
GV 6968°E
GV 6972°E
GV 6976°E
GV 6980°E
GV 6984°E
GV 6988°E
GV 6992°E
GV 6996°E
GV 7000°E
GV 7004°E
GV 7008°E
GV 7012°E
GV 7016°E
GV 7020°E
GV 7024°E
GV 7028°E
GV 7032°E
GV 7036°E
GV 7040°E
GV 7044°E
GV 7048°E
GV 7052°E
GV 7056°E
GV 7060°E
GV 7064°E
GV 7068°E
GV 7072°E
GV 7076°E
GV 7080°E
GV 7084°E
GV 7088°E
GV 7092°E
GV 7096°E
GV 7100°E
GV 7104°E
GV 7108°E
GV 7112°E
GV 7116°E
GV 7120°E
GV 7124°E
GV 7128°E
GV 7132°E
GV 7136°E
GV 7140°E
GV 7144°E
GV 7148°E
GV 7152°E
GV 7156°E
GV 7160°E
GV 7164°E
GV 7168°E
GV 7172°E
GV 7176°E
GV 7180°E
GV 7184°E
GV 7188°E
GV 7192°E
GV 7196°E
GV 7200°E
GV 7204°E
GV 7208°E
GV 7212°E
GV 7216°E
GV 7220°E
GV 7224°E
GV 7228°E
GV 7232°E
GV 7236°E
GV 7240°E
GV 7244°E
GV 7248°E
GV 7252°E
GV 7256°E
GV 7260°E
GV 7264°E
GV 7268°E
GV 7272°E
GV 7276°E
GV 7280°E
GV 7284°E
GV 7288°E
GV 7292°E
GV 7296°E
GV 7300°E
GV 7304°E
GV 7308°E
GV 7312°E
GV 7316°E
GV 7320°E
GV 7324°E
GV 7328°E
GV 7332°E
GV 7336°E
GV 7340°E
GV 7344°E
GV 7348°E
GV 7352°E
GV 7356°E
GV 7360°E
GV 7364°E
GV 7368°E
GV 7372°E
GV 7376°E
GV 7380°E
GV 7384°E
GV 7388°E
GV 7392°E
GV 7396°E
GV 7400°E
GV 7404°E
GV 7408°E
GV 7412°E
GV 7416°E
GV 7420°E
GV 7424°E
GV 7428°E
GV 7432°E
GV 7436°E
GV 7440°E
GV 7444°E
GV 7448°E
GV 7452°E
GV 7456°E
GV 7460°E
GV 7464°E
GV 7468°E
GV 7472°E
GV 7476°E
GV 7480°E
GV 7484°E
GV 7488°E
GV 7492°E
GV 7496°E
GV 7500°E
GV 7504°E
GV 7508°E
GV 7512°E
GV 7516°E
GV 7520°E
GV 7524°E
GV 7528°E
GV 7532°E
GV 7536°E
GV 7540°E
GV 7544°E
GV 7548°E
GV 7552°E
GV 7556°E
GV 7560°E
GV 7564°E
GV 7568°E
GV 7572°E
GV 7576°E
GV 7580°E
GV 7584°E
GV 7588°E
GV 7592°E
GV 7596°E
GV 7600°E
GV 7604°E
GV 7608°E
GV 7612°E
GV 7616°E
GV 7620°E
GV 7624°E
GV 7628°E
GV 7632°E
GV 7636°E
GV 7640°E
GV 7644°E
GV 7648°E
GV 7652°E
GV 7656°E
GV 7660°E
GV 7664°E
GV 7668°E
GV 7672°E
GV 7676°E
GV 7680°E
GV 7684°E
GV 7688°E
GV 7692°E
GV 7696°E
GV 7700°E
GV 7704°E
GV 7708°E
GV 7712°E
GV 7716°E
GV 7720°E
GV 7724°E
GV 7728°E
GV 7732°E
GV 7736°E
GV 7740°E
GV 7744°E
GV 7748°E
GV 7752°E
GV 7756°E
GV 7760°E
GV 7764°E
GV 7768°E
GV 7772°E
GV 7776°E
GV 7780°E
GV 7784°E
GV 7788°E
GV 7792°E
GV 7796°E
GV 7800°E
GV 7804°E
GV 7808°E
GV 7812°E
GV 7816°E
GV 7820°E



WSRP-P10 Total ETE: 8+01 (WC130J No wind)

Description	Latitude	Longitude
Drop01	N 57 00 00	W155 15 00
Drop02	N 54 45 00	W158 00 00
Drop03	N 52 30 00	W160 00 00
Drop04	N50 00 00	W162 00 00
Drop05	N 47 30 00	W160 30 00
Drop06	N 45 00 00	W159 00 00
Drop07	N 45 15 00	W156 00 00
Drop08	N 46 00 00	W153 00 00
Drop09	N 48 30 00	W151 45 00
Drop10	N 51 00 00	W150 30 00
Drop11	N 53 30 00	W150 30 00
Drop12	N 56 00 00	W150 30 00
Drop13	N 58 15 00	W150 45 00

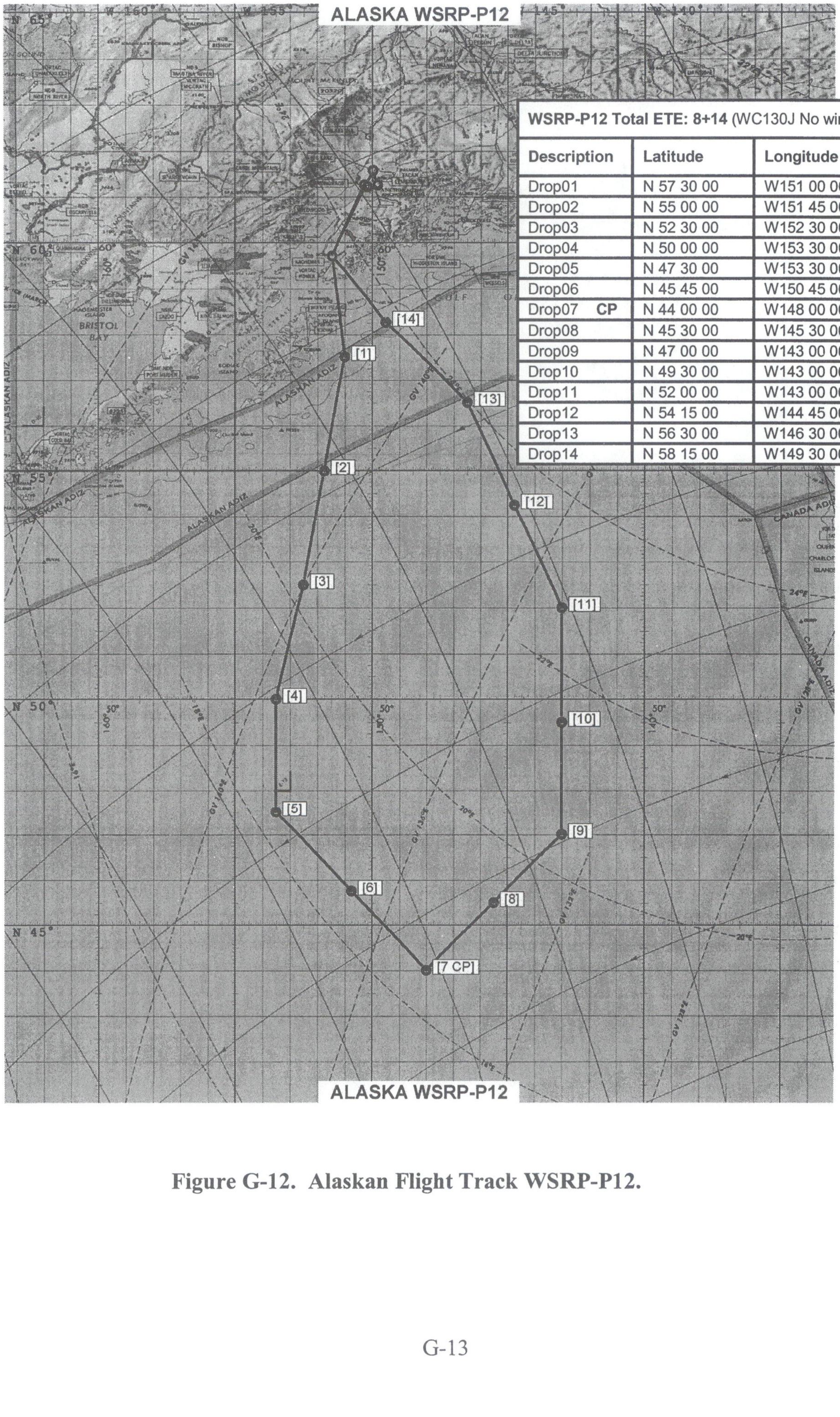
Figure G-10. Alaskan Flight Track WSRP-P10.



WSRP-P11 Total ETE: 8+25 (WC130J No wind)

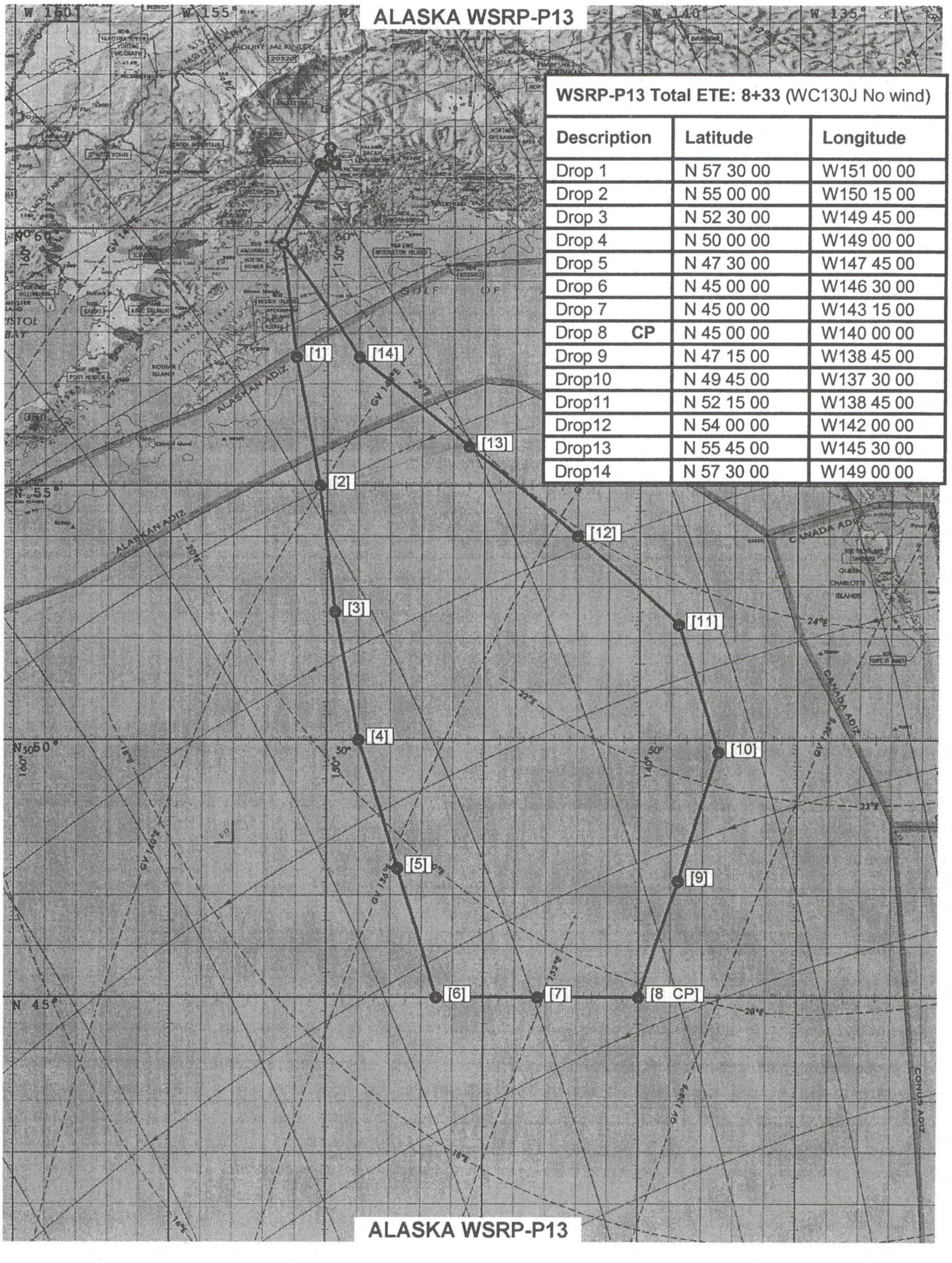
Description	Latitude	Longitude
Drop01	N 56 15 00	W153 00 00
Drop02	N 54 00 00	W155 00 00
Drop03	N 51 45 00	W156 45 00
Drop04	N 49 30 00	W157 30 00
Drop05	N 47 00 00	W158 00 00
Drop06	N 45 30 00	W155 00 00
Drop07 **CP**	N 44 00 00	W152 00 00
Drop08	N 45 15 00	W149 15 00
Drop09	N 46 15 00	W146 15 00
Drop10	N 48 45 00	W146 15 00
Drop11	N 51 15 00	W146 15 00
Drop12	N 53 45 00	W147 45 00
Drop13	N 56 00 00	W149 30 00
Drop14	N 58 30 00	W150 45 00

Figure G-11. Alaskan Flight Track WSRP-P11.



WSRP-P12 Total ETE: 8+14 (WC130J No wind)		
Description	**Latitude**	**Longitude**
Drop01	N 57 30 00	W151 00 00
Drop02	N 55 00 00	W151 45 00
Drop03	N 52 30 00	W152 30 00
Drop04	N 50 00 00	W153 30 00
Drop05	N 47 30 00	W153 30 00
Drop06	N 45 45 00	W150 45 00
Drop07 **CP**	N 44 00 00	W148 00 00
Drop08	N 45 30 00	W145 30 00
Drop09	N 47 00 00	W143 00 00
Drop10	N 49 30 00	W143 00 00
Drop11	N 52 00 00	W143 00 00
Drop12	N 54 15 00	W144 45 00
Drop13	N 56 30 00	W146 30 00
Drop14	N 58 15 00	W149 30 00

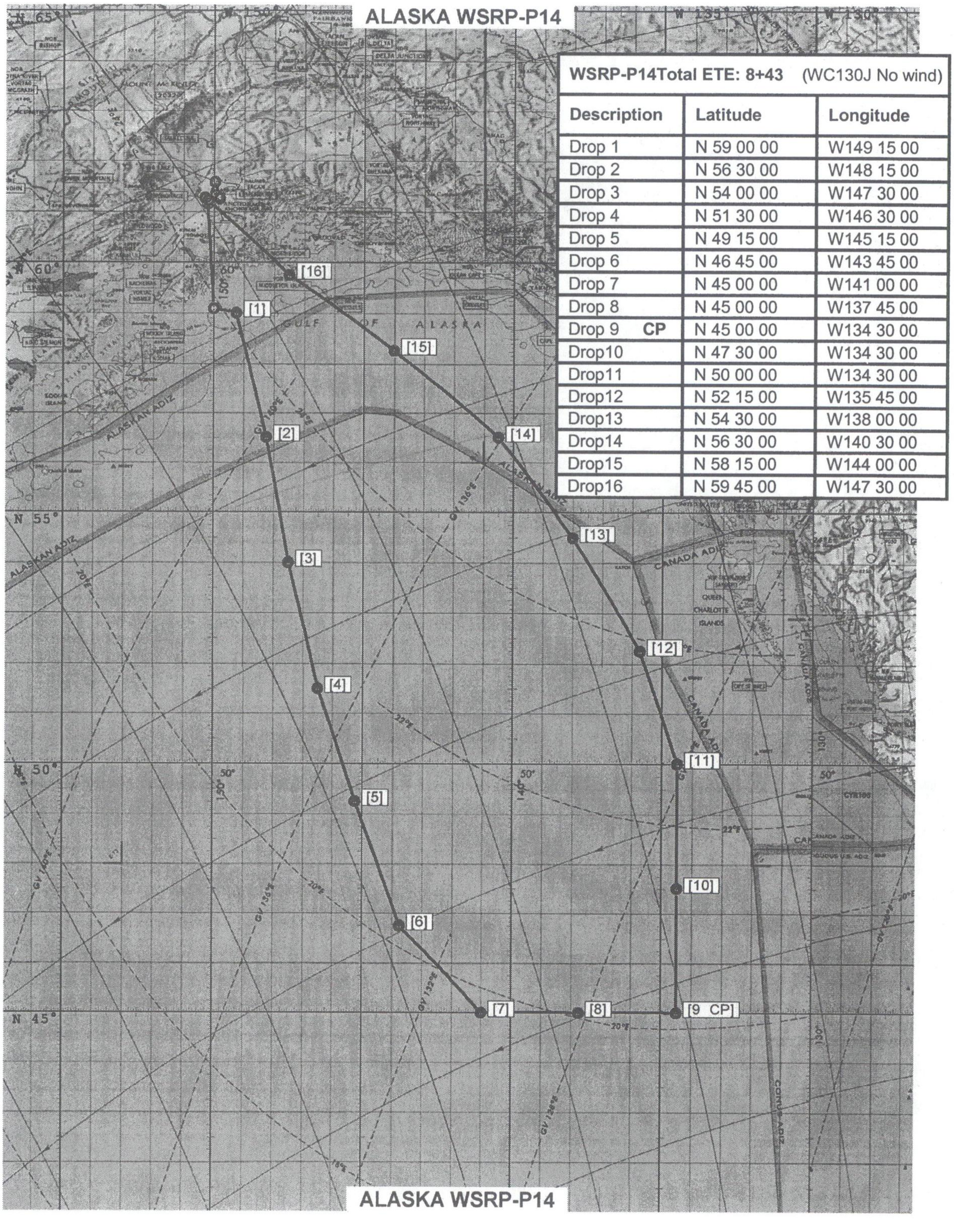
Figure G-12. Alaskan Flight Track WSRP-P12.



WSRP-P13 Total ETE: 8+33 (WC130J No wind)

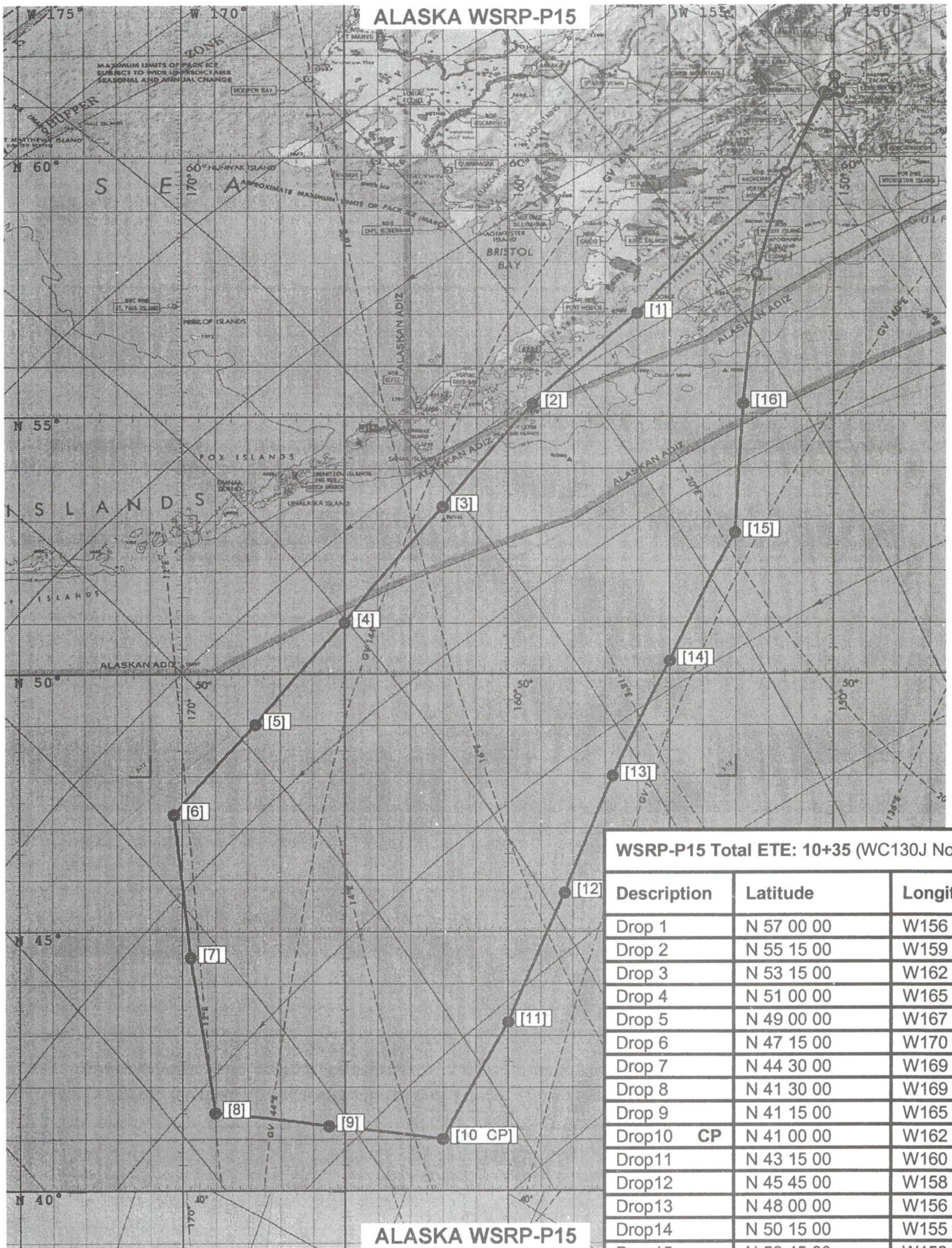
Description	Latitude	Longitude
Drop 1	N 57 30 00	W151 00 00
Drop 2	N 55 00 00	W150 15 00
Drop 3	N 52 30 00	W149 45 00
Drop 4	N 50 00 00	W149 00 00
Drop 5	N 47 30 00	W147 45 00
Drop 6	N 45 00 00	W146 30 00
Drop 7	N 45 00 00	W143 15 00
Drop 8 **CP**	N 45 00 00	W140 00 00
Drop 9	N 47 15 00	W138 45 00
Drop10	N 49 45 00	W137 30 00
Drop11	N 52 15 00	W138 45 00
Drop12	N 54 00 00	W142 00 00
Drop13	N 55 45 00	W145 30 00
Drop14	N 57 30 00	W149 00 00

Figure G-13. Alaskan Flight Track WSRP-P13.



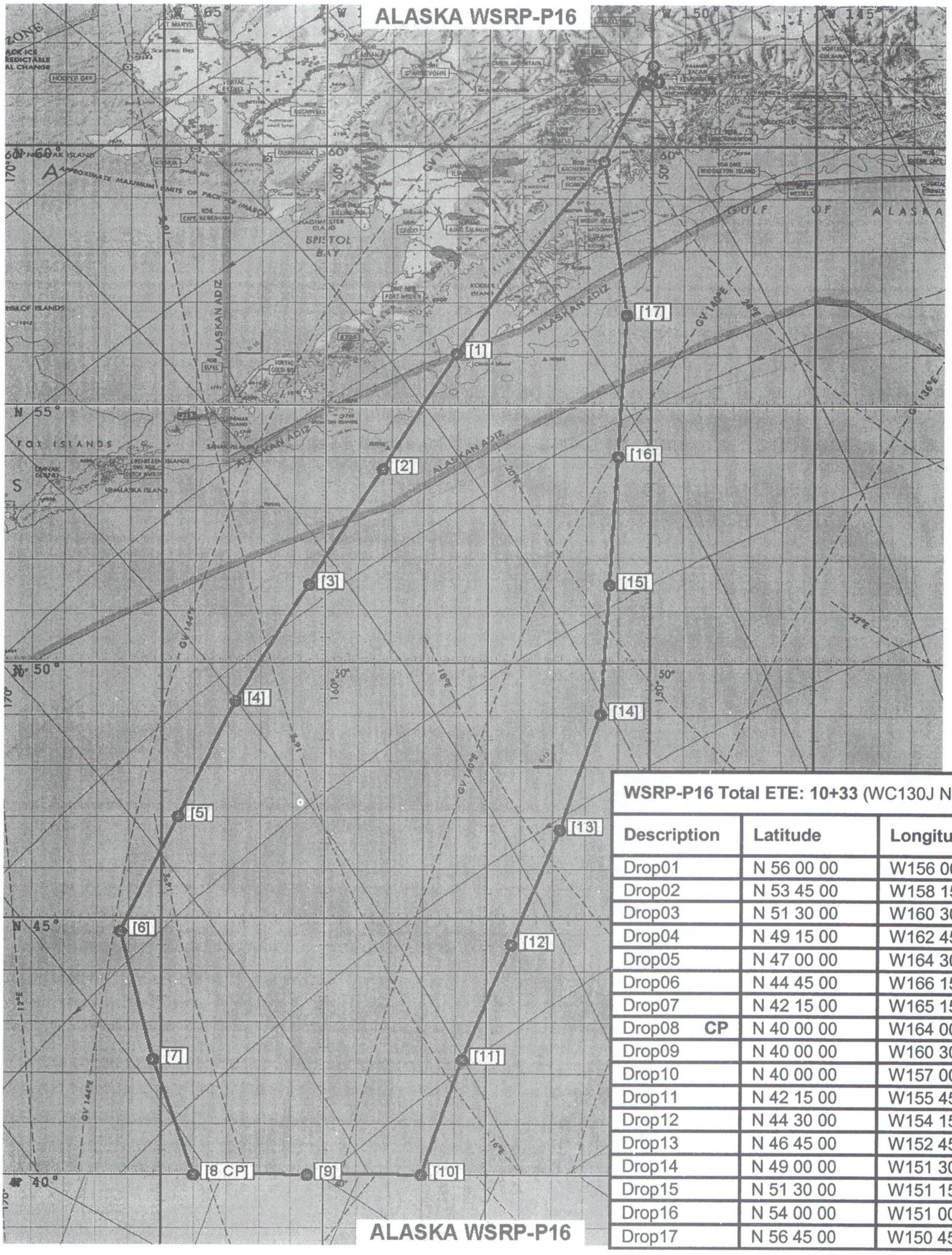
WSRP-P14Total ETE: 8+43 (WC130J No wind)		
Description	**Latitude**	**Longitude**
Drop 1	N 59 00 00	W149 15 00
Drop 2	N 56 30 00	W148 15 00
Drop 3	N 54 00 00	W147 30 00
Drop 4	N 51 30 00	W146 30 00
Drop 5	N 49 15 00	W145 15 00
Drop 6	N 46 45 00	W143 45 00
Drop 7	N 45 00 00	W141 00 00
Drop 8	N 45 00 00	W137 45 00
Drop 9 **CP**	N 45 00 00	W134 30 00
Drop10	N 47 30 00	W134 30 00
Drop11	N 50 00 00	W134 30 00
Drop12	N 52 15 00	W135 45 00
Drop13	N 54 30 00	W138 00 00
Drop14	N 56 30 00	W140 30 00
Drop15	N 58 15 00	W144 00 00
Drop16	N 59 45 00	W147 30 00

Figure G-14. Alaskan Flight Track WSRP-P14.



WSRP-P15 Total ETE: 10+35 (WC130J No wind)		
Description	**Latitude**	**Longitude**
Drop 1	N 57 00 00	W156 00 00
Drop 2	N 55 15 00	W159 15 00
Drop 3	N 53 15 00	W162 00 00
Drop 4	N 51 00 00	W165 00 00
Drop 5	N 49 00 00	W167 45 00
Drop 6	N 47 15 00	W170 15 00
Drop 7	N 44 30 00	W169 45 00
Drop 8	N 41 30 00	W169 00 00
Drop 9	N 41 15 00	W165 30 00
Drop10 **CP**	N 41 00 00	W162 00 00
Drop11	N 43 15 00	W160 00 00
Drop12	N 45 45 00	W158 15 00
Drop13	N 48 00 00	W156 45 00
Drop14	N 50 15 00	W155 00 00
Drop15	N 52 45 00	W153 00 00
Drop16	N 55 15 00	W152 45 00

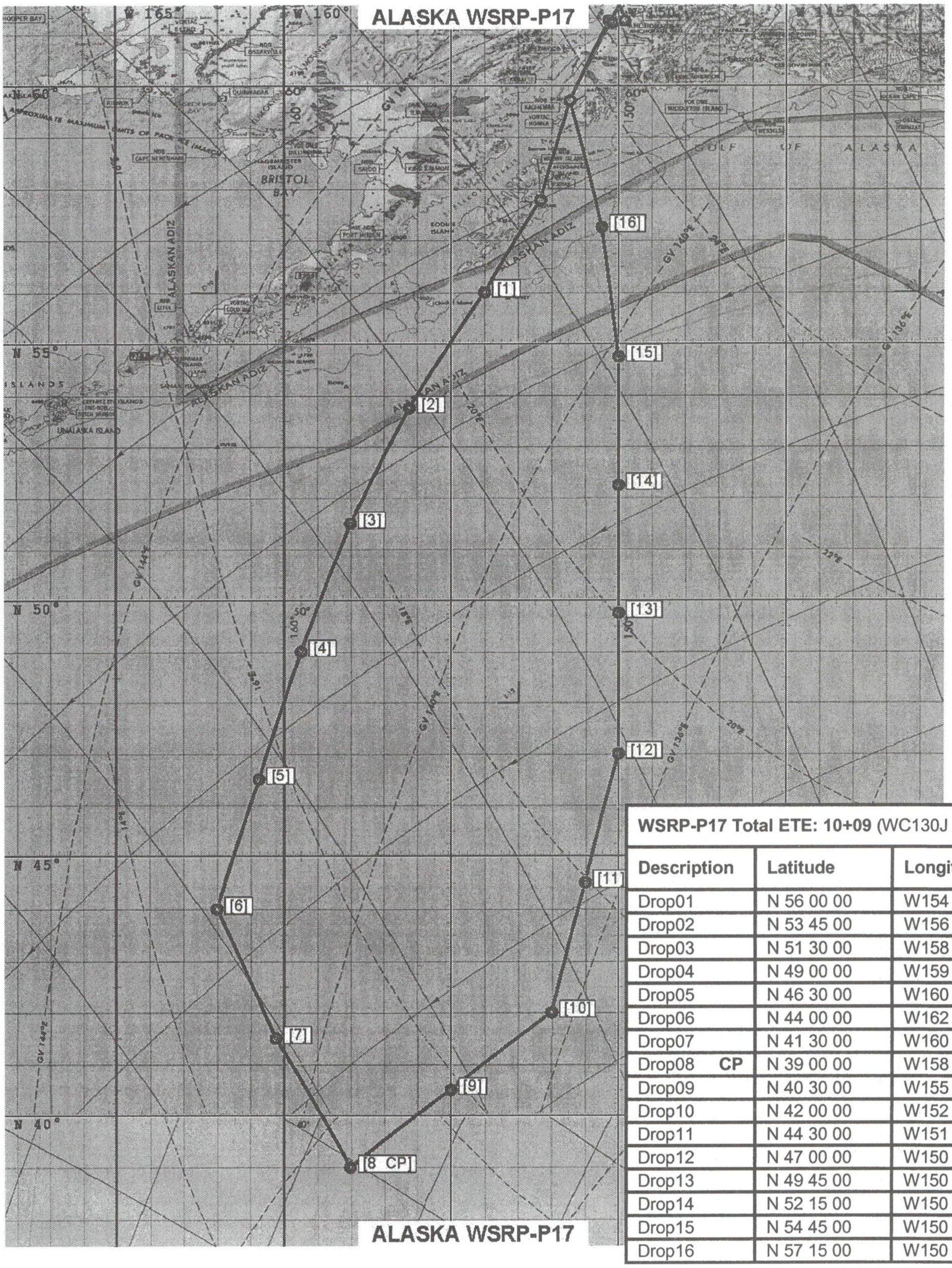
Figure G-15. Alaskan Flight Track WSRP-P15.



WSRP-P16 Total ETE: 10+33 (WC130J No wind)

Description	Latitude	Longitude
Drop01	N 56 00 00	W156 00 00
Drop02	N 53 45 00	W158 15 00
Drop03	N 51 30 00	W160 30 00
Drop04	N 49 15 00	W162 45 00
Drop05	N 47 00 00	W164 30 00
Drop06	N 44 45 00	W166 15 00
Drop07	N 42 15 00	W165 15 00
Drop08 **CP**	N 40 00 00	W164 00 00
Drop09	N 40 00 00	W160 30 00
Drop10	N 40 00 00	W157 00 00
Drop11	N 42 15 00	W155 45 24
Drop12	N 44 30 00	W154 15 00
Drop13	N 46 45 00	W152 45 00
Drop14	N 49 00 00	W151 30 00
Drop15	N 51 30 00	W151 15 00
Drop16	N 54 00 00	W151 00 00
Drop17	N 56 45 00	W150 45 00

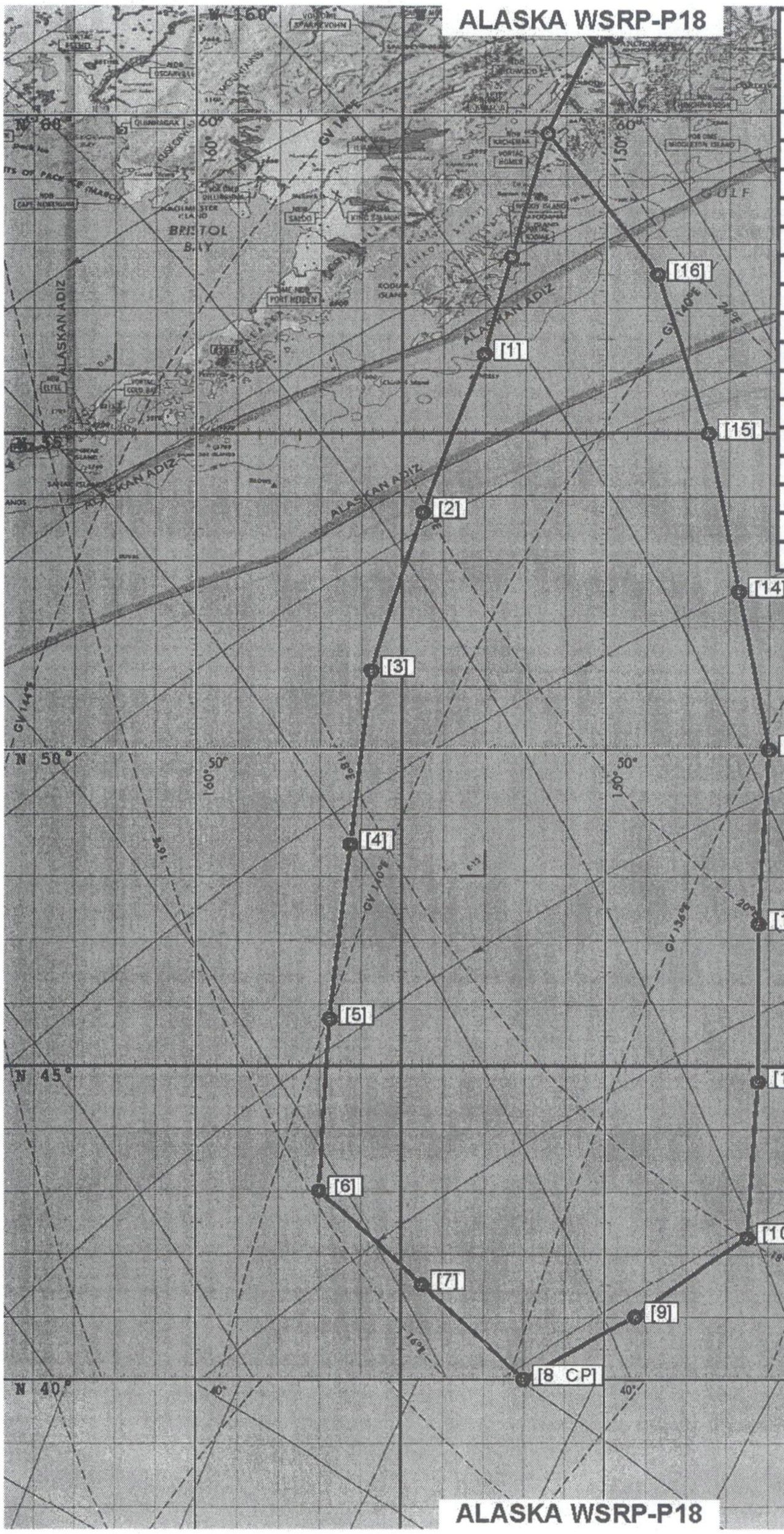
Figure G-16. Alaskan Flight Track WSRP-P16.



WSRP-P17 Total ETE: 10+09 (WC130J No wind)

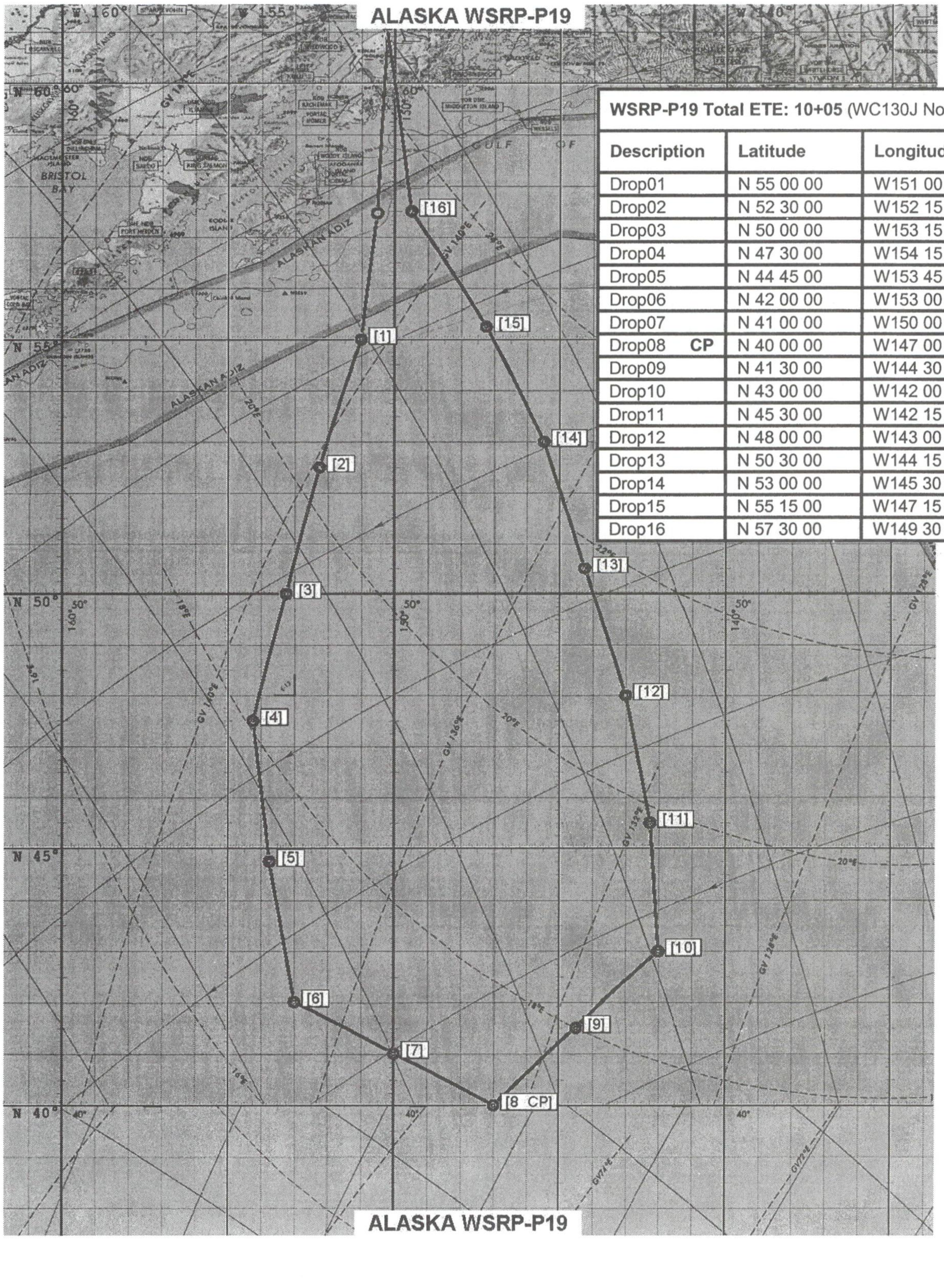
Description		Latitude	Longitude
Drop01		N 56 00 00	W154 00 00
Drop02		N 53 45 00	W156 15 00
Drop03		N 51 30 00	W158 00 00
Drop04		N 49 00 00	W159 30 00
Drop05		N 46 30 00	W160 45 00
Drop06		N 44 00 00	W162 00 00
Drop07		N 41 30 00	W160 15 00
Drop08	**CP**	N 39 00 00	W158 00 00
Drop09		N 40 30 00	W155 00 00
Drop10		N 42 00 00	W152 00 00
Drop11		N 44 30 00	W151 00 00
Drop12		N 47 00 00	W150 00 00
Drop13		N 49 45 00	W150 00 00
Drop14		N 52 15 00	W150 00 00
Drop15		N 54 45 00	W150 00 00
Drop16		N 57 15 00	W150 30 00

Figure G-17. Alaskan Flight Track WSRP-P17.



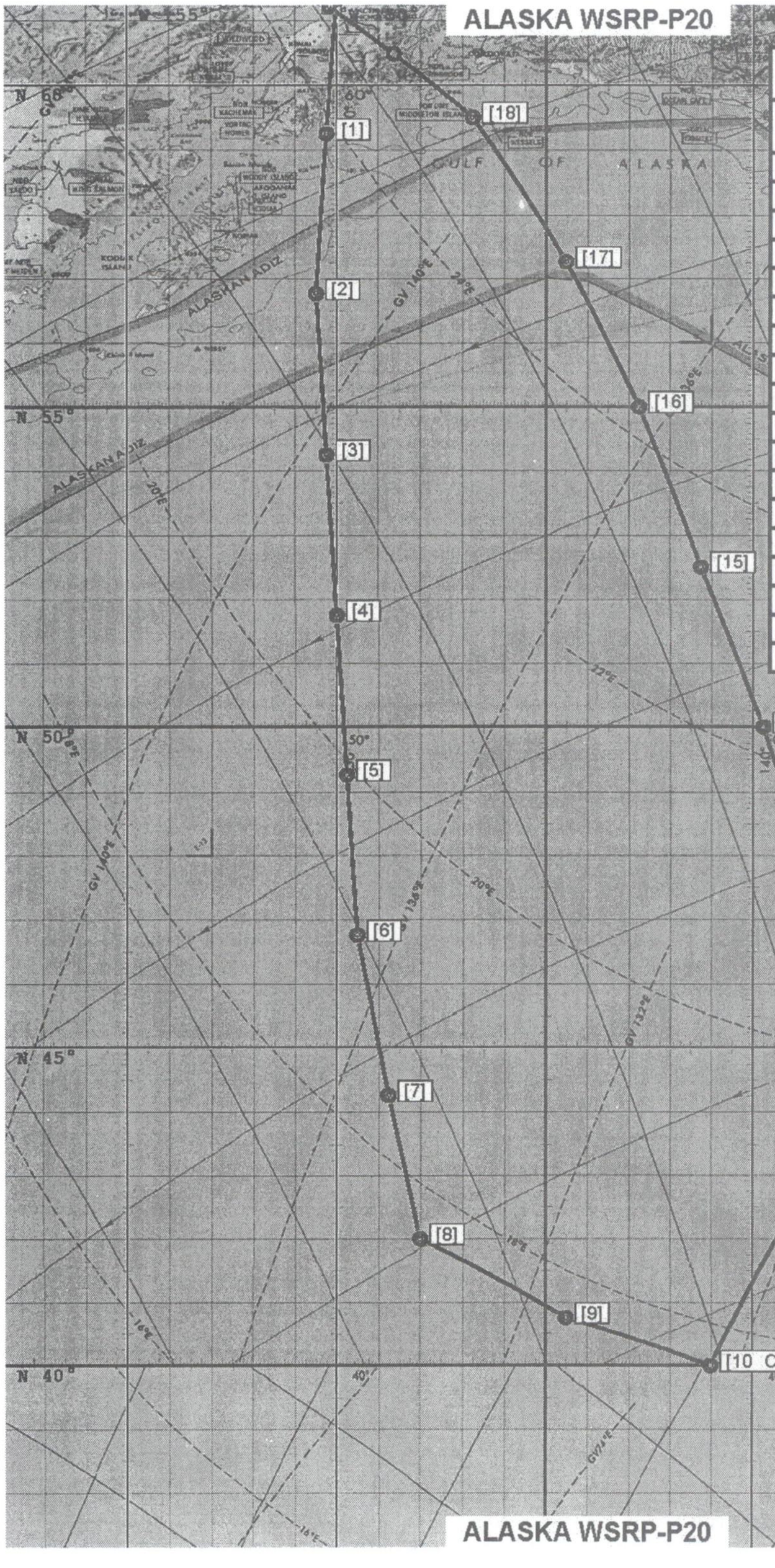
WSRP-P18 Total ETE: 9+50 (WC130J No wind)		
Description	**Latitude**	**Longitude**
Drop01	N 56 15 00	W153 00 00
Drop02	N 53 45 00	W154 30 00
Drop03	N 51 15 00	W155 45 00
Drop04	N 48 30 00	W156 15 00
Drop05	N 45 45 00	W156 45 00
Drop06	N 43 00 00	W157 00 00
Drop07	N 41 30 00	W154 30 00
Drop08 **CP**	N 40 00 00	W152 00 00
Drop09	N 41 00 00	W149 15 00
Drop10	N 42 15 00	W146 30 00
Drop11	N 44 45 00	W146 15 00
Drop12	N 47 15 00	W146 15 00
Drop13	N 50 00 00	W146 00 00
Drop14	N 52 30 00	W146 45 00
Drop15	N 55 00 00	W147 30 00
Drop16	N 57 30 00	W148 45 00

Figure G-18. Alaskan Flight Track WSRP-P18.



WSRP-P19 Total ETE: 10+05 (WC130J No wind)		
Description	**Latitude**	**Longitude**
Drop01	N 55 00 00	W151 00 00
Drop02	N 52 30 00	W152 15 00
Drop03	N 50 00 00	W153 15 00
Drop04	N 47 30 00	W154 15 00
Drop05	N 44 45 00	W153 45 00
Drop06	N 42 00 00	W153 00 00
Drop07	N 41 00 00	W150 00 00
Drop08 **CP**	N 40 00 00	W147 00 00
Drop09	N 41 30 00	W144 30 00
Drop10	N 43 00 00	W142 00 00
Drop11	N 45 30 00	W142 15 00
Drop12	N 48 00 00	W143 00 00
Drop13	N 50 30 00	W144 15 00
Drop14	N 53 00 00	W145 30 00
Drop15	N 55 15 00	W147 15 00
Drop16	N 57 30 00	W149 30 00

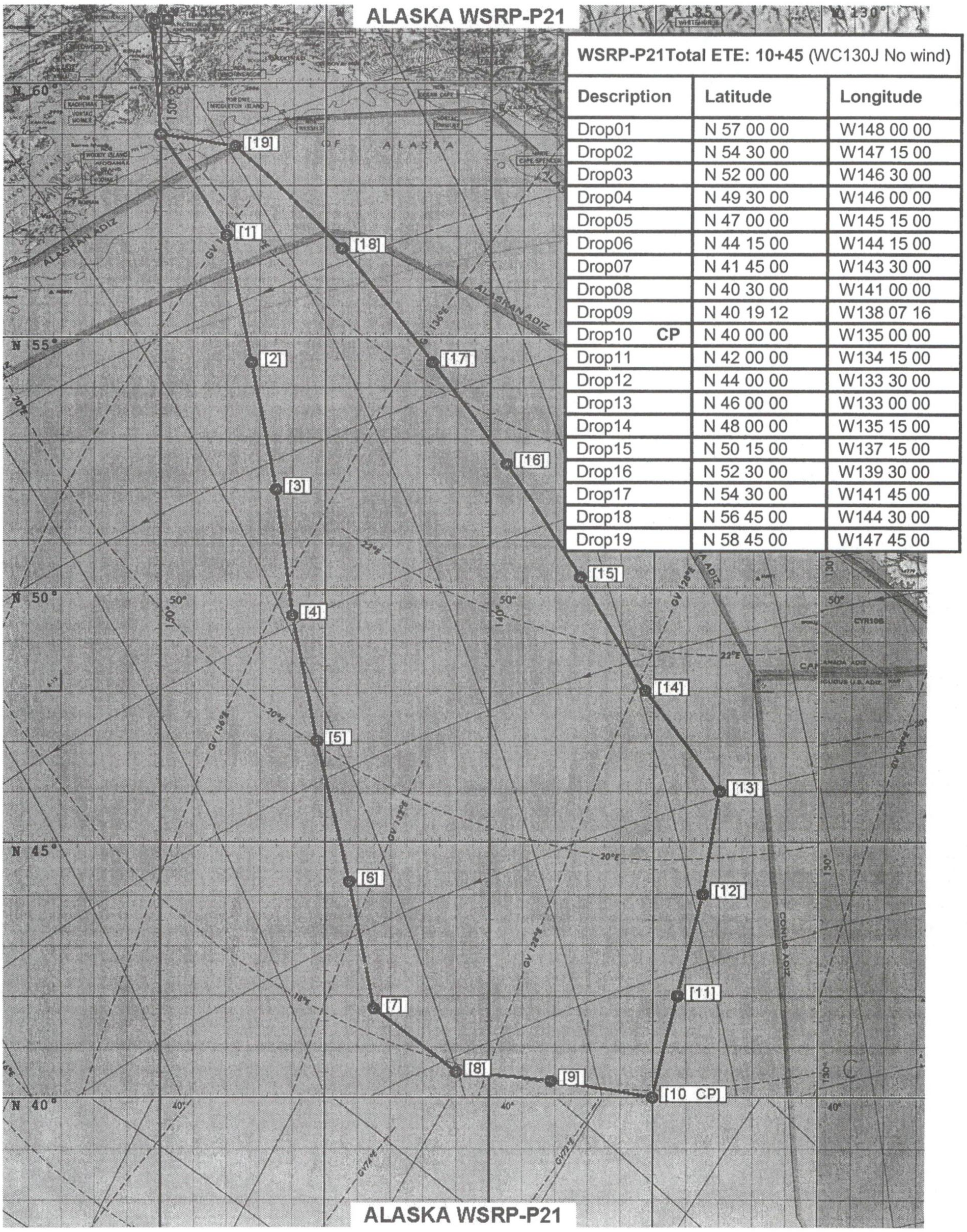
Figure G-19. Alaskan Flight Track WSRP-P19.



WSRP-P20 Total ETE: 10+06 (WC130J No wind)

Description	Latitude	Longitude
Drop01	N 59 15 00	W150 15 00
Drop02	N 56 45 00	W150 30 00
Drop03	N 54 15 00	W150 15 00
Drop04	N 51 45 00	W150 00 00
Drop05	N 49 15 00	W149 45 00
Drop06	N 46 45 00	W149 30 00
Drop07	N 44 15 00	W148 45 00
Drop08	N 42 00 00	W148 00 00
Drop09	N 40 45 00	W144 30 00
Drop10 **CP**	N 40 00 00	W141 00 00
Drop11	N 42 30 00	W139 00 00
Drop12	N 45 00 00	W137 00 00
Drop13	N 47 30 00	W138 30 00
Drop14	N 50 00 00	W139 45 00
Drop15	N 52 30 00	W141 15 00
Drop16	N 55 00 00	W142 45 00
Drop17	N 57 15 00	W144 30 00
Drop18	N 59 30 00	W146 45 00

Figure G-20. Alaskan Flight Track WSRP-P20.



WSRP-P21Total ETE: **10+45** (WC130J No wind)		
Description	**Latitude**	**Longitude**
Drop01	N 57 00 00	W148 00 00
Drop02	N 54 30 00	W147 15 00
Drop03	N 52 00 00	W146 30 00
Drop04	N 49 30 00	W146 00 00
Drop05	N 47 00 00	W145 15 00
Drop06	N 44 15 00	W144 15 00
Drop07	N 41 45 00	W143 30 00
Drop08	N 40 30 00	W141 00 00
Drop09	N 40 19 12	W138 07 16
Drop10 **CP**	N 40 00 00	W135 00 00
Drop11	N 42 00 00	W134 15 00
Drop12	N 44 00 00	W133 30 00
Drop13	N 46 00 00	W133 00 00
Drop14	N 48 00 00	W135 15 00
Drop15	N 50 15 00	W137 15 00
Drop16	N 52 30 00	W139 30 00
Drop17	N 54 30 00	W141 45 00
Drop18	N 56 45 00	W144 30 00
Drop19	N 58 45 00	W147 45 00

Figure G-21. Alaskan Flight Track WSRP-P21.

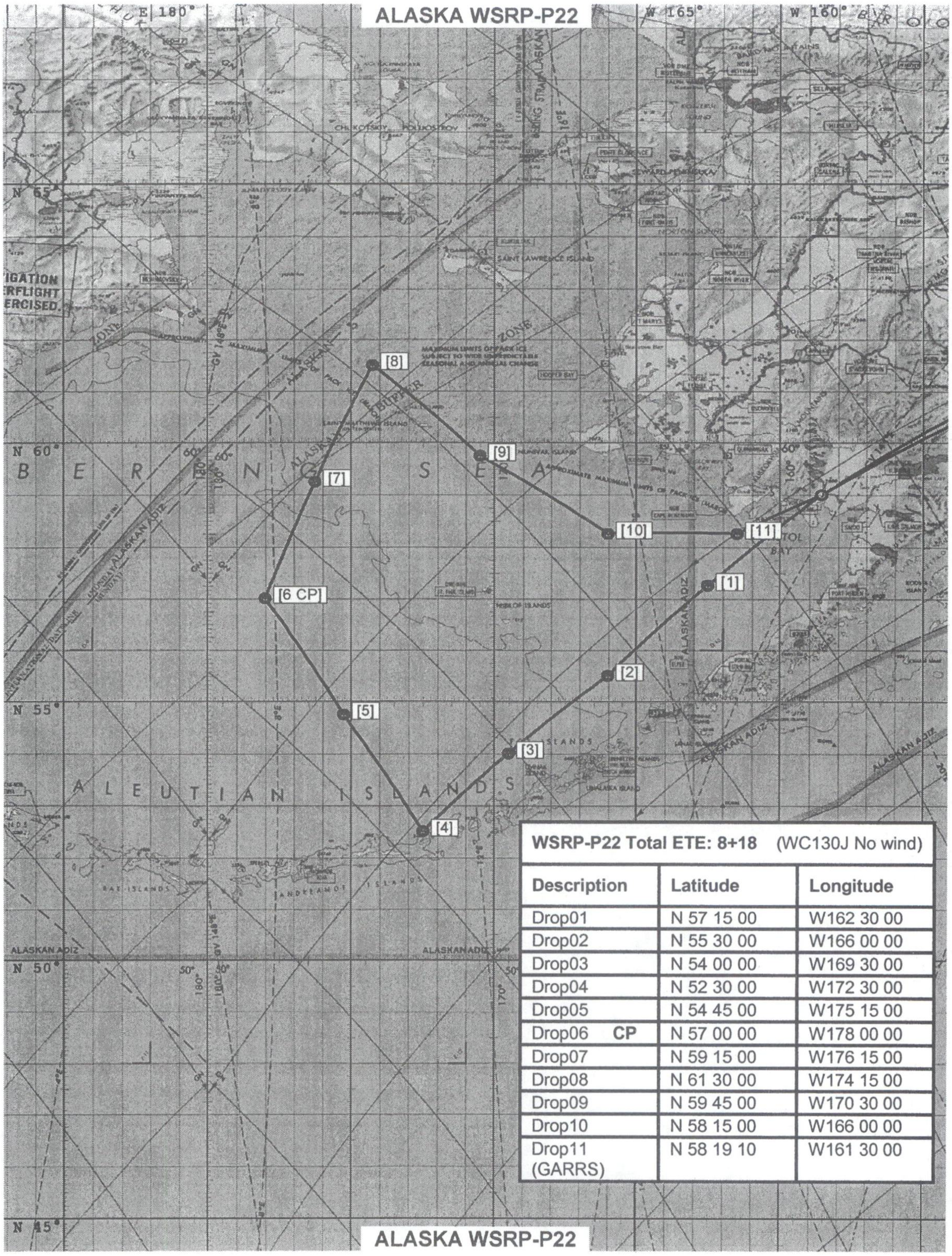
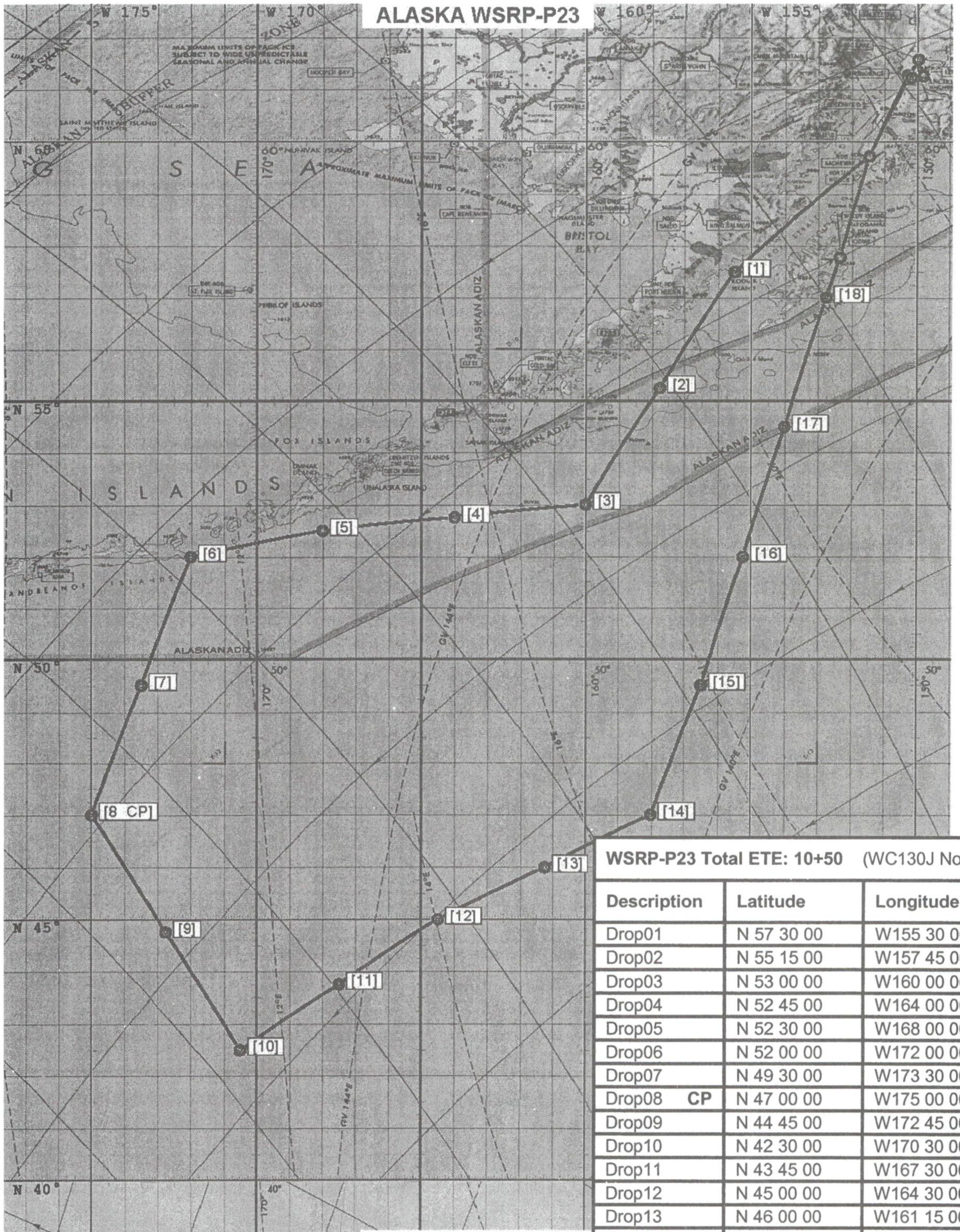


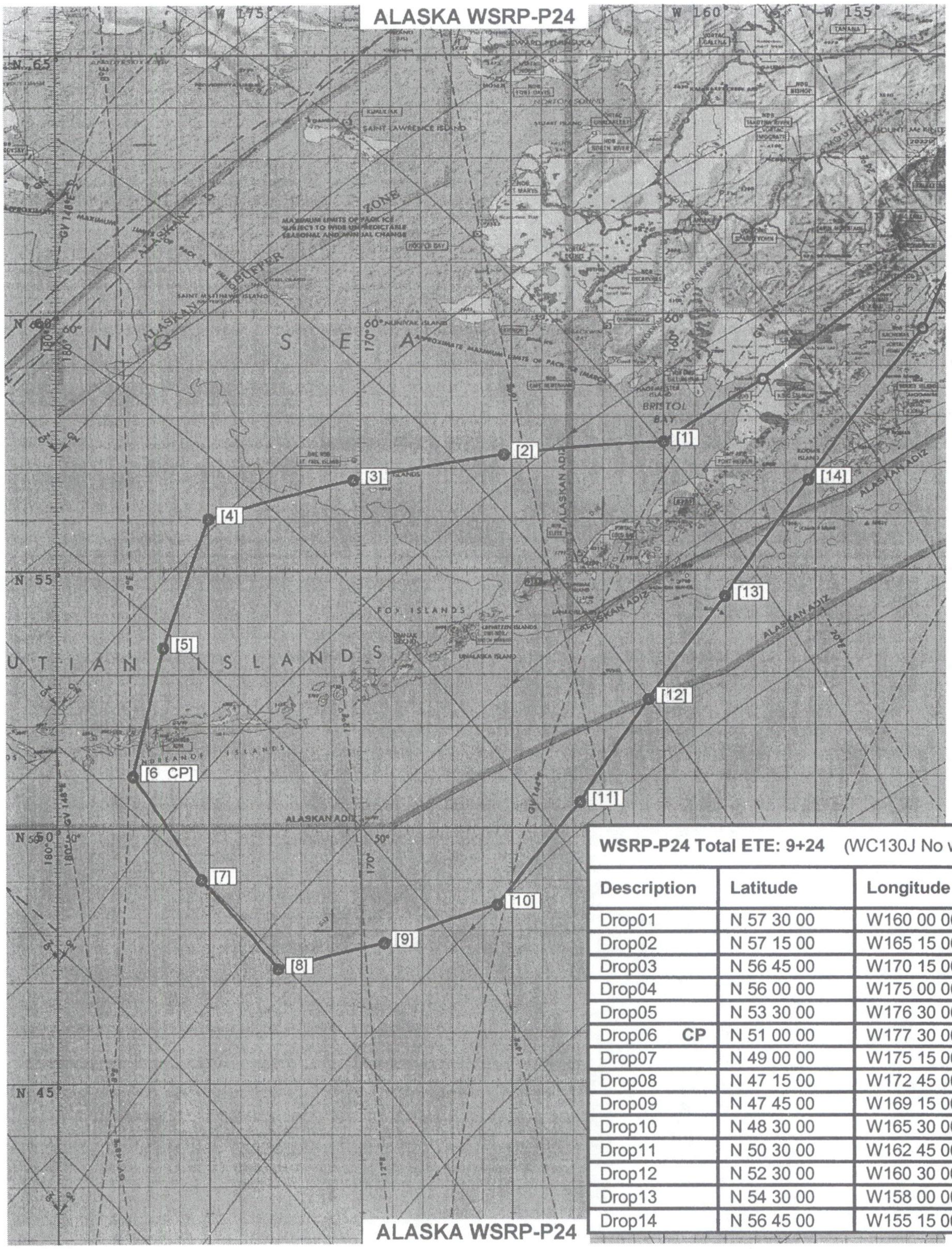
Figure G-22. Alaskan Flight Track WSRP-P22.



WSRP-P23 Total ETE: 10+50 (WC130J No wind)

Description		Latitude	Longitude
Drop01		N 57 30 00	W155 30 00
Drop02		N 55 15 00	W157 45 00
Drop03		N 53 00 00	W160 00 00
Drop04		N 52 45 00	W164 00 00
Drop05		N 52 30 00	W168 00 00
Drop06		N 52 00 00	W172 00 00
Drop07		N 49 30 00	W173 30 00
Drop08	**CP**	N 47 00 00	W175 00 00
Drop09		N 44 45 00	W172 45 00
Drop10		N 42 30 00	W170 30 00
Drop11		N 43 45 00	W167 30 00
Drop12		N 45 00 00	W164 30 00
Drop13		N 46 00 00	W161 15 00
Drop14		N 47 00 00	W158 00 00
Drop15		N 49 30 00	W156 30 00
Drop16		N 52 00 00	W155 15 00
Drop17		N 54 30 00	W154 00 00
Drop18		N 57 00 00	W152 45 00

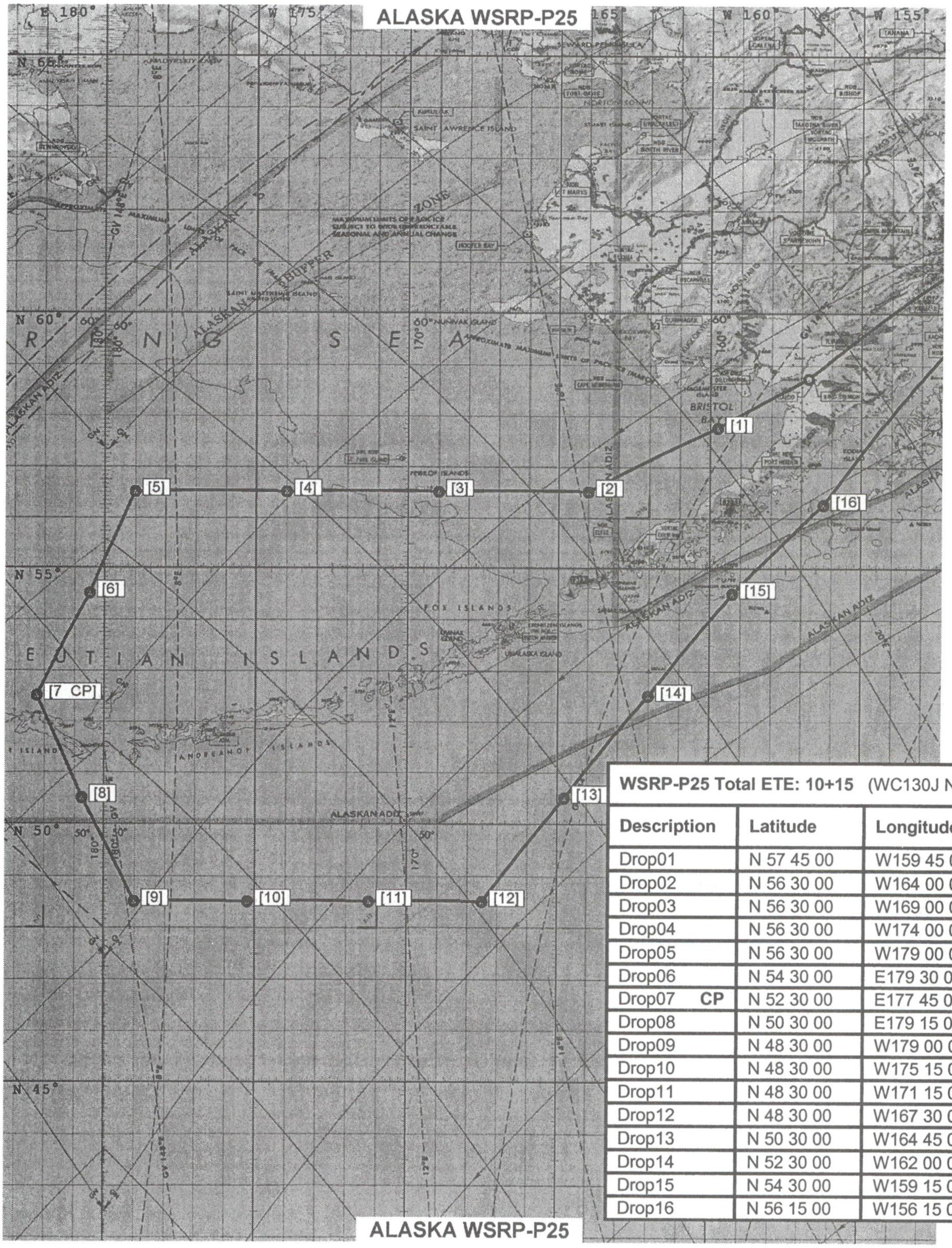
Figure G-23. Alaskan Flight Track WSRP-P23.



WSRP-P24 Total ETE: 9+24 (WC130J No wind)

Description	Latitude	Longitude
Drop01	N 57 30 00	W160 00 00
Drop02	N 57 15 00	W165 15 00
Drop03	N 56 45 00	W170 15 00
Drop04	N 56 00 00	W175 00 00
Drop05	N 53 30 00	W176 30 00
Drop06 **CP**	N 51 00 00	W177 30 00
Drop07	N 49 00 00	W175 15 00
Drop08	N 47 15 00	W172 45 00
Drop09	N 47 45 00	W169 15 00
Drop10	N 48 30 00	W165 30 00
Drop11	N 50 30 00	W162 45 00
Drop12	N 52 30 00	W160 30 00
Drop13	N 54 30 00	W158 00 00
Drop14	N 56 45 00	W155 15 00

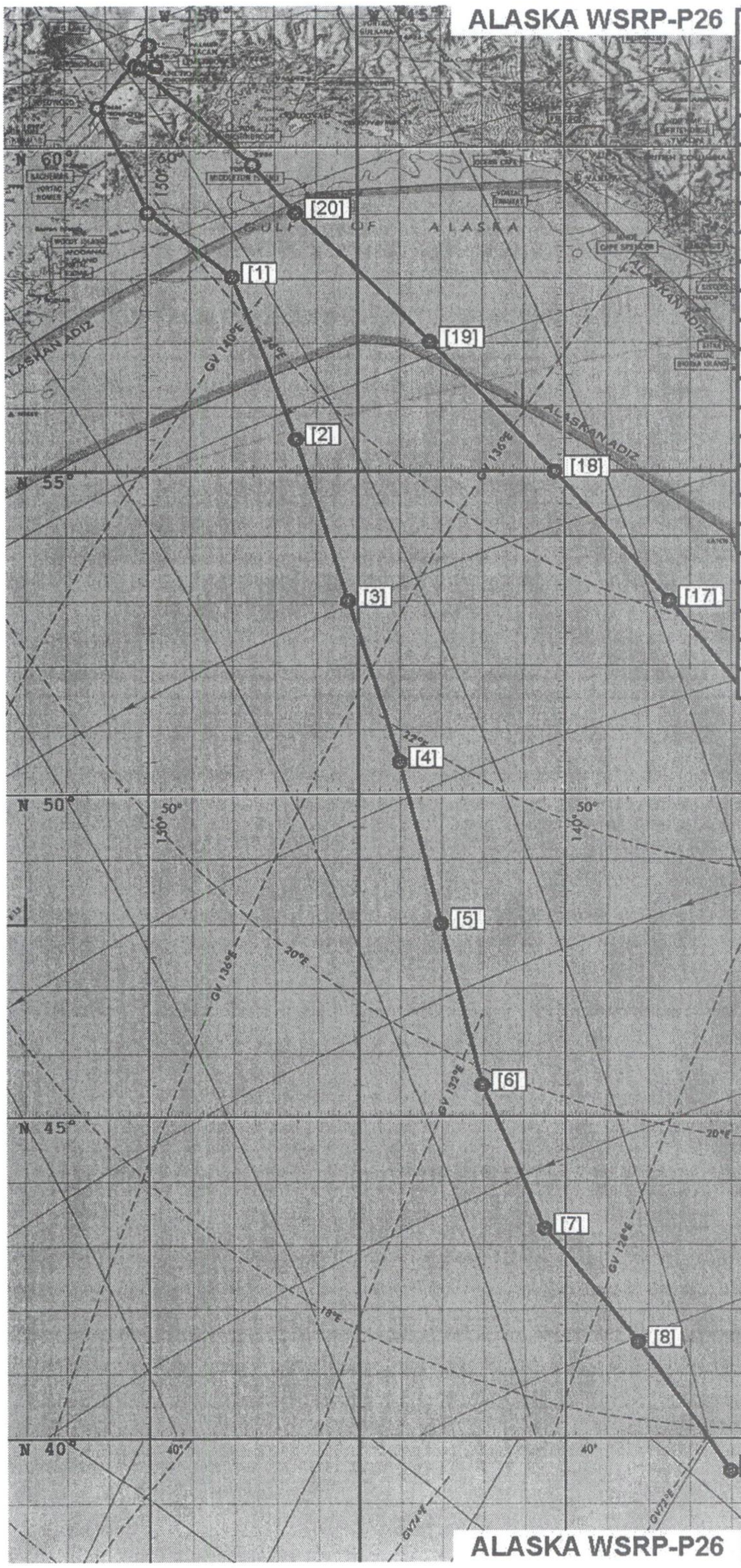
Figure G-24. Alaskan Flight Track WSRP-P24.



WSRP-P25 Total ETE: 10+15 (WC130J No wind)

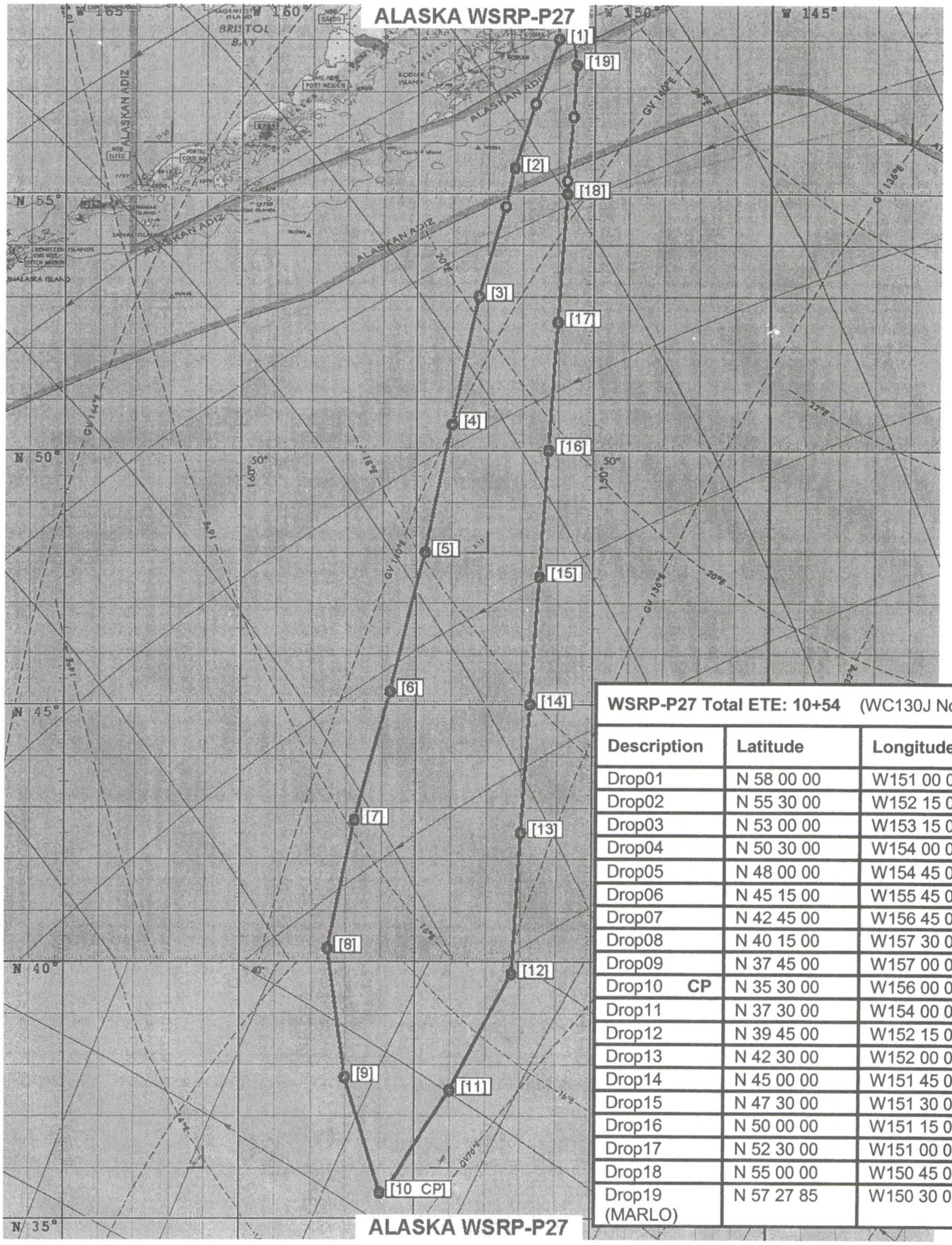
Description	Latitude	Longitude
Drop01	N 57 45 00	W159 45 00
Drop02	N 56 30 00	W164 00 00
Drop03	N 56 30 00	W169 00 00
Drop04	N 56 30 00	W174 00 00
Drop05	N 56 30 00	W179 00 00
Drop06	N 54 30 00	E179 30 00
Drop07 **CP**	N 52 30 00	E177 45 00
Drop08	N 50 30 00	E179 15 00
Drop09	N 48 30 00	W179 00 00
Drop10	N 48 30 00	W175 15 00
Drop11	N 48 30 00	W171 15 00
Drop12	N 48 30 00	W167 30 00
Drop13	N 50 30 00	W164 45 00
Drop14	N 52 30 00	W162 00 00
Drop15	N 54 30 00	W159 15 00
Drop16	N 56 15 00	W156 15 00

Figure G-25. Alaskan Flight Track WSRP-P25.



WSRP-P26 Total ETE: 11+29 (WC130J No wind)		
Description	**Latitude**	**Longitude**
Drop01	N 58 00 00	W148 00 00
Drop02	N 55 30 00	W146 30 00
Drop03	N 53 00 00	W145 15 00
Drop04	N 50 30 00	W144 00 00
Drop05	N 48 00 00	W143 00 00
Drop06	N 45 30 00	W142 00 00
Drop07	N 43 15 00	W140 30 00
Drop08	N 41 30 00	W138 15 00
Drop09	N 39 30 00	W136 00 00
Drop10	N 39 30 00	W132 30 00
Drop11 **CP**	N 39 30 00	W129 00 00
Drop12	N 42 00 00	W128 30 00
Drop13	N 44 45 00	W128 15 00
Drop14	N 47 00 00	W130 00 00
Drop15	N 49 00 00	W132 30 00
Drop16	N 51 00 00	W135 00 00
Drop17	N 53 00 00	W137 30 00
Drop18	N 55 00 00	W140 15 00
Drop19	N 57 00 00	W143 15 00
Drop20	N 59 00 00	W146 30 00

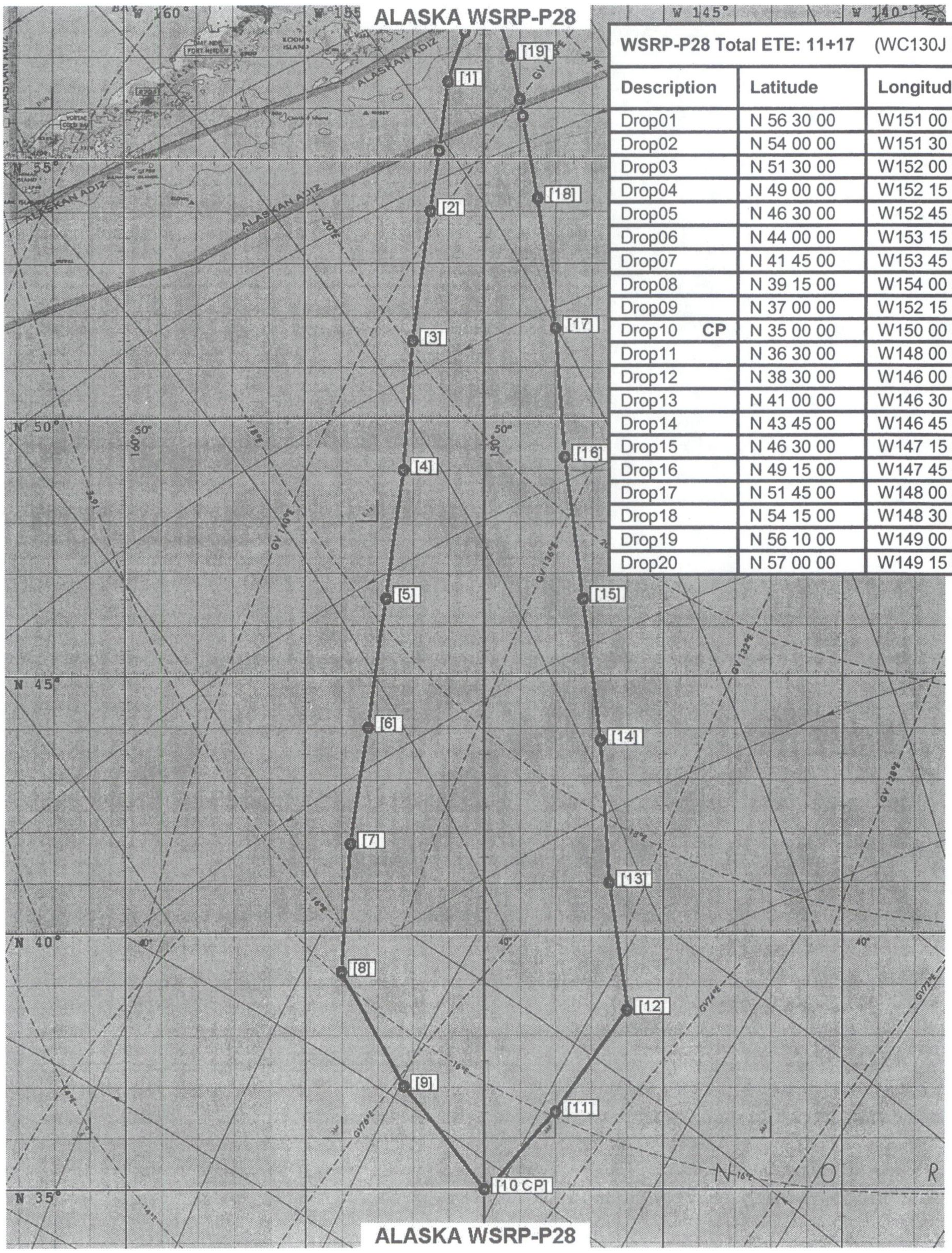
Figure G-26. Alaskan Flight Track WSRP-P26.



WSRP-P27 Total ETE: 10+54 (WC130J No wind)

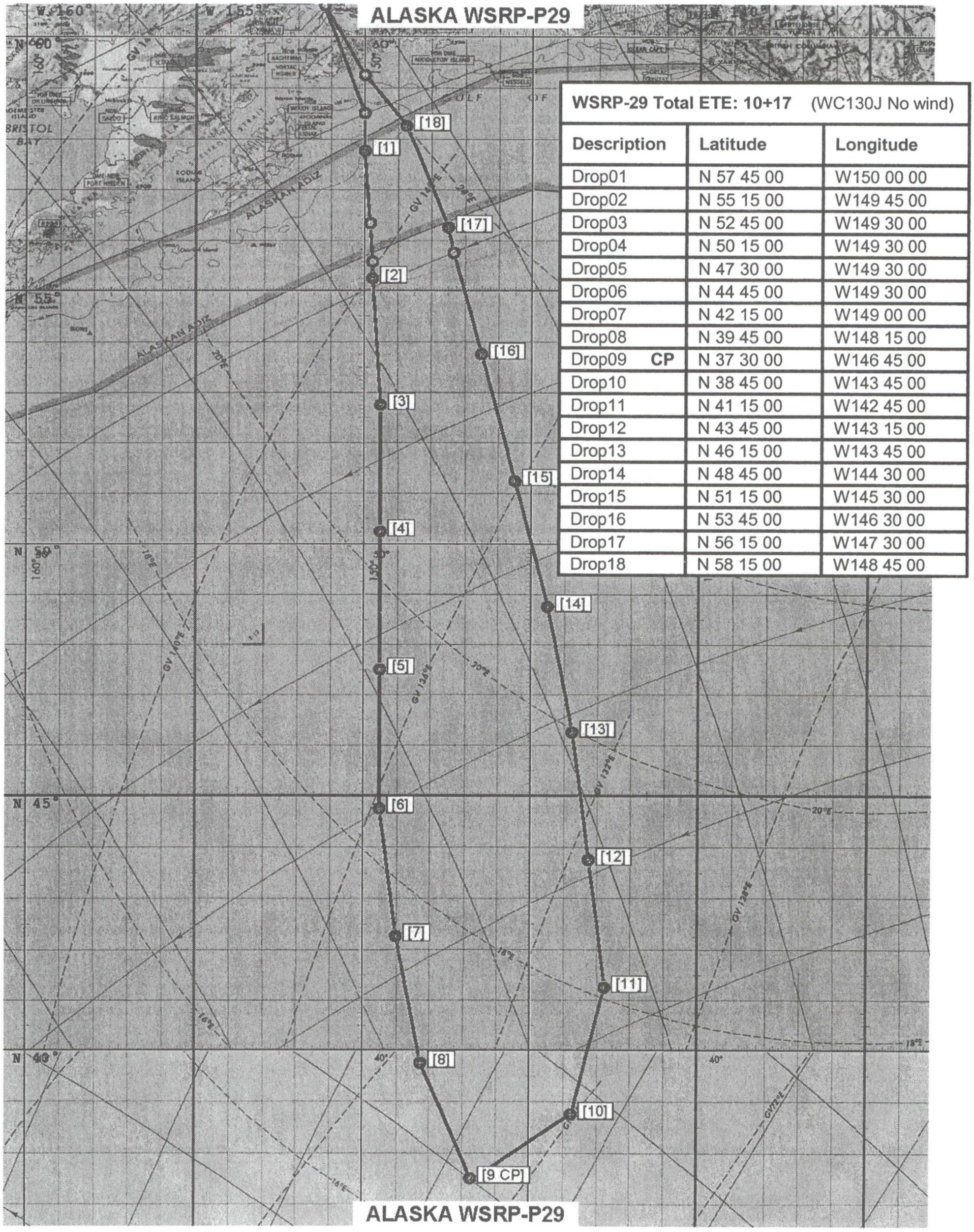
Description	Latitude	Longitude
Drop01	N 58 00 00	W151 00 00
Drop02	N 55 30 00	W152 15 00
Drop03	N 53 00 00	W153 15 00
Drop04	N 50 30 00	W154 00 00
Drop05	N 48 00 00	W154 45 00
Drop06	N 45 15 00	W155 45 00
Drop07	N 42 45 00	W156 45 00
Drop08	N 40 15 00	W157 30 00
Drop09	N 37 45 00	W157 00 00
Drop10 **CP**	N 35 30 00	W156 00 00
Drop11	N 37 30 00	W154 00 00
Drop12	N 39 45 00	W152 15 00
Drop13	N 42 30 00	W152 00 00
Drop14	N 45 00 00	W151 45 00
Drop15	N 47 30 00	W151 30 00
Drop16	N 50 00 00	W151 15 00
Drop17	N 52 30 00	W151 00 00
Drop18	N 55 00 00	W150 45 00
Drop19 (MARLO)	N 57 27 85	W150 30 00

Figure G-27. Alaskan Flight Track WSRP-P27.



WSRP-P28 Total ETE: 11+17 (WC130J No wind)		
Description	**Latitude**	**Longitude**
Drop01	N 56 30 00	W151 00 00
Drop02	N 54 00 00	W151 30 00
Drop03	N 51 30 00	W152 00 00
Drop04	N 49 00 00	W152 15 00
Drop05	N 46 30 00	W152 45 00
Drop06	N 44 00 00	W153 15 00
Drop07	N 41 45 00	W153 45 00
Drop08	N 39 15 00	W154 00 00
Drop09	N 37 00 00	W152 15 00
Drop10 **CP**	N 35 00 00	W150 00 00
Drop11	N 36 30 00	W148 00 00
Drop12	N 38 30 00	W146 00 00
Drop13	N 41 00 00	W146 30 00
Drop14	N 43 45 00	W146 45 00
Drop15	N 46 30 00	W147 15 00
Drop16	N 49 15 00	W147 45 00
Drop17	N 51 45 00	W148 00 00
Drop18	N 54 15 00	W148 30 00
Drop19	N 56 10 00	W149 00 00
Drop20	N 57 00 00	W149 15 00

Figure G-28. Alaskan Flight Track WSRP-P28.



WSRP-29 Total ETE: 10+17 (WC130J No wind)

Description	Latitude	Longitude
Drop01	N 57 45 00	W150 00 00
Drop02	N 55 15 00	W149 45 00
Drop03	N 52 45 00	W149 30 00
Drop04	N 50 15 00	W149 30 00
Drop05	N 47 30 00	W149 30 00
Drop06	N 44 45 00	W149 30 00
Drop07	N 42 15 00	W149 00 00
Drop08	N 39 45 00	W148 15 00
Drop09 **CP**	N 37 30 00	W146 45 00
Drop10	N 38 45 00	W143 45 00
Drop11	N 41 15 00	W142 45 00
Drop12	N 43 45 00	W143 15 00
Drop13	N 46 15 00	W143 45 00
Drop14	N 48 45 00	W144 30 00
Drop15	N 51 15 00	W145 30 00
Drop16	N 53 45 00	W146 30 00
Drop17	N 56 15 00	W147 30 00
Drop18	N 58 15 00	W148 45 00

Figure G-29. Alaskan Flight Track WSRP-P29.

APPENDIX H
HAWAIIAN FLIGHT TRACKS

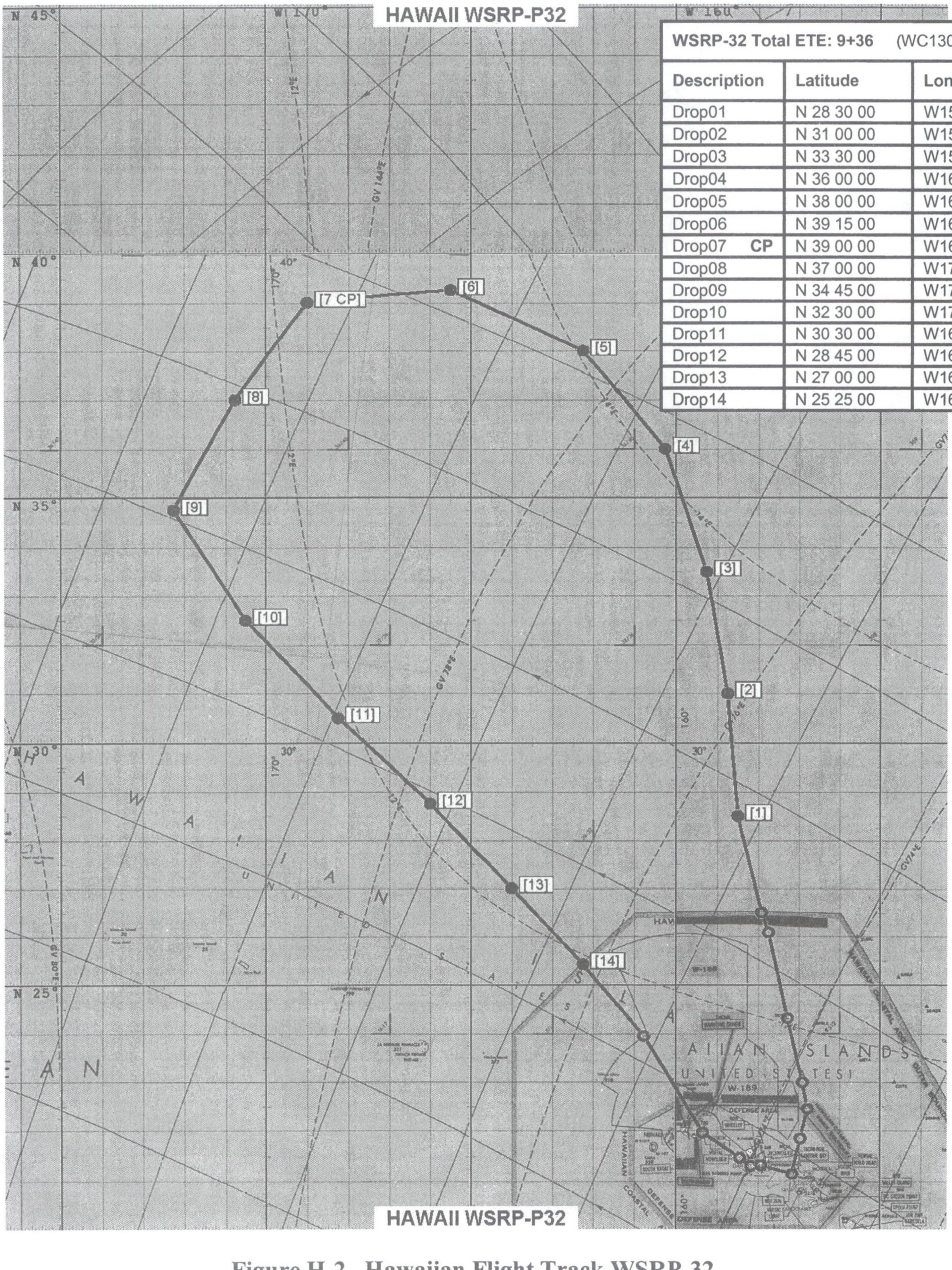
Note: The 53 WRS and NOAA AOC flight operations planners will plan tasked missions to meet Control Point/Control Time criteria and will fly the route in the most efficient direction possible. If a specific direction is desired (clockwise or counterclockwise), it should be indicated in the WSPOD; e.g., Track WSRP-P32 CW or Track WSRP-A64 CCW. Tasking agencies should not use the terminology "Reverse" indicated by an "R" when requesting a track.



WSRP-P31 Total ETE: 10+27 (WC130J No wind)

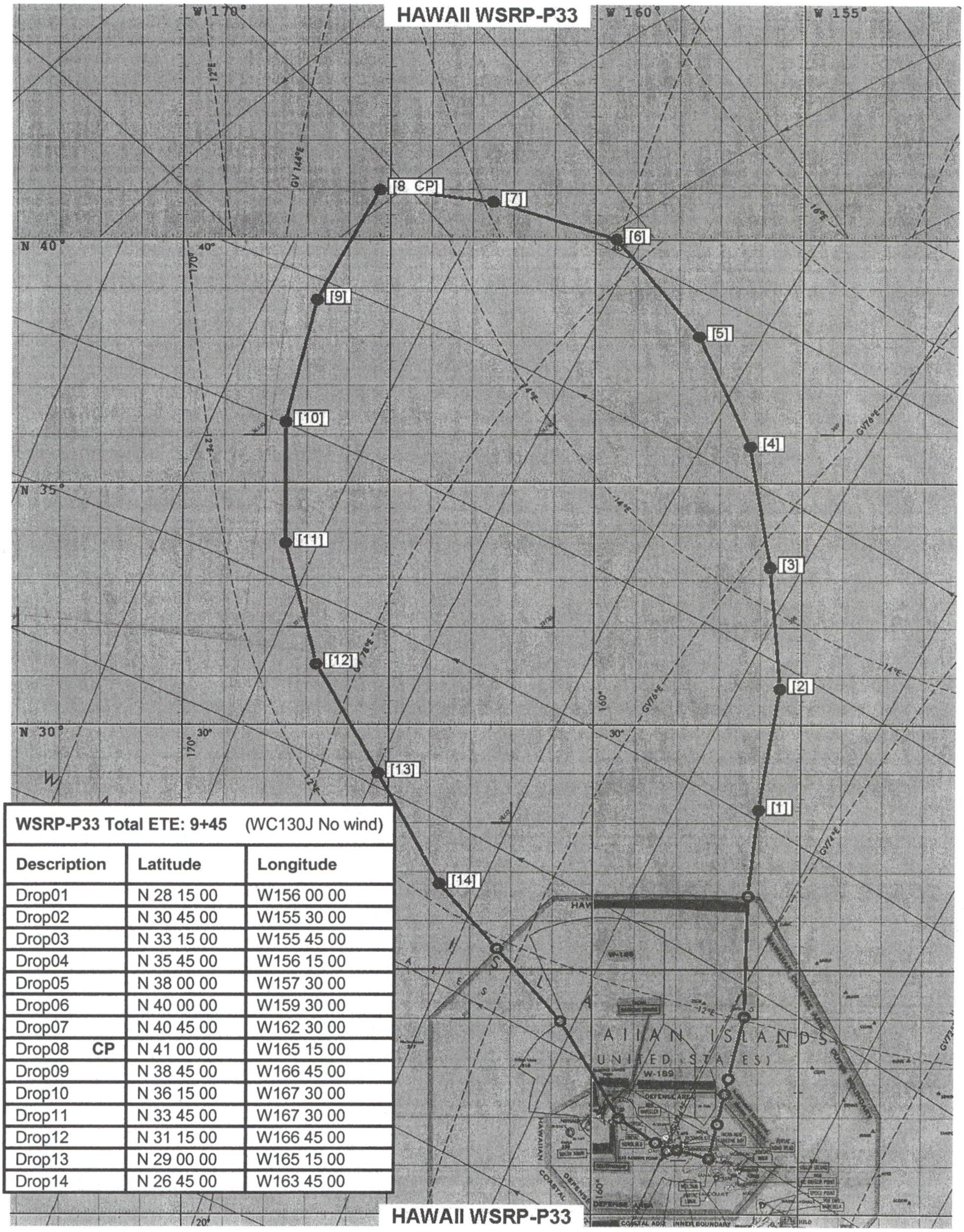
Description	Latitude	Longitude
Drop01	N 29 45 00	W161 00 00
Drop02	N 32 15 00	W161 45 00
Drop03	N 34 30 00	W162 45 00
Drop04	N 36 15 00	W165 00 00
Drop05	N 38 00 00	W167 30 00
Drop06	N 39 15 00	W169 45 00
Drop07	N 38 30 00	W173 00 00
Drop08 **CP**	N 37 45 00	W176 00 00
Drop09	N 35 15 00	W175 45 00
Drop10	N 32 45 00	W175 30 00
Drop11	N 31 15 00	W173 00 00
Drop12	N 30 00 00	W170 30 00
Drop13	N 28 30 00	W168 15 00
Drop14	N 27 00 00	W166 00 00
Drop15	N 25 30 00	W163 45 00

Figure H-1. Hawaiian Flight Track WSRP-31.



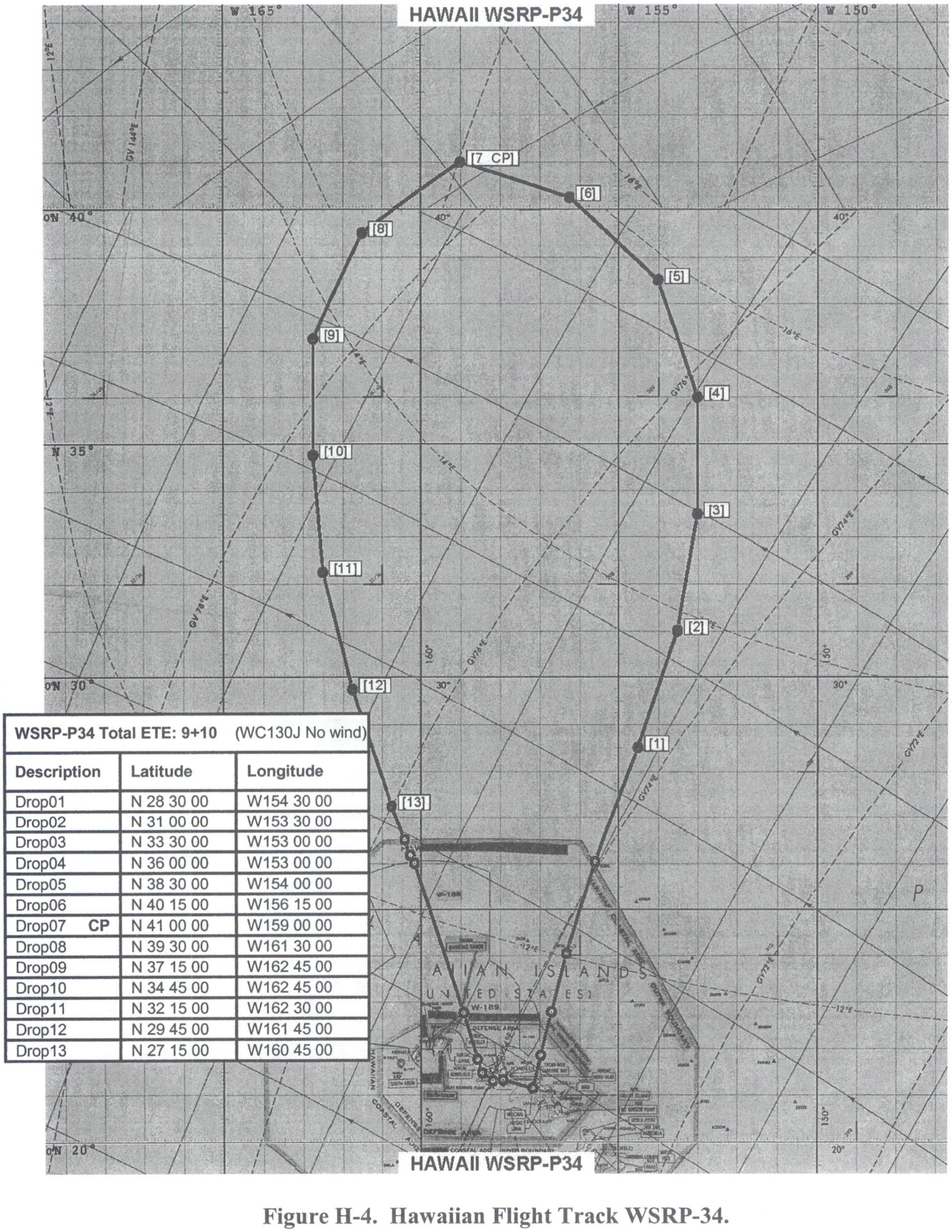
WSRP-32 Total ETE: 9+36 (WC130J No wind)		
Description	**Latitude**	**Longitude**
Drop01	N 28 30 00	W158 30 00
Drop02	N 31 00 00	W158 45 00
Drop03	N 33 30 00	W159 15 00
Drop04	N 36 00 00	W160 15 00
Drop05	N 38 00 00	W162 15 00
Drop06	N 39 15 00	W165 30 00
Drop07 **CP**	N 39 00 00	W169 00 00
Drop08	N 37 00 00	W170 45 00
Drop09	N 34 45 00	W172 15 00
Drop10	N 32 30 00	W170 30 00
Drop11	N 30 30 00	W168 15 00
Drop12	N 28 45 00	W166 00 00
Drop13	N 27 00 00	W164 00 00
Drop14	N 25 25 00	W162 15 00

Figure H-2. Hawaiian Flight Track WSRP-32.



WSRP-P33 Total ETE: 9+45 (WC130J No wind)		
Description	**Latitude**	**Longitude**
Drop01	N 28 15 00	W156 00 00
Drop02	N 30 45 00	W155 30 00
Drop03	N 33 15 00	W155 45 00
Drop04	N 35 45 00	W156 15 00
Drop05	N 38 00 00	W157 30 00
Drop06	N 40 00 00	W159 30 00
Drop07	N 40 45 00	W162 30 00
Drop08 **CP**	N 41 00 00	W165 15 00
Drop09	N 38 45 00	W166 45 00
Drop10	N 36 15 00	W167 30 00
Drop11	N 33 45 00	W167 30 00
Drop12	N 31 15 00	W166 45 00
Drop13	N 29 00 00	W165 15 00
Drop14	N 26 45 00	W163 45 00

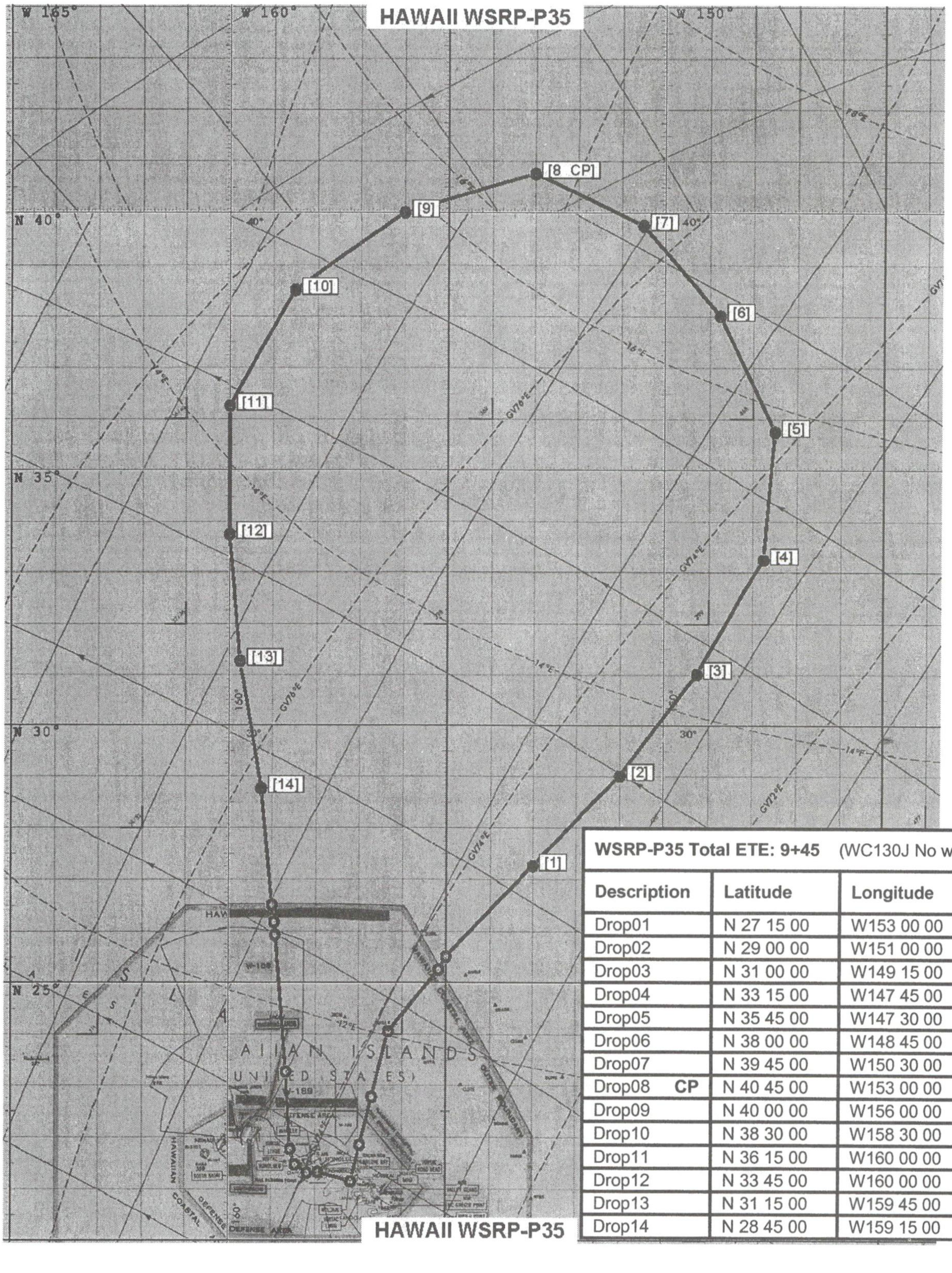
Figure H-3. Hawaiian Flight Track WSRP-33.



WSRP-P34 Total ETE: 9+10 (WC130J No wind)

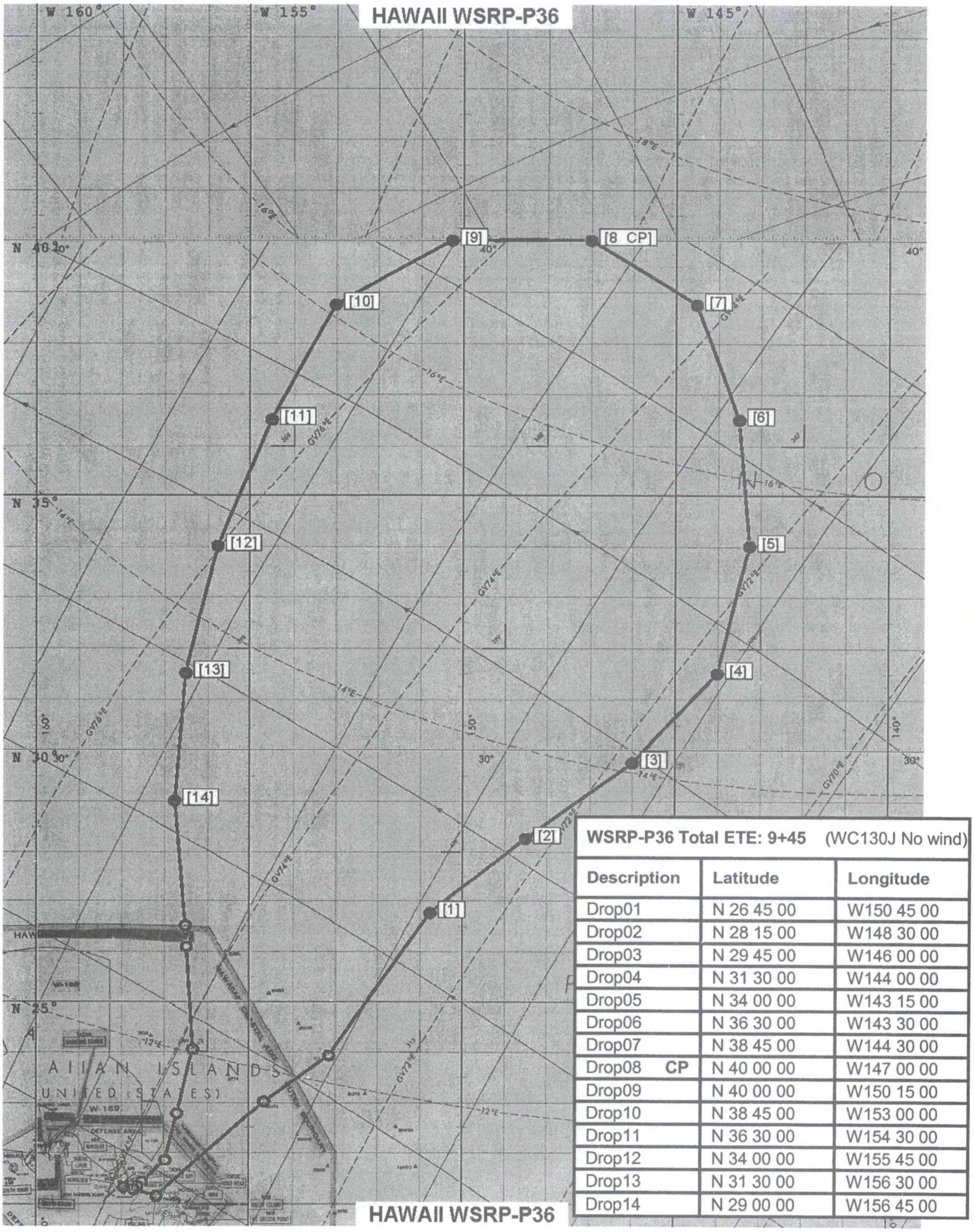
Description		Latitude	Longitude
Drop01		N 28 30 00	W154 30 00
Drop02		N 31 00 00	W153 30 00
Drop03		N 33 30 00	W153 00 00
Drop04		N 36 00 00	W153 00 00
Drop05		N 38 30 00	W154 00 00
Drop06		N 40 15 00	W156 15 00
Drop07	**CP**	N 41 00 00	W159 00 00
Drop08		N 39 30 00	W161 30 00
Drop09		N 37 15 00	W162 45 00
Drop10		N 34 45 00	W162 45 00
Drop11		N 32 15 00	W162 30 00
Drop12		N 29 45 00	W161 45 00
Drop13		N 27 15 00	W160 45 00

Figure H-4. Hawaiian Flight Track WSRP-34.



WSRP-P35 Total ETE: 9+45 (WC130J No wind)		
Description	**Latitude**	**Longitude**
Drop01	N 27 15 00	W153 00 00
Drop02	N 29 00 00	W151 00 00
Drop03	N 31 00 00	W149 15 00
Drop04	N 33 15 00	W147 45 00
Drop05	N 35 45 00	W147 30 00
Drop06	N 38 00 00	W148 45 00
Drop07	N 39 45 00	W150 30 00
Drop08 **CP**	N 40 45 00	W153 00 00
Drop09	N 40 00 00	W156 00 00
Drop10	N 38 30 00	W158 30 00
Drop11	N 36 15 00	W160 00 00
Drop12	N 33 45 00	W160 00 00
Drop13	N 31 15 00	W159 45 00
Drop14	N 28 45 00	W159 15 00

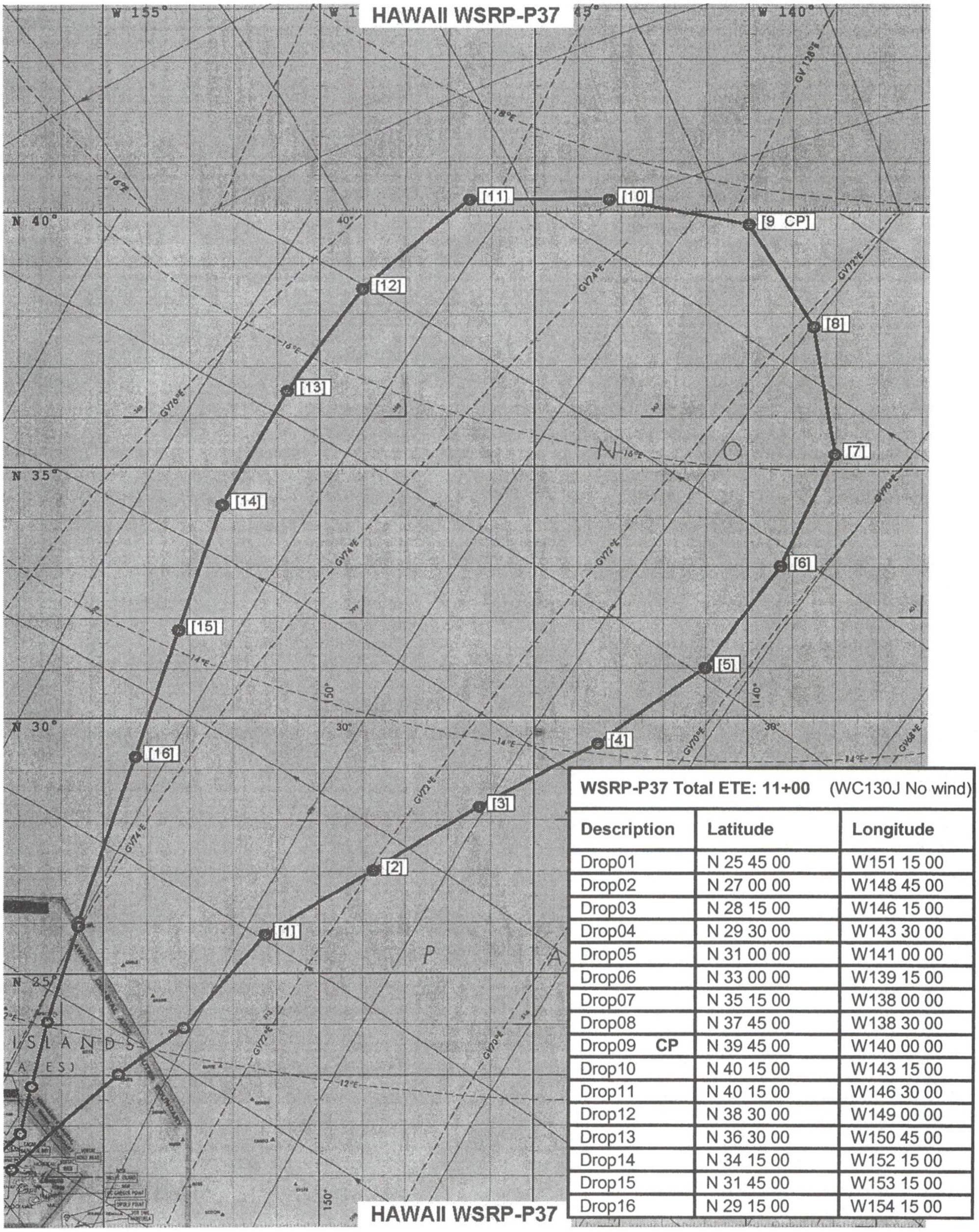
Figure H-5. Hawaiian Flight Track WSRP-35.



WSRP-P36 Total ETE: 9+45 (WC130J No wind)

Description	Latitude	Longitude
Drop01	N 26 45 00	W150 45 00
Drop02	N 28 15 00	W148 30 00
Drop03	N 29 45 00	W146 00 00
Drop04	N 31 30 00	W144 00 00
Drop05	N 34 00 00	W143 15 00
Drop06	N 36 30 00	W143 30 00
Drop07	N 38 45 00	W144 30 00
Drop08 **CP**	N 40 00 00	W147 00 00
Drop09	N 40 00 00	W150 15 00
Drop10	N 38 45 00	W153 00 00
Drop11	N 36 30 00	W154 30 00
Drop12	N 34 00 00	W155 45 00
Drop13	N 31 30 00	W156 30 00
Drop14	N 29 00 00	W156 45 00

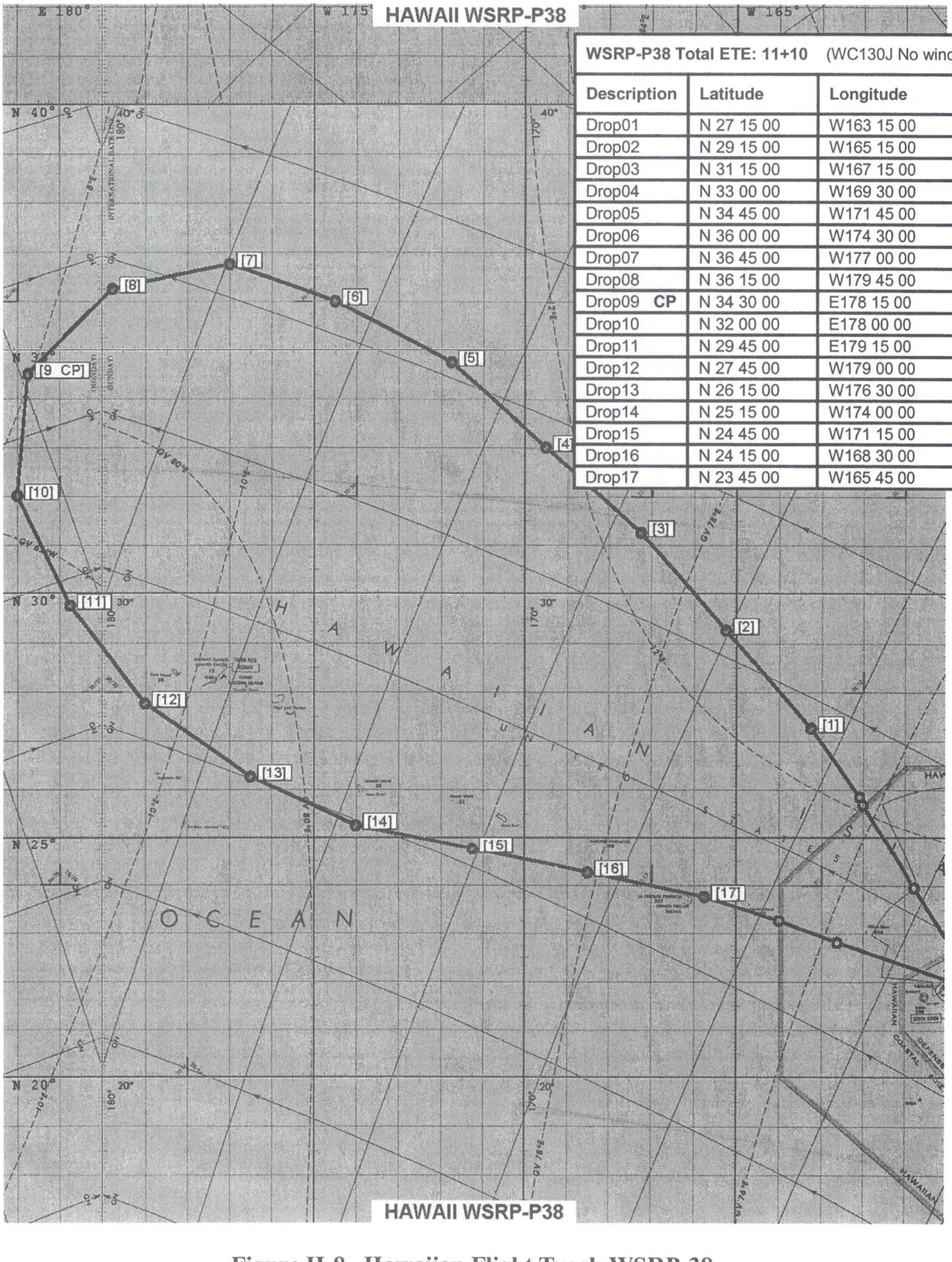
Figure H-6. Hawaiian Flight Track WSRP-36.



WSRP-P37 Total ETE: 11+00 (WC130J No wind)

Description	Latitude	Longitude
Drop01	N 25 45 00	W151 15 00
Drop02	N 27 00 00	W148 45 00
Drop03	N 28 15 00	W146 15 00
Drop04	N 29 30 00	W143 30 00
Drop05	N 31 00 00	W141 00 00
Drop06	N 33 00 00	W139 15 00
Drop07	N 35 15 00	W138 00 00
Drop08	N 37 45 00	W138 30 00
Drop09 **CP**	N 39 45 00	W140 00 00
Drop10	N 40 15 00	W143 15 00
Drop11	N 40 15 00	W146 30 00
Drop12	N 38 30 00	W149 00 00
Drop13	N 36 30 00	W150 45 00
Drop14	N 34 15 00	W152 15 00
Drop15	N 31 45 00	W153 15 00
Drop16	N 29 15 00	W154 15 00

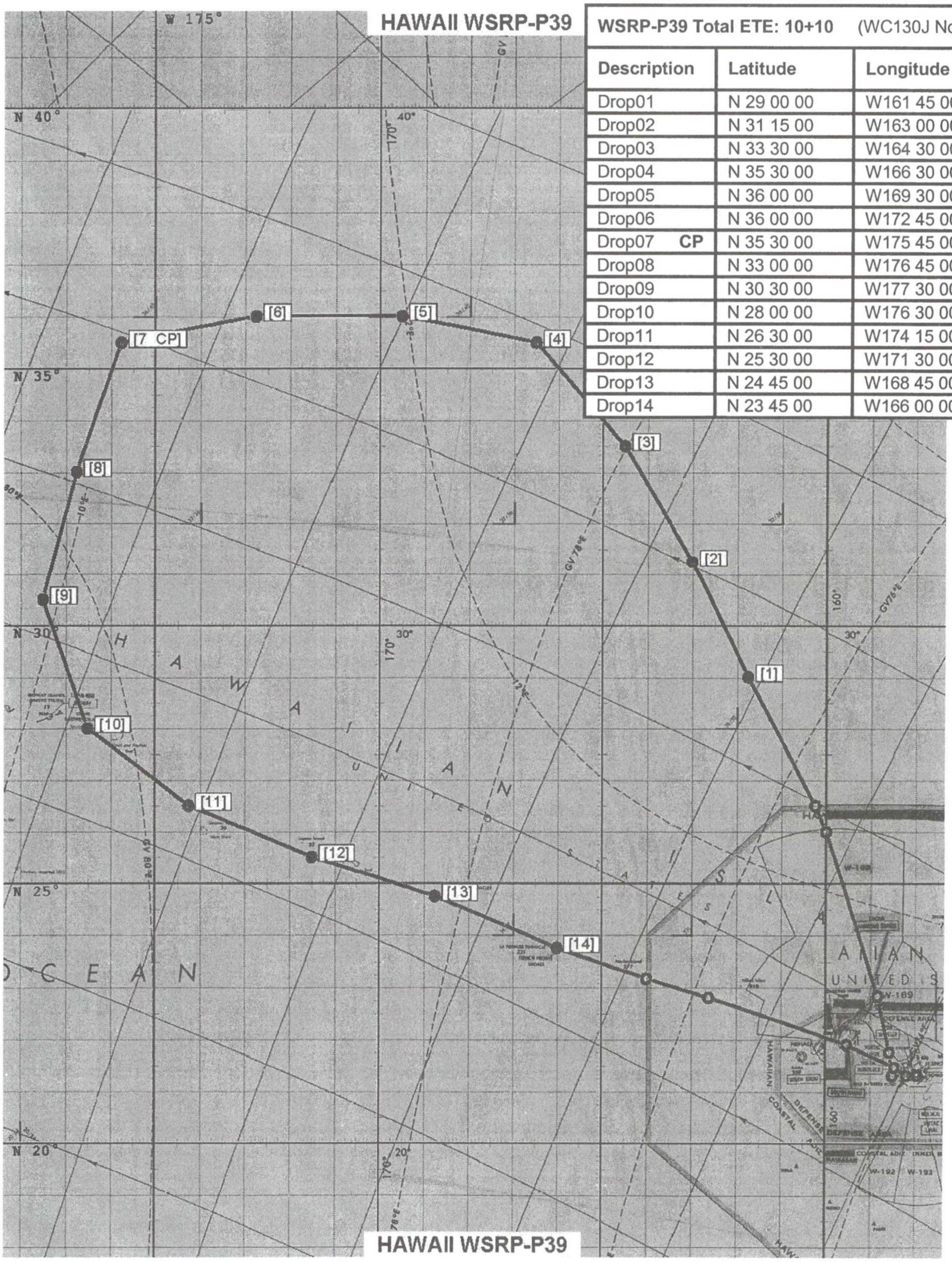
Figure H-7. Hawaiian Flight Track WSRP-37.



WSRP-P38 Total ETE: 11+10 (WC130J No wind)

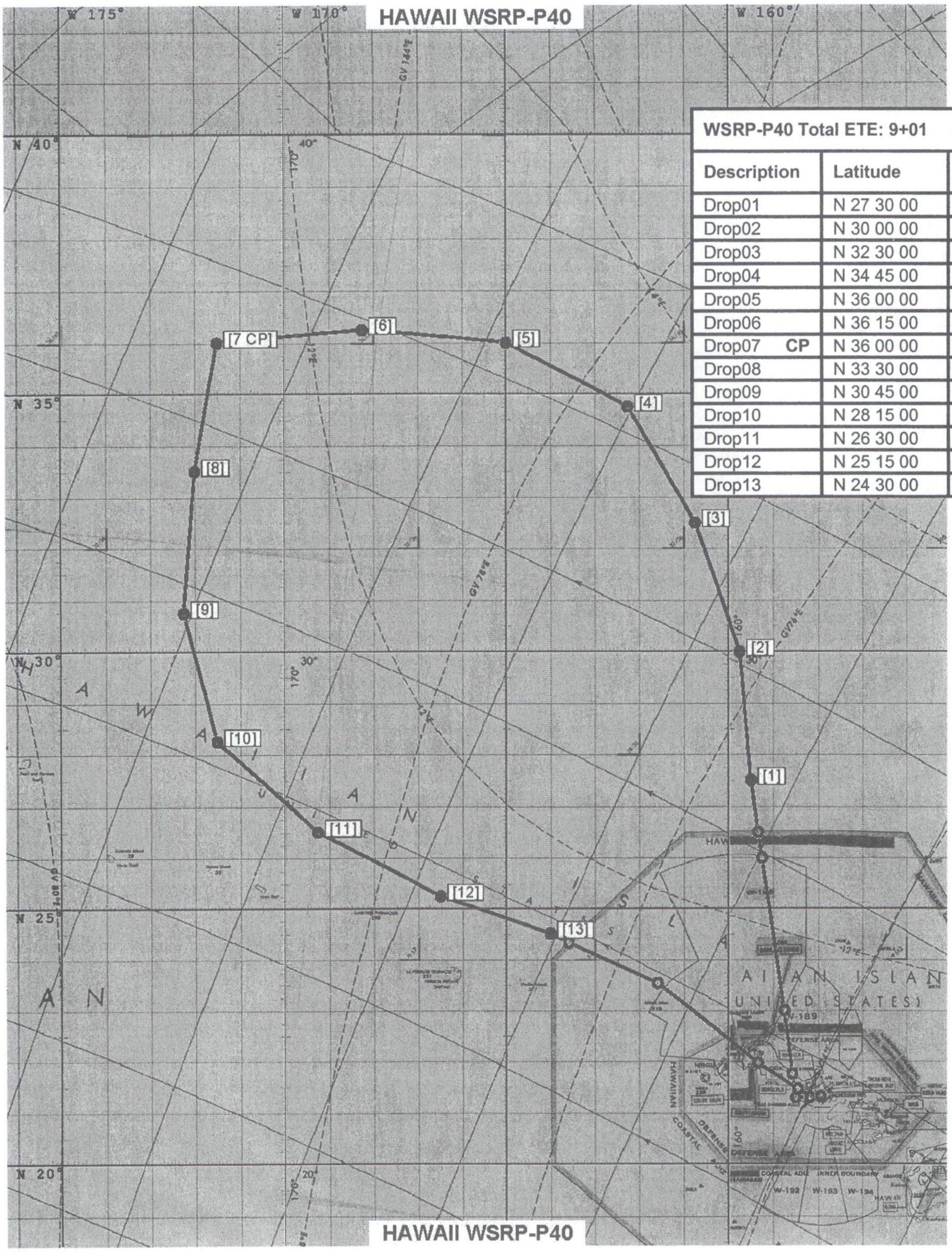
Description	Latitude	Longitude
Drop01	N 27 15 00	W163 15 00
Drop02	N 29 15 00	W165 15 00
Drop03	N 31 15 00	W167 15 00
Drop04	N 33 00 00	W169 30 00
Drop05	N 34 45 00	W171 45 00
Drop06	N 36 00 00	W174 30 00
Drop07	N 36 45 00	W177 00 00
Drop08	N 36 15 00	W179 45 00
Drop09 **CP**	N 34 30 00	E178 15 00
Drop10	N 32 00 00	E178 00 00
Drop11	N 29 45 00	E179 15 00
Drop12	N 27 45 00	W179 00 00
Drop13	N 26 15 00	W176 30 00
Drop14	N 25 15 00	W174 00 00
Drop15	N 24 45 00	W171 15 00
Drop16	N 24 15 00	W168 30 00
Drop17	N 23 45 00	W165 45 00

Figure H-8. Hawaiian Flight Track WSRP-38.



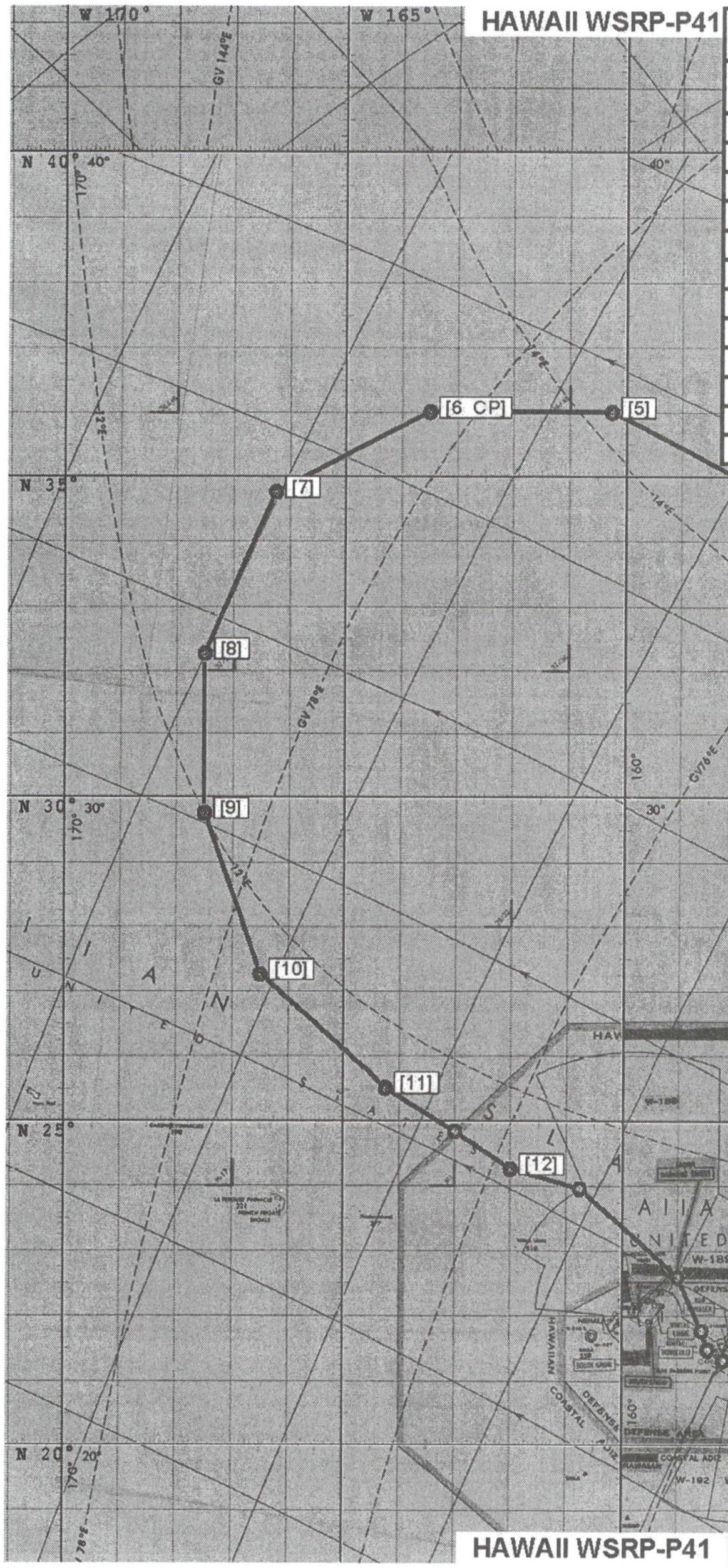
WSRP-P39 Total ETE: 10+10 (WC130J No wind)		
Description	**Latitude**	**Longitude**
Drop01	N 29 00 00	W161 45 00
Drop02	N 31 15 00	W163 00 00
Drop03	N 33 30 00	W164 30 00
Drop04	N 35 30 00	W166 30 00
Drop05	N 36 00 00	W169 30 00
Drop06	N 36 00 00	W172 45 00
Drop07 **CP**	N 35 30 00	W175 45 00
Drop08	N 33 00 00	W176 45 00
Drop09	N 30 30 00	W177 30 00
Drop10	N 28 00 00	W176 30 00
Drop11	N 26 30 00	W174 15 00
Drop12	N 25 30 00	W171 30 00
Drop13	N 24 45 00	W168 45 00
Drop14	N 23 45 00	W166 00 00

Figure H-9. Hawaiian Flight Track WSRP-39.



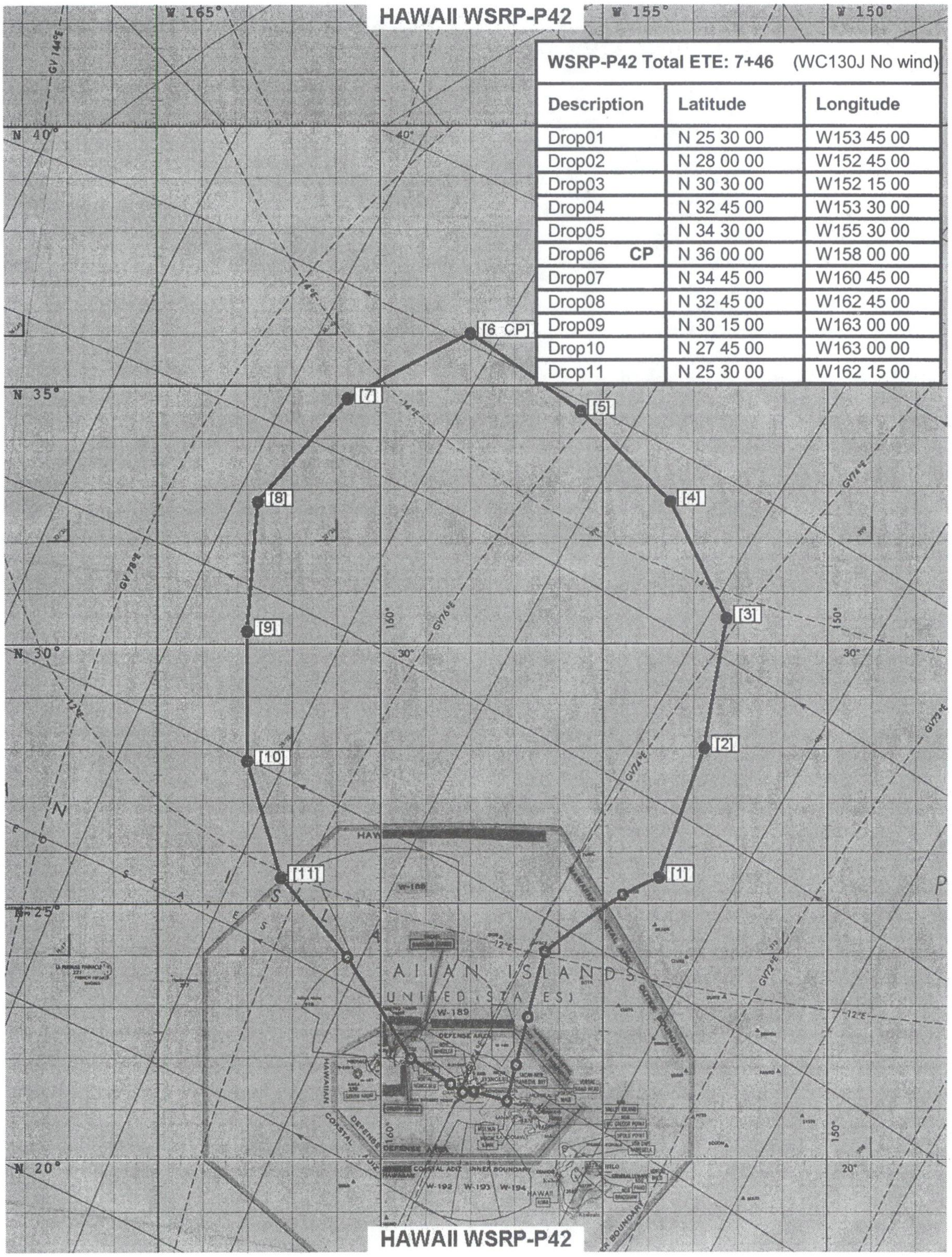
WSRP-P40 Total ETE: 9+01		(WC130J No wind)
Description	**Latitude**	**Longitude**
Drop01	N 27 30 00	W159 30 00
Drop02	N 30 00 00	W159 45 00
Drop03	N 32 30 00	W160 45 00
Drop04	N 34 45 00	W162 15 00
Drop05	N 36 00 00	W165 00 00
Drop06	N 36 15 00	W168 15 00
Drop07 **CP**	N 36 00 00	W171 30 00
Drop08	N 33 30 00	W172 00 00
Drop09	N 30 45 00	W172 15 00
Drop10	N 28 15 00	W171 30 00
Drop11	N 26 30 00	W169 15 00
Drop12	N 25 15 00	W166 30 00
Drop13	N 24 30 00	W164 00 00

Figure H-10. Hawaiian Flight Track WSRP-40.



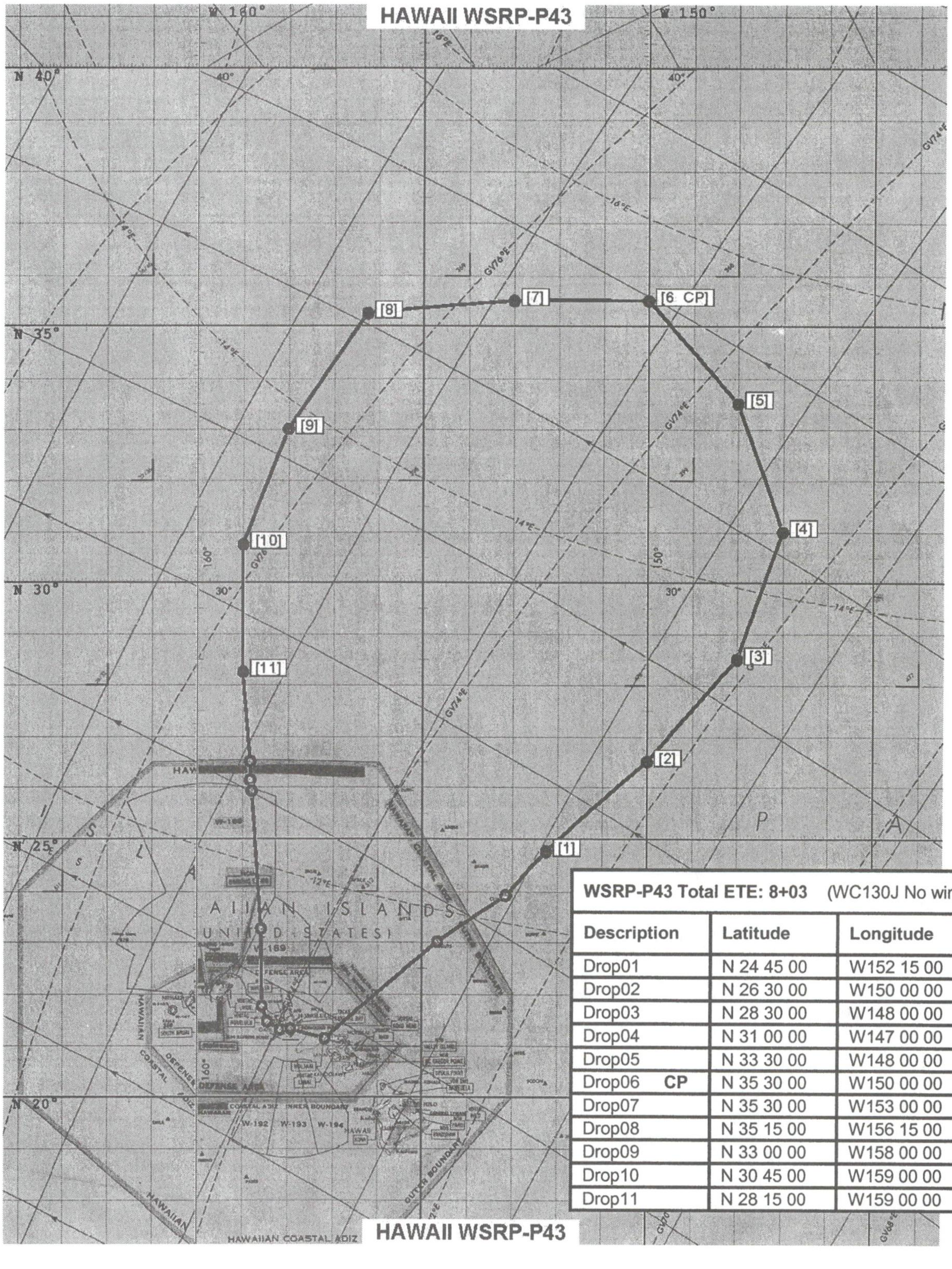
WSRP-P41 Total ETE: 8+23 (WC130J No wind)		
Description	**Latitude**	**Longitude**
Drop01	N 27 30 00	W155 45 00
Drop02	N 30 00 00	W155 15 00
Drop03	N 32 30 00	W155 45 00
Drop04	N 34 45 00	W157 30 00
Drop05	N 36 00 00	W160 15 00
Drop06 **CP**	N 36 00 00	W163 30 00
Drop07	N 34 45 00	W166 15 00
Drop08	N 32 15 00	W167 30 00
Drop09	N 29 45 00	W167 30 00
Drop10	N 27 15 00	W166 30 00
Drop11	N 25 30 00	W164 15 00
Drop12	N 24 15 00	W162 00 00

Figure H-11. Hawaiian Flight Track WSRP-41.



WSRP-P42 Total ETE: 7+46 (WC130J No wind)		
Description	**Latitude**	**Longitude**
Drop01	N 25 30 00	W153 45 00
Drop02	N 28 00 00	W152 45 00
Drop03	N 30 30 00	W152 15 00
Drop04	N 32 45 00	W153 30 00
Drop05	N 34 30 00	W155 30 00
Drop06 **CP**	N 36 00 00	W158 00 00
Drop07	N 34 45 00	W160 45 00
Drop08	N 32 45 00	W162 45 00
Drop09	N 30 15 00	W163 00 00
Drop10	N 27 45 00	W163 00 00
Drop11	N 25 30 00	W162 15 00

Figure H-12. Hawaiian Flight Track WSRP-42.



WSRP-P43 Total ETE: 8+03 (WC130J No wind)		
Description	**Latitude**	**Longitude**
Drop01	N 24 45 00	W152 15 00
Drop02	N 26 30 00	W150 00 00
Drop03	N 28 30 00	W148 00 00
Drop04	N 31 00 00	W147 00 00
Drop05	N 33 30 00	W148 00 00
Drop06 **CP**	N 35 30 00	W150 00 00
Drop07	N 35 30 00	W153 00 00
Drop08	N 35 15 00	W156 15 00
Drop09	N 33 00 00	W158 00 00
Drop10	N 30 45 00	W159 00 00
Drop11	N 28 15 00	W159 00 00

Figure H-13. Hawaiian Flight Track WSRP-43.

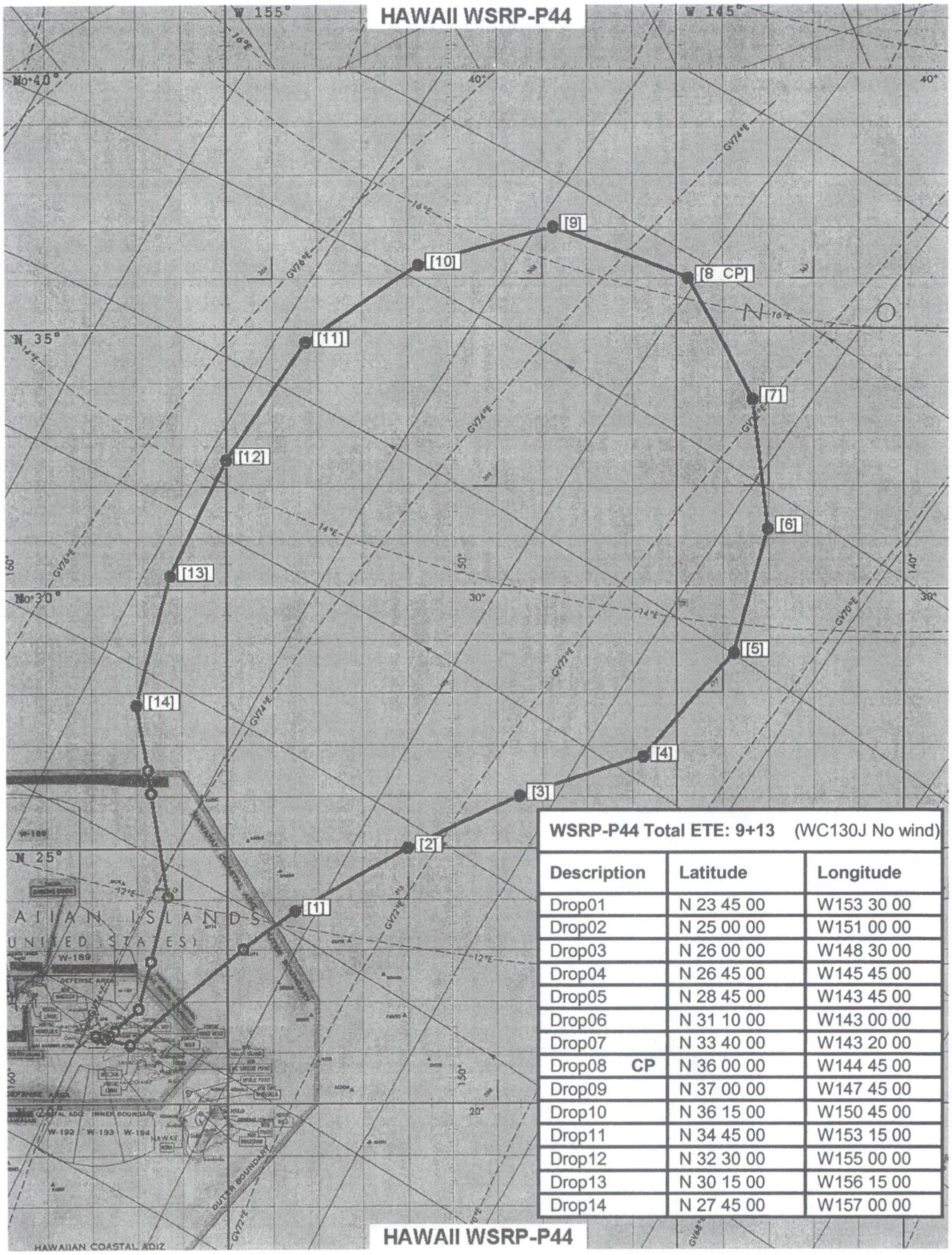
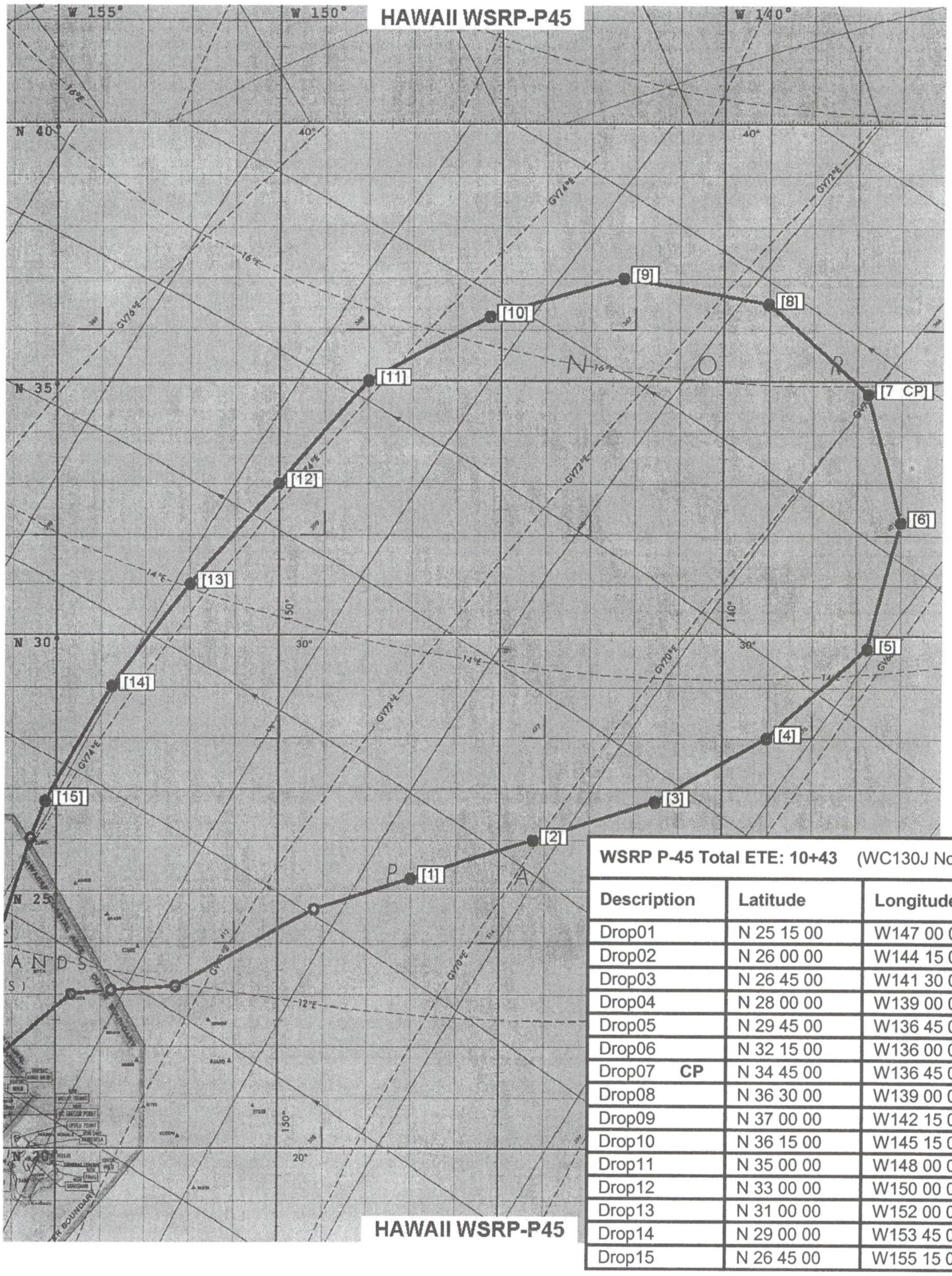


Figure H-14. Hawaiian Flight Track WSRP-44.



WSRP P-45 Total ETE: 10+43 (WC130J No wind)		
Description	**Latitude**	**Longitude**
Drop01	N 25 15 00	W147 00 00
Drop02	N 26 00 00	W144 15 00
Drop03	N 26 45 00	W141 30 00
Drop04	N 28 00 00	W139 00 00
Drop05	N 29 45 00	W136 45 00
Drop06	N 32 15 00	W136 00 00
Drop07 **CP**	N 34 45 00	W136 45 00
Drop08	N 36 30 00	W139 00 00
Drop09	N 37 00 00	W142 15 00
Drop10	N 36 15 00	W145 15 00
Drop11	N 35 00 00	W148 00 00
Drop12	N 33 00 00	W150 00 00
Drop13	N 31 00 00	W152 00 00
Drop14	N 29 00 00	W153 45 00
Drop15	N 26 45 00	W155 15 00

Figure H-15. Hawaiian Flight Track WSRP-45.

WSRP P-46 Total ETE: 11+38 (WC130J No wind)		
Description	**Latitude**	**Longitude**
Drop01	N 25 00 00	W143 00 00
Drop02	N 25 30 00	W140 15 00
Drop03	N 26 15 00	W137 30 00
Drop04	N 27 30 00	W135 00 00
Drop05	N 29 30 00	W133 15 00
Drop06	N 31 45 00	W132 15 00
Drop07 **CP**	N 34 00 00	W132 45 00
Drop08	N 35 30 00	W135 15 00
Drop09	N 36 00 00	W138 15 00
Drop10	N 35 30 00	W141 15 00
Drop11	N 34 30 00	W144 00 00
Drop12	N 33 15 00	W146 45 00
Drop13	N 31 45 00	W149 15 00
Drop14	N 30 00 00	W151 30 00

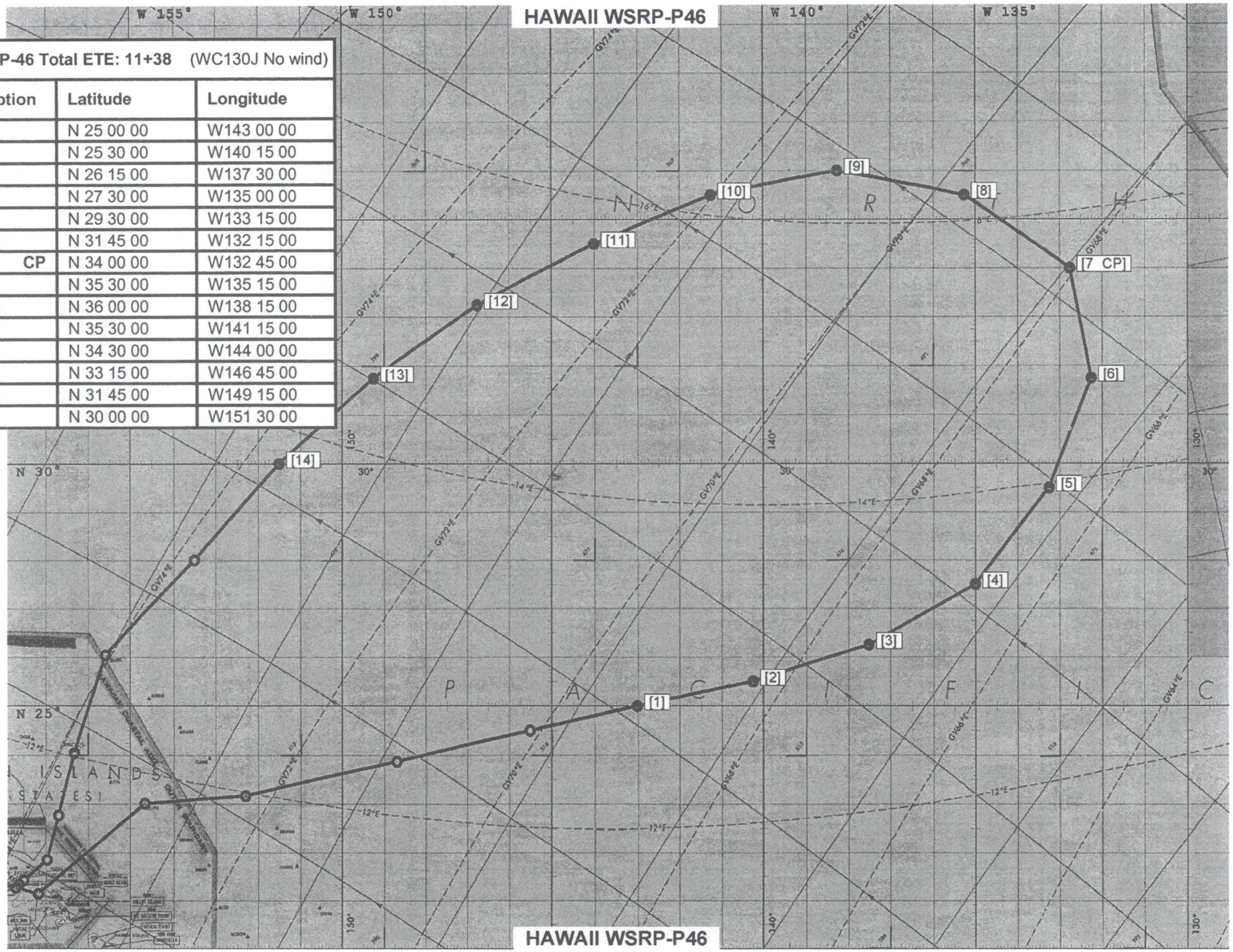
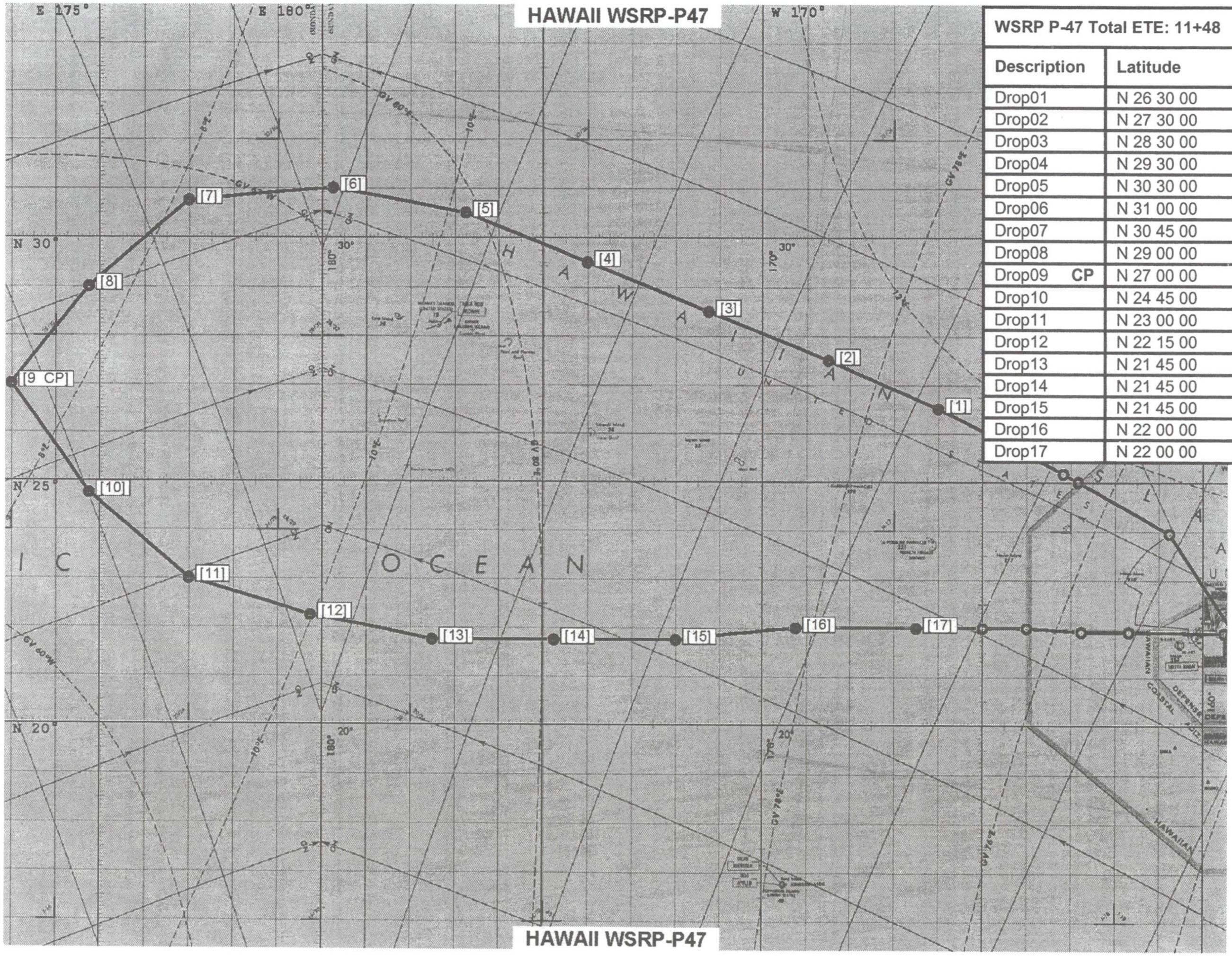
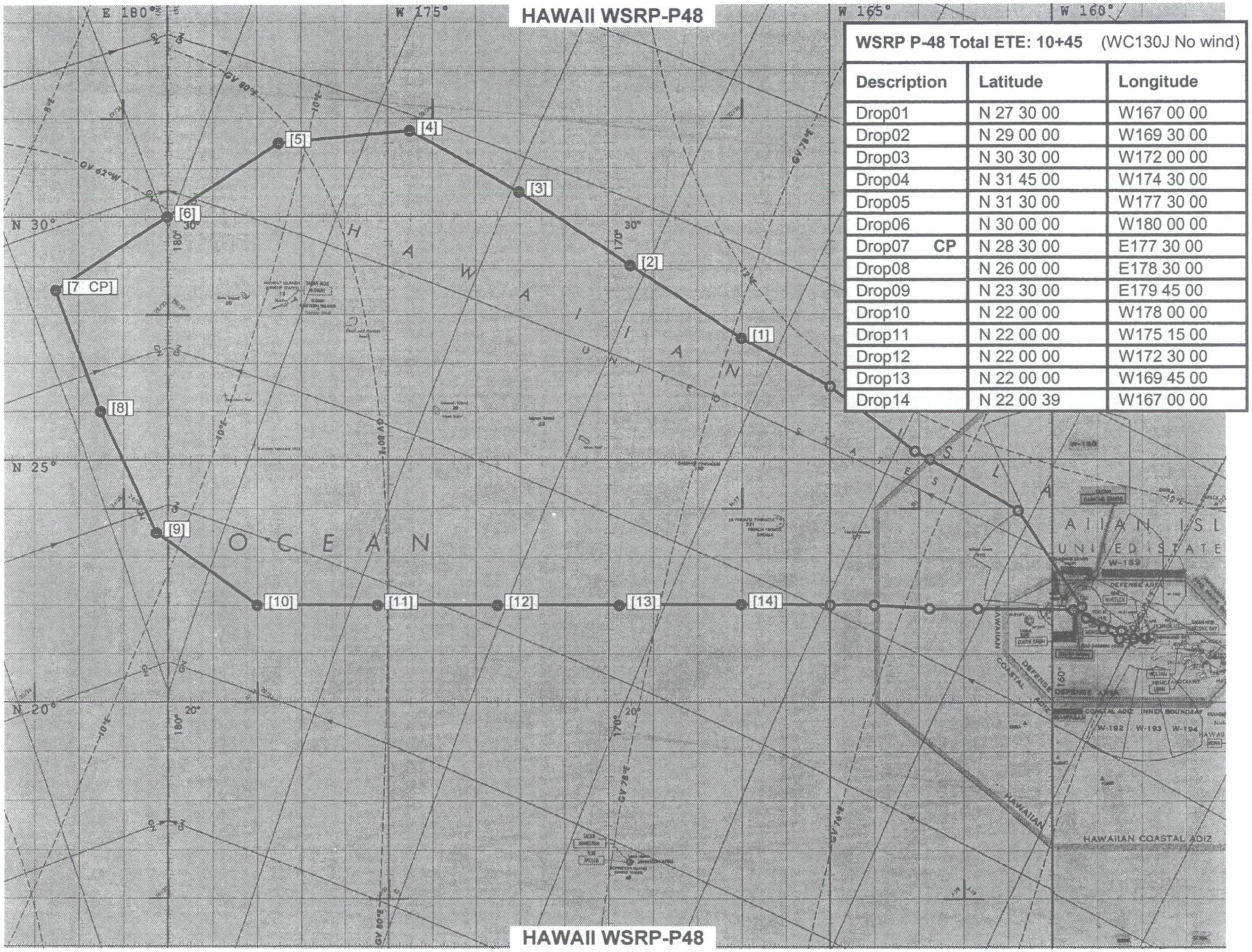


Figure H-16. Hawaiian Flight Track WSRP-46.



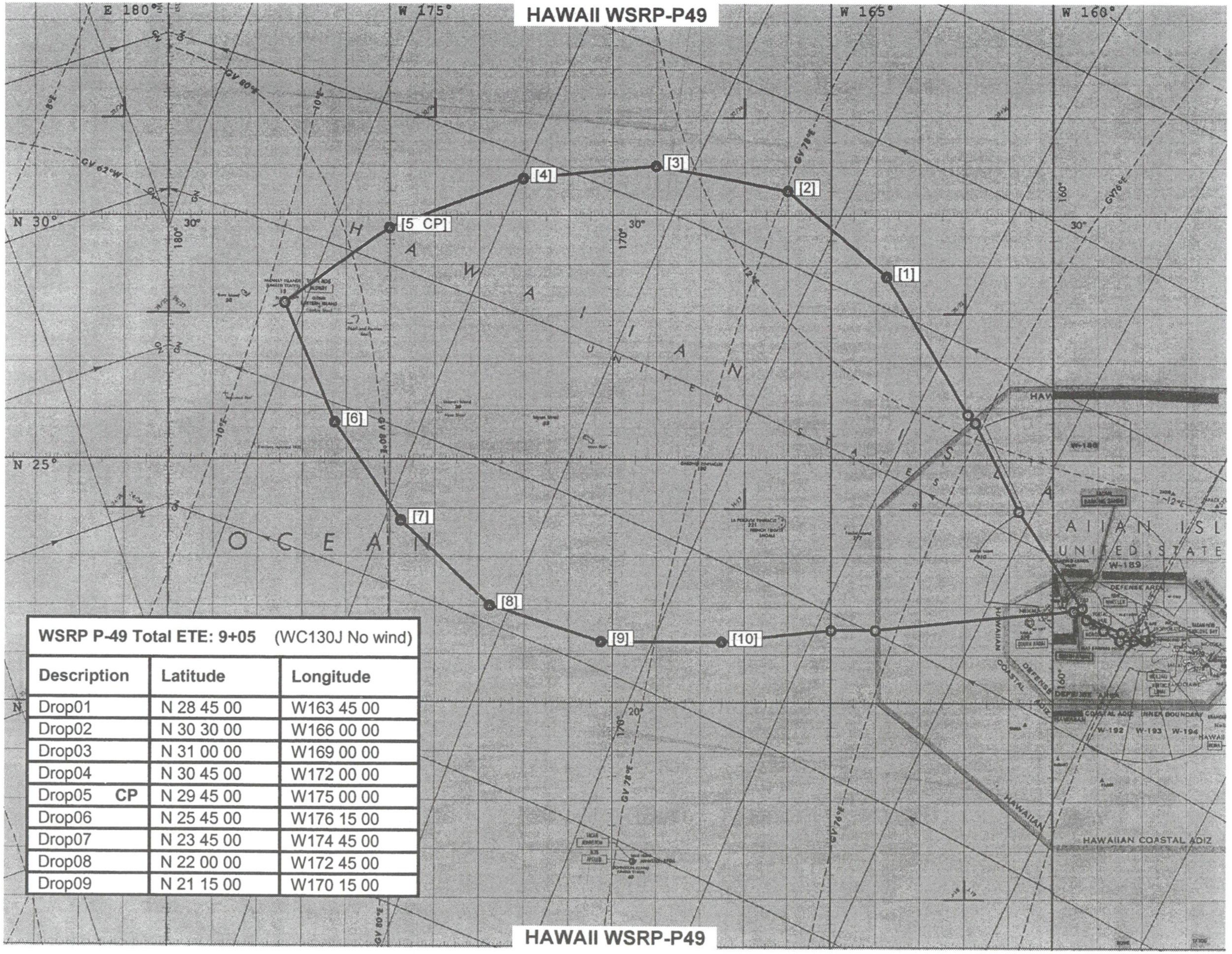
WSRP P-47 Total ETE: 11+48 (WC130J No wind)		
Description	**Latitude**	**Longitude**
Drop01	N 26 30 00	W166 00 00
Drop02	N 27 30 00	W168 30 00
Drop03	N 28 30 00	W171 15 00
Drop04	N 29 30 00	W174 00 00
Drop05	N 30 30 00	W176 45 00
Drop06	N 31 00 00	W179 45 00
Drop07	N 30 45 00	E177 00 00
Drop08	N 29 00 00	E174 45 00
Drop09 **CP**	N 27 00 00	E173 00 00
Drop10	N 24 45 00	E174 45 00
Drop11	N 23 00 00	E177 00 00
Drop12	N 22 15 00	E179 45 00
Drop13	N 21 45 00	W177 30 00
Drop14	N 21 45 00	W174 45 00
Drop15	N 21 45 00	W172 00 00
Drop16	N 22 00 00	W169 15 00
Drop17	N 22 00 00	W166 30 00

Figure H-17. Hawaiian Flight Track WSRP-47.



WSRP P-48 Total ETE: 10+45 (WC130J No wind)		
Description	**Latitude**	**Longitude**
Drop01	N 27 30 00	W167 00 00
Drop02	N 29 00 00	W169 30 00
Drop03	N 30 30 00	W172 00 00
Drop04	N 31 45 00	W174 30 00
Drop05	N 31 30 00	W177 30 00
Drop06	N 30 00 00	W180 00 00
Drop07 **CP**	N 28 30 00	E177 30 00
Drop08	N 26 00 00	E178 30 00
Drop09	N 23 30 00	E179 45 00
Drop10	N 22 00 00	W178 00 00
Drop11	N 22 00 00	W175 15 00
Drop12	N 22 00 00	W172 30 00
Drop13	N 22 00 00	W169 45 00
Drop14	N 22 00 39	W167 00 00

Figure H-18. Hawaiian Flight Track WSRP-48.



WSRP P-49 Total ETE: 9+05 (WC130J No wind)

Description	Latitude	Longitude
Drop01	N 28 45 00	W163 45 00
Drop02	N 30 30 00	W166 00 00
Drop03	N 31 00 00	W169 00 00
Drop04	N 30 45 00	W172 00 00
Drop05 **CP**	N 29 45 00	W175 00 00
Drop06	N 25 45 00	W176 15 00
Drop07	N 23 45 00	W174 45 00
Drop08	N 22 00 00	W172 45 00
Drop09	N 21 15 00	W170 15 00

Figure H-19. Hawaiian Flight Track WSRP-49.

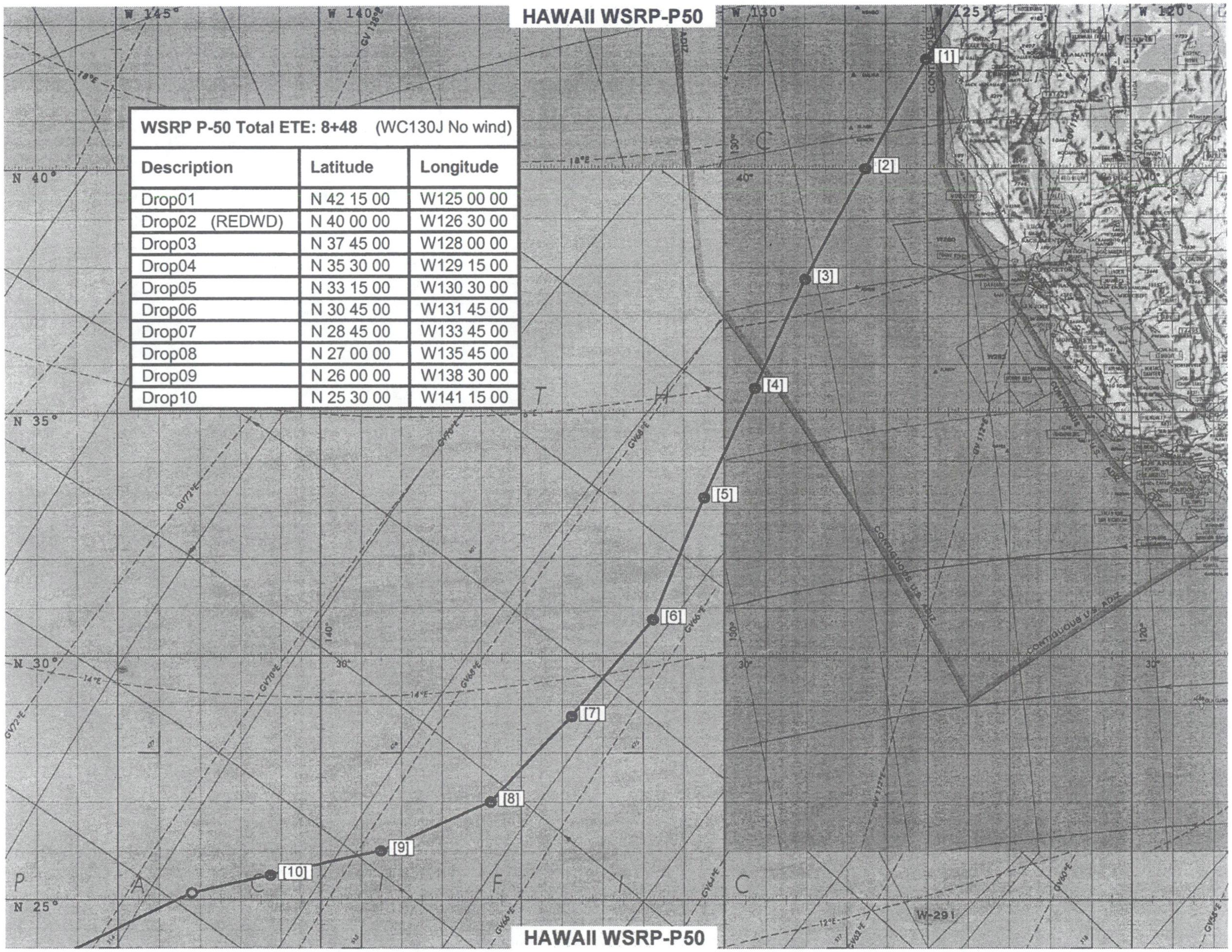


Figure H-20. Hawaiian Flight Track WSRP-50.

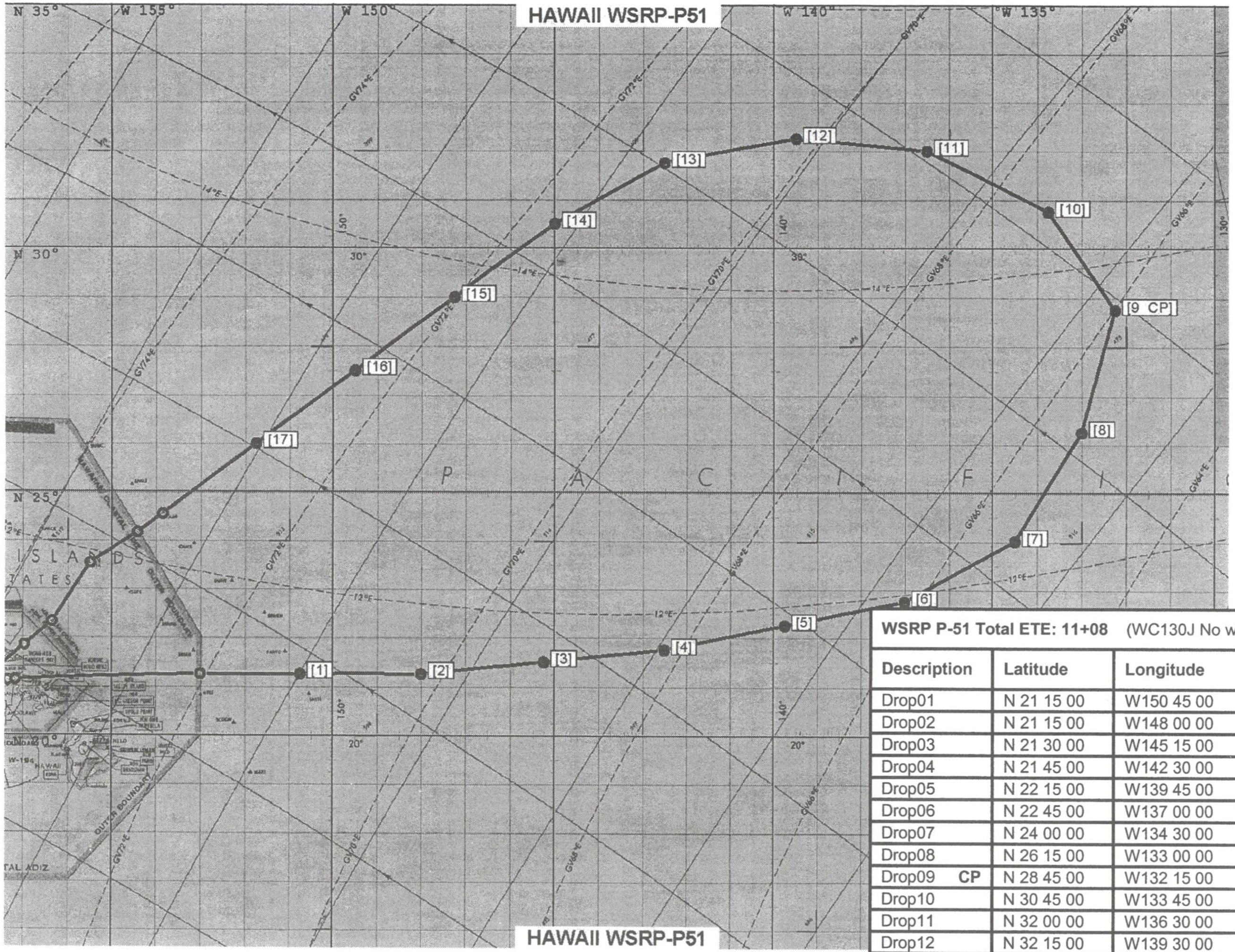
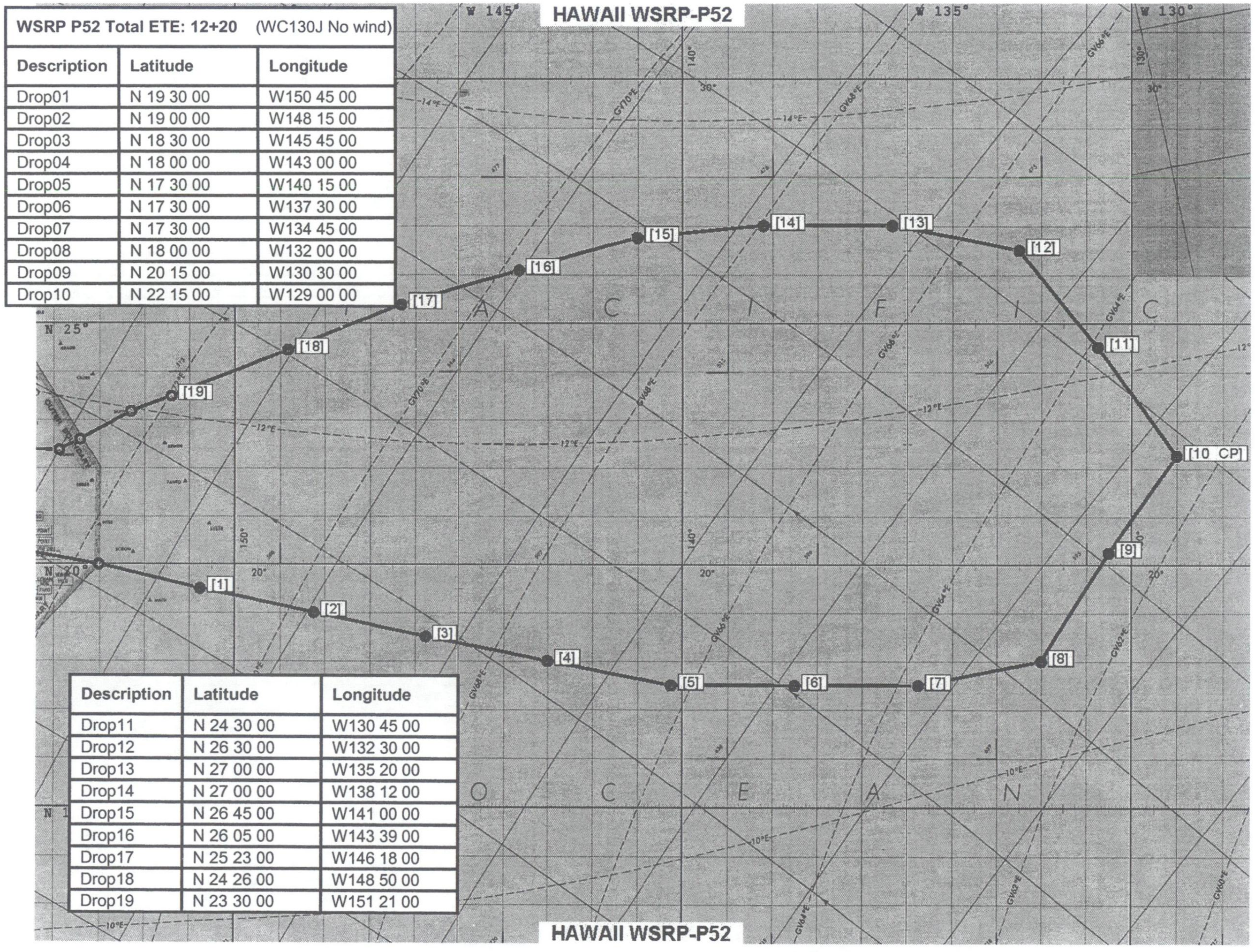


Figure H-21. Hawaiian Flight Track WSRP-51.

WSRP P-51 Total ETE: 11+08 (WC130J No wind)

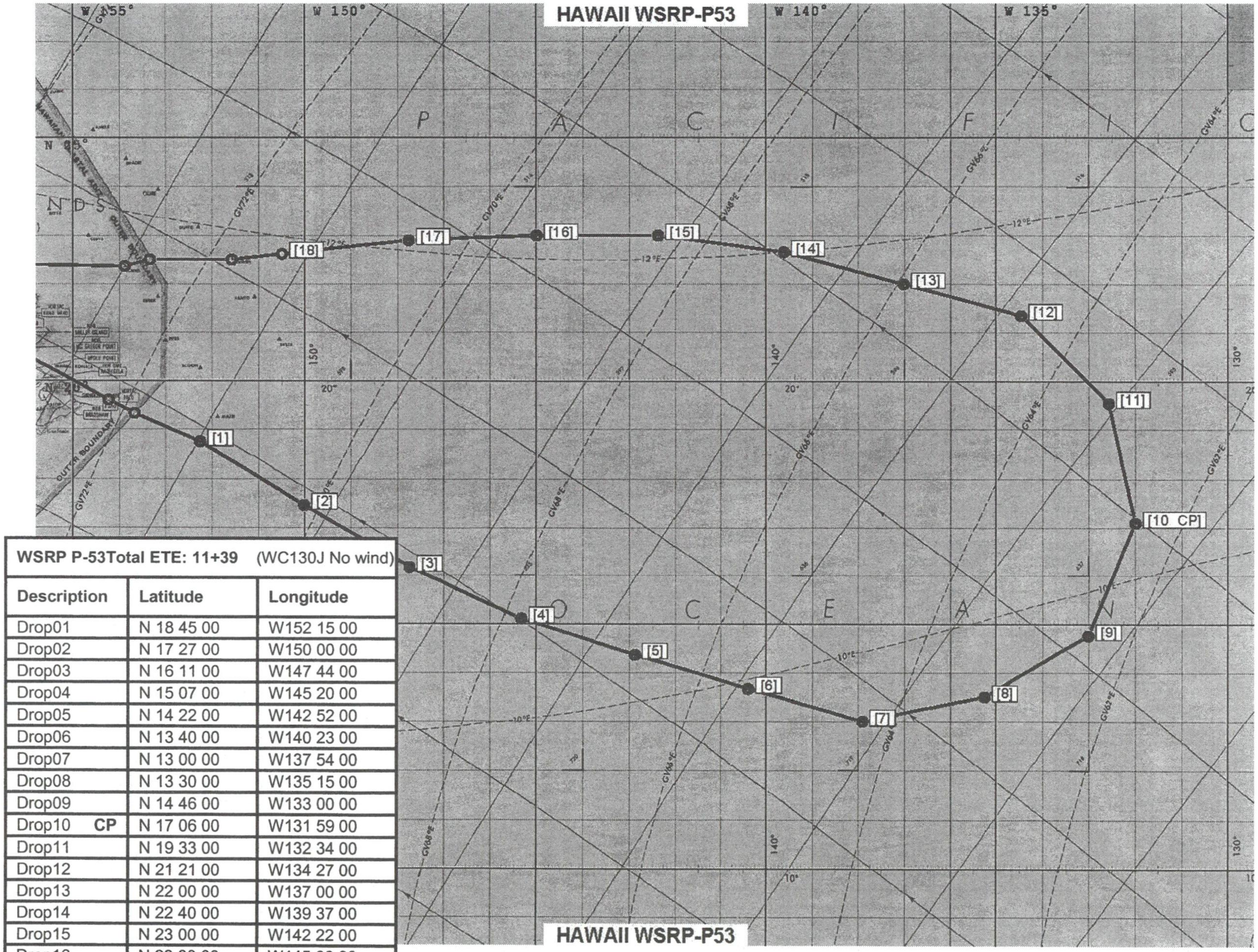
Description	Latitude	Longitude
Drop01	N 21 15 00	W150 45 00
Drop02	N 21 15 00	W148 00 00
Drop03	N 21 30 00	W145 15 00
Drop04	N 21 45 00	W142 30 00
Drop05	N 22 15 00	W139 45 00
Drop06	N 22 45 00	W137 00 00
Drop07	N 24 00 00	W134 30 00
Drop08	N 26 15 00	W133 00 00
Drop09 **CP**	N 28 45 00	W132 15 00
Drop10	N 30 45 00	W133 45 00
Drop11	N 32 00 00	W136 30 00
Drop12	N 32 15 00	W139 30 00
Drop13	N 31 45 00	W142 30 00
Drop14	N 30 30 00	W145 00 00
Drop15	N 29 00 00	W147 15 00
Drop16	N 27 30 00	W149 30 00
Drop17	N 26 00 00	W151 45 00



WSRP P52 Total ETE: 12+20 (WC130J No wind)		
Description	**Latitude**	**Longitude**
Drop01	N 19 30 00	W150 45 00
Drop02	N 19 00 00	W148 15 00
Drop03	N 18 30 00	W145 45 00
Drop04	N 18 00 00	W143 00 00
Drop05	N 17 30 00	W140 15 00
Drop06	N 17 30 00	W137 30 00
Drop07	N 17 30 00	W134 45 00
Drop08	N 18 00 00	W132 00 00
Drop09	N 20 15 00	W130 30 00
Drop10	N 22 15 00	W129 00 00

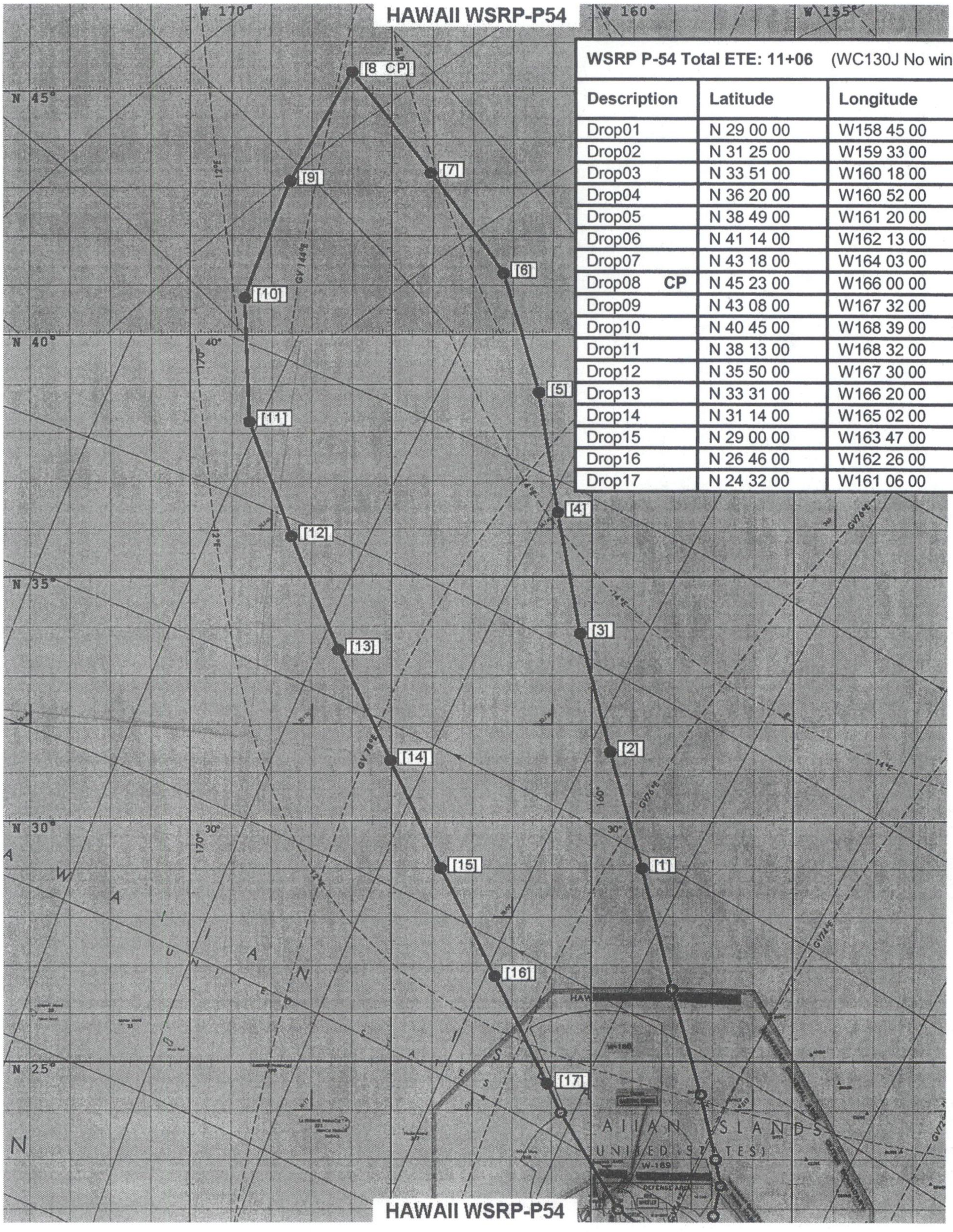
Description	Latitude	Longitude
Drop11	N 24 30 00	W130 45 00
Drop12	N 26 30 00	W132 30 00
Drop13	N 27 00 00	W135 20 00
Drop14	N 27 00 00	W138 12 00
Drop15	N 26 45 00	W141 00 00
Drop16	N 26 05 00	W143 39 00
Drop17	N 25 23 00	W146 18 00
Drop18	N 24 26 00	W148 50 00
Drop19	N 23 30 00	W151 21 00

Figure H-22. Hawaiian Flight Track WSRP-52.



WSRP P-53Total ETE: 11+39 (WC130J No wind)		
Description	**Latitude**	**Longitude**
Drop01	N 18 45 00	W152 15 00
Drop02	N 17 27 00	W150 00 00
Drop03	N 16 11 00	W147 44 00
Drop04	N 15 07 00	W145 20 00
Drop05	N 14 22 00	W142 52 00
Drop06	N 13 40 00	W140 23 00
Drop07	N 13 00 00	W137 54 00
Drop08	N 13 30 00	W135 15 00
Drop09	N 14 46 00	W133 00 00
Drop10 **CP**	N 17 06 00	W131 59 00
Drop11	N 19 33 00	W132 34 00
Drop12	N 21 21 00	W134 27 00
Drop13	N 22 00 00	W137 00 00
Drop14	N 22 40 00	W139 37 00
Drop15	N 23 00 00	W142 22 00
Drop16	N 23 00 00	W145 00 00
Drop17	N 22 54 00	W147 45 00
Drop18	N 22 40 00	W150 30 00

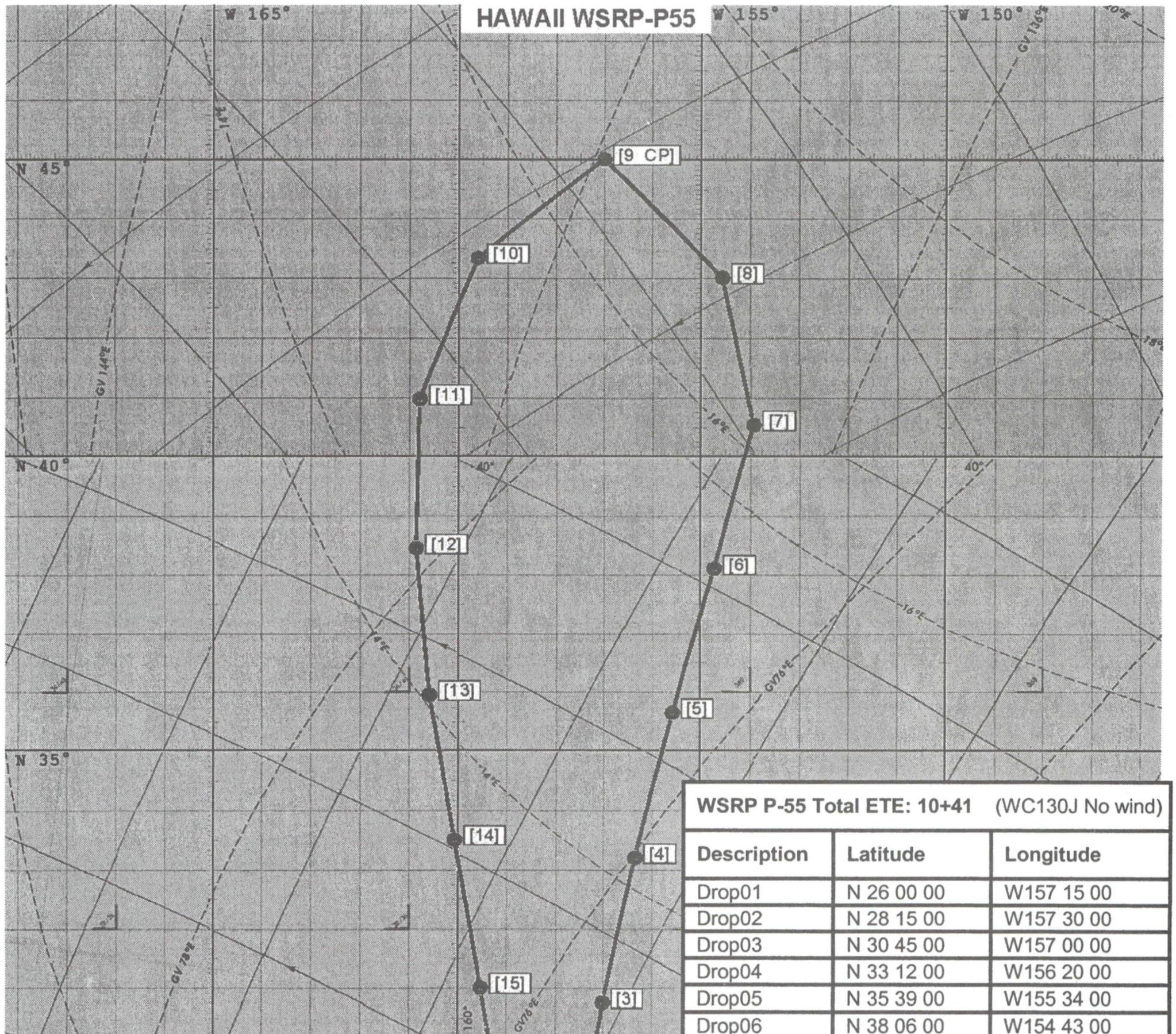
Figure H-23. Hawaiian Flight Track WSRP-53.



WSRP P-54 Total ETE: 11+06 (WC130J No wind)

Description	Latitude	Longitude
Drop01	N 29 00 00	W158 45 00
Drop02	N 31 25 00	W159 33 00
Drop03	N 33 51 00	W160 18 00
Drop04	N 36 20 00	W160 52 00
Drop05	N 38 49 00	W161 20 00
Drop06	N 41 14 00	W162 13 00
Drop07	N 43 18 00	W164 03 00
Drop08 **CP**	N 45 23 00	W166 00 00
Drop09	N 43 08 00	W167 32 00
Drop10	N 40 45 00	W168 39 00
Drop11	N 38 13 00	W168 32 00
Drop12	N 35 50 00	W167 30 00
Drop13	N 33 31 00	W166 20 00
Drop14	N 31 14 00	W165 02 00
Drop15	N 29 00 00	W163 47 00
Drop16	N 26 46 00	W162 26 00
Drop17	N 24 32 00	W161 06 00

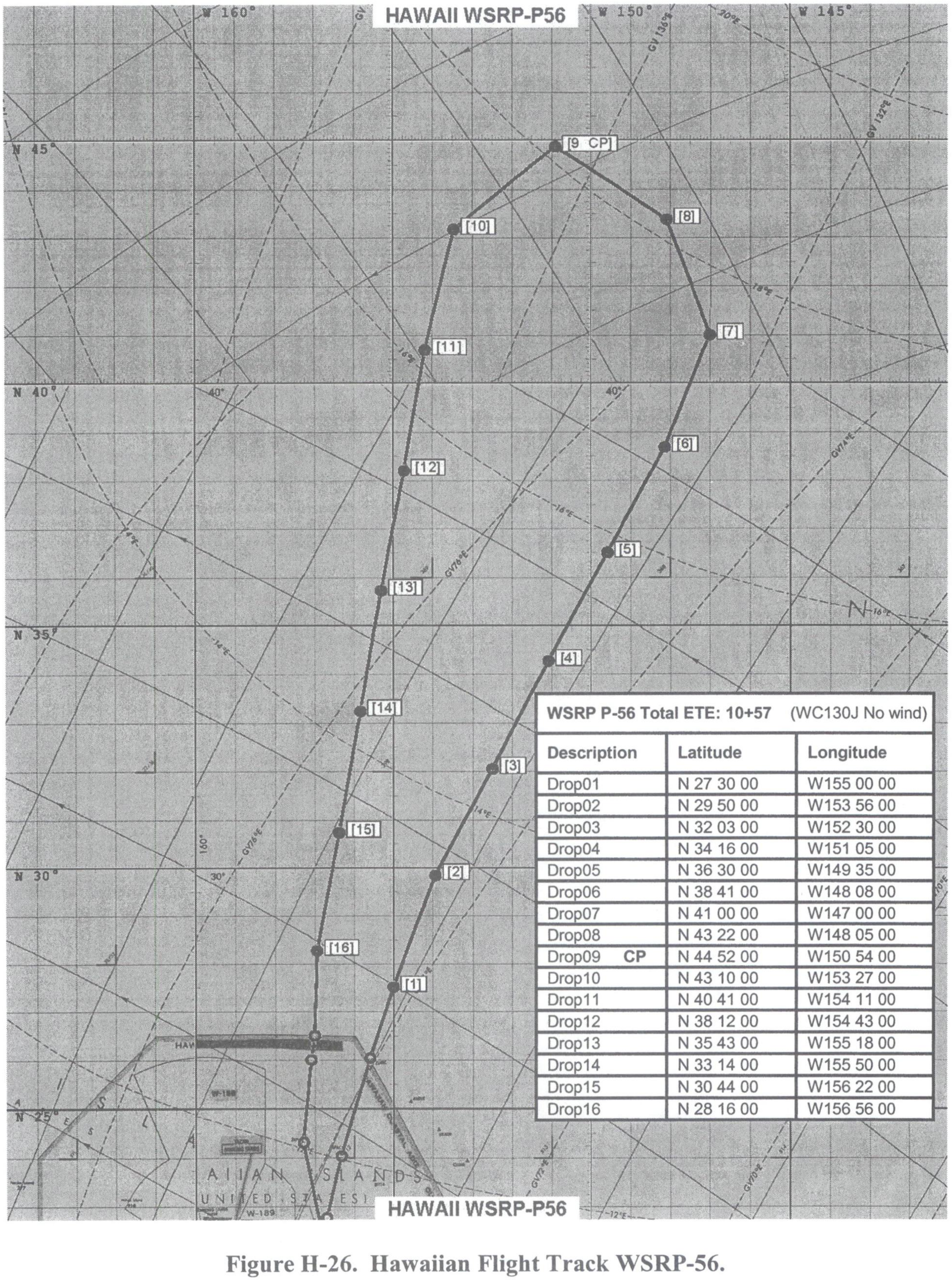
Figure H-24. Hawaiian Flight Track WSRP-54.



WSRP P-55 Total ETE: 10+41 (WC130J No wind)

Description		Latitude	Longitude
Drop01		N 26 00 00	W157 15 00
Drop02		N 28 15 00	W157 30 00
Drop03		N 30 45 00	W157 00 00
Drop04		N 33 12 00	W156 20 00
Drop05		N 35 39 00	W155 34 00
Drop06		N 38 06 00	W154 43 00
Drop07		N 40 32 00	W153 55 00
Drop08		N 43 00 00	W154 34 00
Drop09	**CP**	N 45 00 00	W157 00 00
Drop10		N 43 20 00	W159 36 00
Drop11		N 40 58 00	W160 47 00
Drop12		N 38 27 00	W160 51 00
Drop13		N 35 57 00	W160 35 00
Drop14		N 33 30 00	W160 04 00
Drop15		N 31 00 00	W159 32 00
Drop16		N 28 30 00	W159 00 00
Drop17		N 26 05 00	W158 15 00

Figure H-25. Hawaiian Flight Track WSRP-55.



WSRP P-56 Total ETE: 10+57 (WC130J No wind)

Description	Latitude	Longitude
Drop01	N 27 30 00	W155 00 00
Drop02	N 29 50 00	W153 56 00
Drop03	N 32 03 00	W152 30 00
Drop04	N 34 16 00	W151 05 00
Drop05	N 36 30 00	W149 35 00
Drop06	N 38 41 00	W148 08 00
Drop07	N 41 00 00	W147 00 00
Drop08	N 43 22 00	W148 05 00
Drop09 **CP**	N 44 52 00	W150 54 00
Drop10	N 43 10 00	W153 27 00
Drop11	N 40 41 00	W154 11 00
Drop12	N 38 12 00	W154 43 00
Drop13	N 35 43 00	W155 18 00
Drop14	N 33 14 00	W155 50 00
Drop15	N 30 44 00	W156 22 00
Drop16	N 28 16 00	W156 56 00

Figure H-26. Hawaiian Flight Track WSRP-56.

APPENDIX I

OFFICIAL INTERAGENCY AGREEMENTS

The following enclosure is the Memorandum of Agreement (MOA) between the Air Force Reserve Command (AFRC) and the National Oceanic and Atmospheric Administration (NOAA), October 12, 2000. The purpose of this agreement is to establish policies, principles, and procedures under which the AFRC and NOAA provide aircraft weather reconnaissance in support of the *National Hurricane Operations Plan* and the *National Winter Storms Operations Plan*.

MEMORANDUM OF AGREEMENT

BETWEEN

THE UNITED STATES AIR FORCE RESERVE COMMAND

AND

THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

PURPOSE: The National Oceanic and Atmospheric Administration (NOAA), an agency of the Department of Commerce, does not have the capability to fully support all operational requirements in support of tropical cyclone and winter storm aerial reconnaissance. This memorandum of agreement establishes policies, principles, and procedures under which the Air Force Reserve Command (AFRC) will provide aircraft weather reconnaissance support to NOAA. NOAA and AFRC enters into this agreement pursuant to its authority under 15 U.S.C. 313.

1. REFERENCES:

   a. *National Hurricane Operations Plan* (NHOP)

   b. *National Winter Storms Operations Plan* (NWSOP)

   c. Department of Defense Appropriations Act, 2000

2. BACKGROUND: The Air Force Reserve Command (AFRC) maintains 10 WC-130s to meet the Department of Commerce (DOC) aircraft reconnaissance requirements. AFRC will conduct up to five (5) sorties per day in support of NHOP requirements and up to two (2) sorties per day in support of NWSOP requirements. The Department of Defense (DOD), through AFRC, will bear all costs directly attributed to providing aircraft weather reconnaissance support. Support will be limited to the number of AFRC congressionally funded aircraft flying hours per year.

   a. Total flying hours used to support the weather reconnaissance mission are set annually in the DOD Appropriations Act. The 53rd Weather Reconnaissance Squadron (53 WRS) manages the flying hour program.

   b. The operational area for AFRC weather reconnaissance includes the Atlantic Ocean, Gulf of Mexico, the Caribbean Sea, and the North Pacific Ocean east of the international date line, as outlined in the NHOP and the NWSOP.

   c. The 53 WRS will be capable of operating from two (2) deployed locations, as well as from home station, simultaneously, supporting a maximum of five tropical cyclone

sorties per day or two winter storm sorties per day.

3. IMPLEMENTATION: Implementation details are contained in "GENERAL PROVISIONS."

4. GENERAL PROVISIONS:

   a. AFRC agrees:

      1) Within the limits of military capability, to meet NOAA's requirements for aerial weather reconnaissance in accordance with the NHOP and NWSOP.

      2) To provide at the Tropical Prediction Center/National Hurricane Center (TPC/NHC) the staff and equipment required to support the mission of the Chief, Aerial Reconnaissance Coordination, All Hurricanes (CARCAH). CARCAH provides 24-hour telecon/aircraft SATCOM operational interface between NOAA/TPC/NHC and AFRC/53WRS for NHOP and NWSOP taskings. CARCAH is a subunit of and reports directly to the 53WRS.

   b. NOAA agrees to promptly notify AFRC/53WRS of the requirements for tropical cyclone or winter storm mission taskings in accordance with the NHOP and the NWSOP. Tropical cyclone missions will be tasked by the Director, TPC/NHC. Winter storm missions will be tasked by the Director, National Centers for Environmental Prediction.

   c. AFRC recognizes the obligation to support winter storm operations and associated research projects as delineated by the DOD Appropriations Act and the NWSOP. Support to research projects will be contingent upon aircraft availability.

5. MOBILIZATION: In times of national emergency or war, some or all AFRC/53WRS reconnaissance resources may not be available to fulfill DOC/NOAA needs.

6. EFFECTIVE AND TERMINATION DATES: This memorandum will become effective on the date signed by the last approving official. The parties will review this memorandum of agreement at least once every three years to determine whether it should be revised, amended, or cancelled. Amendments or revisions to this agreement require the mutual consents of the parties.

7. COORDINATION:

The agency contacts for coordination of the activities under this MOU are:

AOC: CAPT Robert W. Maxson, NOAA, Aircraft Operations Center, DOC, MacDill AFB, Florida; phone: (813) 828-3310 ext. 3001; fax: (813) 828-3266 E-mail Bob.W.Maxson@NOAA.gov

Ms. Julie Robertson, (813) 828-3310 ext. 3010; fax: (813) 828-8923 E-mail Julie.A.Robertson@NOAA.gov

AFRC:

HQ AFRC/DOOX
DSN 497-1161; Commercial (228)327-1161

403 WG/XPL
SSgt Clarence Hester Jr., Logistics Plans Manager
Keesler AFB, MS
DSN 597-3521; Commercial (228) 377-3521
Fax DSN 597-4624; Commercial (228) 377-3521
Email: Clarence.Hester@keesler.af.mil

53 WRS
Lt Col Dennis L. Price, Director of Operation
817 H Street, Keesler AFB, MS 39534
DSN 597-8510; Commercial (228) 377-8510
Fax DSN 597-1923; Commercial (228) 337-1923
Email: Dennis.Price@keesler.af.mil

8. RESOLUTION OF DISAGREEMENTS

Nothing herein is intended to conflict with current DOC or the NOAA Aircraft Operations Center directives. If the terms of this agreement are inconsistent with existing directives of either of the agencies entering into this agreement, then those portions of this agreement which are determined to be inconsistent shall be invalid, but the remaining terms and conditions not affected by the inconsistency shall remain in full force and effect. At the first opportunity for review of the agreement, all necessary changes will be accomplished either by an amendment to this agreement or by entering into a new agreement, whichever is deemed expedient to the interest of both parties.

Should disagreement arise on the interpretation of the provisions of this agreement, or amendments and/or revisions thereto, that cannot be resolved at the operating level, the area(s) of disagreement shall be stated in writing by each party and presented to the other party for consideration. If agreement on interpretation is not reached within thirty (30) days, the parties shall forward the written presentation of the disagreement to respective higher officials for appropriate resolution.

FOR THE UNITED STATES
AIR FORCE RESERVE COMMAND

Date: 10 Oct 2000

FOR THE NATIONAL OCEANIC AND
ATMOSPHERIC ADMINISTRATION

RW Maxson Capt NOAA

Date: 10/12/2000

APPENDIX J

RECCO FORM, CODE TABLES AND REGULATIONS

DATE	ORGANIZATION	MISSION IDENTIFIER

OBSERVATION NUMBER																		
9	RECCO INDICATOR SPECIFYING TYPE OF OBSERVATION *Table 1*	Q	TIME OF OBSERVATION *(Hours and Minutes)* *(GMT)*	Y	DAY OF WEEK *SUN-1*	L_o	LONGITUDE DEGREES AND TENTHS *(Note 4)*	h_a	PRESSURE ALTITUDE OF AIRCRAFT REPORTED TO THE NEAREST DECAMETER	d	WIND DIRECTION AT FLIGHT LEVEL *(Tens of deg. true.)*	T	TEMPERATURE WHOLE °C *(Note 6)*	/	INDICATOR
X		Q		Q	OCTANT *Table 3*	L_o		h_a		d		T		J	INDEX TO HHH *Table 9*
X		g		L_a	LATITUDE DEGREES AND TENTHS	L_o		h_a		f	WIND SPEED AT FLIGHT LEVEL *(Knots)*	T_d	DEW POINT WHOLE °C *(Note 6)*	H	GEOPOTENTIAL HEIGHT/ D-VALUE OR SLP PER INDEX j *(Note 8)*
X		g		L_a		B	TURBULENCE *Table 4*	d_t	TYPE OF WIND *Table 6*	f		T_d		H	
9		I_d	DEW POINT INDICATOR *Table 2*	L_a		f_c	FLIGHT COND *Table 3 (Note 5)*	d_a	METHOD OF OBTAINING WIND *Table 7*	f		w	PRESENT WEATHER *(Note 7 Table 8)*	H	
1		2		3		4		5		6		7		8	

REMARKS

TYPE AIRCRAFT	CALL SIGN	METEOROLOGIST

1	INDICATOR	C	CLOUD TYPE *Table 11*	C	CLOUD TYPE *Table 11*	C	CLOUD TYPE *Table 11*	1	INDICATOR	C	CLOUD TYPE *Table 11*	C	CLOUD TYPE *Table 11*	C	CLOUD TYPE *Table 11*
k_n	NR OF CLOUD LAYERS *(Note 9)*	h_s	ALTITUDE OF BASE *Table 12*	h_s	ALTITUDE OF BASE *Table 12*	h_s	ALTITUDE OF BASE *Table 12*	K_n	NR OF CLOUD LAYERS *(Note 9)*	h_s	ALTITUDE OF BASE *Table 12*	h_s	ALTITUDE OF BASE *Table 12*	h_s	ALTITUDE OF BASE *Table 12*
N_s	AMOUNT OF CLOUDS *(Note 9)* *Table 10*	h_s		h_s		h_s		N_s	AMOUNT OF CLOUDS *(Note 9)* *Table 10*	h_s		h_s		h_s	
N_s		H_t	ALTITUDE OF TOP *Table 12*	H_t	ALTITUDE OF TOP *Table 12*	H_t	ALTITUDE OF TOP *Table 12*	N_s		H_t	ALTITUDE OF TOP *Table 12*	H_t	ALTITUDE OF TOP *Table 12*	H_t	ALTITUDE OF TOP *Table 12*
N_s		H_t		H_t		H_t		N_s		H_t		H_t		H_t	
9		10		11		12		13		14		15		16	

REMARKS

RECCO RECORDING WORKSHEET

4	INDICATOR	6	INDICATOR *(Note 11)*	6	INDICATOR *(Note 11)*	7	INDICATOR	7	INDICATOR	8	INDICATOR	8	INDICATOR	9	INDICATOR	REMARKS
d	DIRECTION OF SFC WIND *(Tens of deg. true)*	W_s	SIGNIFICANT WEATHER CHANGES *Table 14*	W_s	SIGNIFICANT WEATHER CHANGES *Table 14*	I_r	RATE OF ICING *Table17*	h_l	ALT OF BASE OF ICING STRATUM (Note 12) *Table 12*	d_r	BEARING OF ECHO CENTER *(Tens of Deg. True)*	E_w	ECHO WIDTH OR DIAMETER *Table 19*	V_l	INFLIGHT VISIBILITY *Table 23*	
d		S_s	DISTANCE OF OCCURENCE OF Ws *Table 15*	S_s	DISTANCE OF OCCURENCE OF Ws *Table 15*	I_t	TYPE OF ICING *Table18*	h_l		d_r		E_l	LENGTH OF MAJ AXIS *Table 19*	T_w	SEA SURFACE TEMPERATURE DEGREES AND TENTHS	
f	SURFACE WIND SPEED *(knots)* *(Note 10)*	d_w	BEARING OF W_d *Table 13*	d_w	BEARING OF W_d *Table 13*	S_b	DISTANCE TO BEGINNING OF ICING *Table15*	H_l	ALTITUDE OF TOP OF ICING STRATUM *(Note 12) Table 12*	S_r	DISTANCE TO ECHO CENTER *Table 19*	c_e	CHARACTER OF ECHO *Table 21*	T_w		
f		d_w		d_w		S_e	DISTANCE TO ENDING OF ICING *Table15*	H_l		O_e	ORIENTATION OF ELLIPSE *Table 20*	I_e	INTENSITY OF ECHO *Table 22*	T_w		
17		18		19		20		21		22		23		24		

REMARKS

Figure J-1. Reconnaissance code recording form.

Table J-1. Reconnaissance code tables.

TABLE 1 XXX

222 Sec One Observation without radar capability
555 Sec Three (intermediate) observation with or without radar capability
777 Sec One Observation with radar capability

TABLE 2 i_d

0 No dew point capability/acft below 10,000 meters
1 No dew point capability/acft at or above 10,000 meters
2 No dew point capability/acft below 10,000 meters and flight lvl tem -50°C or colder
3 No dew point capability/acft at or above 10,000 meters and flight lvl temp -50°C or colder
4 Dew point capability/acft below 10,000 meters
5 Dew point capability/acft at or above 10,000 meters
6 Dew point capability/acft below 10,000 meters and flight lvl temp -50°C or colder
7 Dew point capability/acft at or above 10,000 meters and flight lvl temp -50°C or colder

TABLE 3 Q

0	0° -90° W	Northern
1	90° W - 180°	Northern
2	180° - 90° E	Northern
3	90° - 0° E	Northern
4	Not Used	
5	0° - 90° W	Southern
6	90° W - 180°	Southern
7	180° - 90° E	Southern
8	90° - 0° E	Southern

TABLE 4 B

0 None
1 Light turbulence
2 Moderate turbulence in clear air, infrequent
3 Moderate turbulence in clear air, frequent
4 Moderate turbulence in cloud, infrequent
5 Moderate turbulence in cloud, frequent
6 Severe Turbulence in clear air, infrequent
7 Severe Turbulence in clear air, frequent
8 Severe Turbulence in cloud, infrequent
9 Severe Turbulence in cloud, frequent

TABLE 5 f_c

0 In the clear
8 In and out of clouds
9 In clouds all the time (continuous IMC)
/ Impossible to determine due to darkness or other cause

TABLE 6 d_t

0 Spot of Wind
1 Average wind
/ No wind reported

TABLE 7 d_a

0 Winds obtained using doppler radar or inertial systems
1 Winds obtained using other navigation equipment and/or techniques
/ Navigator unable to determine or wind not compatible

TABLE 8 w

0 Clear
1 Scattered (trace to 4/8 cloud coverage)
2 Broken (5/8 to 7/8 cloud coverage)
3 Overcast/undercast
4 Fog, thick dust or haze
5 Drizzle
6 Rain (continuous or intermittent precip - from stratiform clouds)
7 Snow or rain and snow mixed
8 Shower(s) (continuous or intermittent precip - from cumuliform clouds)
9 Thunderstorm(s)
/ Unknown for any cause, including darkness

TABLE 9 j

0 Sea level pressure in whole millibars (thousands fig if any omitted)
1 Altitude 200 mb surface in geopotential decameters (thousands fig if any omitted)
2 Altitude 850 mb surface in geopotential meters (thousands fig omitted)
3 Altitude 700 mb surface in geopotential meters (thousands fig omitted)
4 Altitude 500 mb surface in geopotential decameters
5 Altitude 400 mb surface in geopotential decameters
6 Altitude 300 mb surface in geopotential decameters
7 Altitude 250 mb surface in geopotential decameters (thousands fig if any omitted)
8 D - Value in geopotential decameters; if negative 500 is added to HHH
9 Altitude 925 mb surface in geopotential meters
/ No absolute altitude available or geopotential data not within ± 30 meters/4 mb accuracy requirements

TABLE 10 N_s

0 No additional cloud layers (place holder)
1 1 okta or less, but not zero (1/8 or less sky covered)
2 2 oktas (or 2/8 of sky covered)
3 3 oktas (or 3/8 of sky covered)
4 4 oktas (or 4/8 of sky covered)
5 5 oktas (or 5/8 of sky covered)
6 6 oktas (or 6/8 of sky covered)
7 7 oktas or more but not 8 oktas
8 8 oktas or sky completely covered
9 Sky obscured (place holder)

TABLE 11 C

0 Cirrus (Ci)
1 Cirrocumulus (Cc)
2 Cirrostratus (Cs)
3 Altocumulus (Ac)
4 Altostratus (As)
5 Nimbostratus (Ns)
6 Stratocumulus (Sc)
7 Stratus (St)
8 Cumulus (Cu)
9 Cumulonimbus (Cb)
/ Cloud type unknown due to darkness or other analogous phenomena

TABLE 12 $h_sh_sH_tH_th_ih_iH_iH_i$

00 Less than 100
01 100 ft
02 200 ft
03 300 ft
etc, etc
49 4,900 ft
50 5,000 ft
51-55 Not used
56 6,000 ft
57 7,000 ft
etc, etc
79 29,000 ft
80 30,000 ft
81 35,000 ft
82 40,000 ft
etc, etc
89 Greater than 70,000 ft
// Unknown

TABLE 13 d_w

0	No report	5	SW
1	NE	6	W
2	E	7	NW
3	SE	8	N
4	S	9	all directions

TABLE 14 W_s

0 No change
1 Marked wind shift
2 Beginning or ending or marked turbulence
3 Marked temperature change (not with altitude)
4 Precipitation begins or ends
5 Change in cloud forms
6 Fog or ice fog bank begins or ends
7 Warm front
8 Cold Front
9 Front, type not specified

TABLE 15 $S_bS_eS_s$

0 No report
1 Previous position
2 Present position
3 30 nautical miles
4 60 nautical miles
5 90 nautical miles
6 120 nautical miles
7 150 nautical miles
8 180 nautical miles
9 More than 180 nautical miles
/ Unknown (not used for S_s)

Table J-1. Reconnaissance code tables (continued)

TABLE 16 w_d

0 No report
1 Signs of a tropical cyclone
2 Ugly threatening sky
3 Duststorm or sandstorm
4 Fog or ice fog
5 Waterspout
6 Cirrostratus shield or bank
7 Altostratus or altocumulus shield or bank
8 Line of heavy cumulus
9 Cumulonimbus heads or thunderstorms

TABLE 17 I_r

7 Light
8 Moderate
9 Severe
/ Unknown or contrails

TABLE 18 I_t

0 None
1 Rime ice in clouds
2 Clear ice in clouds
3 Combination rime and clear ice in clouds
4 Rime ice in precipitation
5 Clear ice in precipitation
6 Combination rime and clear ice in precip
7 Frost (icing in clear air)
8 Nonpersistent contrails (less than 1/4 nautical miles long)
9 Persistent contrails

TABLE 19 S_r, E_w, E_l

0 0NM	5 50NM
1 10NM	6 60-80NM
2 20NM	7 80-100NM
3 30NM	8 100-150NM
4 40NM	9 Greater than 150NM
	/ Unknown

TABLE 20 O_e

0 Circular
1 NNE - SSW
2 NE - SW
3 ENE - WSW
4 E - W
5 ESE - WNW
6 SE - NW
7 SSE - NNW
8 S - N
/ Unknown

TABLE 21 c_e

1 Scattered Area
2 Solid Area
3 Scattered Line
4 Solid Line
5 Scattered, all quadrants
6 Solid, all quadrants
/ Unknown

TABLE 22 i_e

2 Weak
5 Moderate
8 Strong
/ Unknown

TABLE 23 V_i

1 Inflight visibility 0 to and including 1 nautical mile
2 Inflight visibility greater than 1 and not exceeding 3 nautical miles
3 Inflight visibility greater than 3 nautical miles

RECCO SYMBOLIC FORM

SECTION ONE (MANDATORY)

9XXX9 GGggi$_d$ YQL$_a$L$_a$L$_a$ L$_o$L$_o$L$_o$Bf$_c$ h$_a$h$_a$h$_a$d$_t$d$_a$

ddfff TTT$_d$T$_d$w /jHHH

SECTION TWO (ADDITIONAL)

1k$_n$N$_s$N$_s$N$_s$ Ch$_s$h$_s$H$_t$H$_t$ 4ddff

6W$_s$S$_s$W$_d$d$_w$ 7I$_r$I$_t$S$_b$S$_e$ 7h$_i$h$_i$H$_i$H$_i$ 8d$_r$d$_r$S$_r$O$_e$

8E$_w$E$_l$c$_e$i$_e$ 9V$_i$T$_w$T$_w$T$_w$

SECTION THREE (INTERMEDIATE)

9XXX9 GGggi$_d$ YQL$_a$L$_a$L$_a$ L$_o$L$_o$L$_o$Bf$_c$ h$_a$h$_a$h$_a$d$_t$d$_a$

ddfff TTT$_d$T$_d$w /jHHH

Table J-2. Reconnaissance code regulations.

1. At the time of the observation the aircraft observing platform is considered to be located on the axis of a right vertical cylinder with a radius of 30 nautical miles bounded by the earth's surface and the top atmosphere. Present weather, cloud amount and type, turbulence, and other subjective elements are reported as occurring within the cylinder. Flight level winds, temperature, dew point, and geopotential values are sensed or computed and reported as occurring at the center of the observation circle. Radar echoes, significant weather changes, distant weather, and icing are phenomena that may also be observed/reported. Code groups identifying these phenomena may be reported as necessary to adequately describe met conditions observed.

2. The intermediate observation (Section Three) is reported following Section One (or Section Two if appended to Section One) in the order that it was taken.

3. Plain language remarks may be added as appropriate. These remarks follow the last encoded portion of the horizontal or vertical observation and will clearly convey the intended message. Vertical observations will not include meteorological remarks. These remarks must begin with a letter or word-e.g. "FL TEMP" vice "700 MB FL TEMP." The last report plain language remarks are mandatory, i.e., "LAST REPORT. OBS 01 thru 08 to KNHC, OBS 09 and 10 to KBIX."

4. The hundreds digit of longitude is omitted for longitudes from 100° to 180°.

5. Describe conditions along the route of flight actually experienced at flight level by aircraft.

6. TT, T_dT_d. When encoding negative temperatures, 50 is added to the absolute value of the temperature with the hundreds figure, if any, being omitted. A temperature of -52°C is encoded as 02, the distinction between -52°C and 2°C being made from i_d. Missing or unknown temperatures are reported as //. When the dew point is colder than -49.4°C, Code T_dT_d as // and report the actual value as a plain language remark - e.g. "DEW POINT NEG 52°C".

7. When two or more types of w co-exist, the type with the higher code figure will be reported. Code Figure 1, 2 and 3 are reported based on the total cloud amount through a given altitude, above or below the aircraft, and when other figures are inappropriate. The summation principle applies only when two or more cloud types share a given altitude.

8. When j is reported as a /, HHH is encoded as ///.

9. If the number of cloud layers reported exceeds 3, k_n in the first 1-group reports the total number of cloud layers. The second 1-group reports the additional number of layers being reported exclusive of those previously reported. In those cases where a cloud layer(s) is discernible, but a descriptive cloud picture of the observation circle is not possible, use appropriate remarks such as "Clouds Blo" or "As Blo" to indicate the presence of clouds. In such cases, coded entries are not made for group 9. The sequence in which cloud amounts are encoded depends upon type of cloud, cloud base, and vertical extent of the cloud. The cloud with the largest numerical value of cloud type code (C) is reported first, regardless of coverage, base, or vertical extent. Among clouds of the same cloud type code, sharing a common base, the cloud of greatest vertical extent is reported first. The summation principle is not used; each layer is treated as though no other clouds were present. The total amount of clouds through one altitude shared by several clouds will not exceed 8 oktas. Only use code figure 0 as a place holder when you can determine that no additional cloud layers exist. In case of undercast, overcast, etc., use code figure 9 as a placeholder.

10. Due to limitations in the ability to distinguish sea state features representative of wind speeds above 130 knots, surface wind speeds in excess of 130 knots will not be encoded. Wind speeds of 100 to 130 knots inclusive will be encoded by deleting the hundreds figure and adding 50 to dd. For wind speeds above 130 knots, dd is reported without adding 50 and ff is encoded as // with a plain language remark added, i.e., "SFC WIND ABOVE 130 KNOTS."

11. Significant weather changes which have occurred since the last observation along the track are reported for W_s.

12. When aircraft encounters icing in level flight, the height at which the icing occurred will be reported for h_i h_i. The H_iH_i will be reported as //.

APPENDIX K

TEMP DROP CODE

EXTRACT FROM: WMO-No. 306 MANUAL ON CODES
FM 37-IX Ext. TEMP DROP - Upper-level pressure, temperature, humidity and wind report from a sonde released by carrier balloons or aircraft. Figure E-1 is an example TEMP DROP message.

CODE FORM:

PART A

SECTION 1 $M_iM_iM_jM_j$ $YYGGI_d$ $99L_aL_aL_a$ $Q_cL_oL_oL_oL_o$ $MMMU_{La}U_{Lo}$

SECTION 2 $99P_oP_oP_o$ $T_oT_oT_{ao}D_oD_o$ $d_od_of_of_of_o$

$P_1P_1h_1h_1h_1$ $T_1T_1T_{a1}D_1D_1$ $d_1d_1f_1f_1f_1$

$P_nP_nh_nh_nh_n$ $T_nT_nT_{an}D_nD_n$ $d_nd_nf_nf_nf_n$

SECTION 3 $88P_tP_tP_t$ $T_tT_tT_{at}D_tD_t$ $d_td_tf_tf_tf_t$
or
88999

SECTION 4 $77P_mP_mP_m$ $d_md_mf_mf_mf_m$ $(4v_bv_bv_av_a)$
or
$66P_mP_mP_m$ $d_md_mf_mf_mf_m$ $(4v_bv_bv_av_a)$
or
77999

SECTION 9 51515 (through 59595) Code groups to be developed regionally.

SECTION 10 61616 (through 69696) Code groups to be developed nationally.

PART A
SECTION 1 - IDENTIFICATION AND POSITION

M_iM_i Identification letters of the report = XX

M_jM_j Identification letters of the part of the report = AA

YY Day of the month (GMT). When wind data are included 50 is added to YY.

GG Actual time of the observation, to the nearest whole hour (GMT).

I_d Highest mandatory level for which wind is available. 7=700 mb, 5=500 mb, etc. If flight level is above a standard surface, for example 495, report a 5 for 500 mb in the I_d group.

Note the following clarification was approved at the 52d IHC: I_d will specify in hundreds of mb (Part A) or tens of mb (Part C) the highest mandatory isobaric level for which the wind is reported. For example, in Part A, I_d = 7 indicates 700 mb, but in Part C, I_d = 7 indicates 70 mb. I_d = 0 refers to the 1000 mb level. The surface wind group should always be present.
(1) The wind group shall be omitted at all levels above the level specified by I_d, except as noted in (3) and (4) below.

(2) The wind group shall be present at all levels at and below the level specified by I_d. At levels below that specified by I_d for which the wind is missing, encode the wind group as "/////."

(3) When the highest mandatory level for which the wind is reported is 250 mb, encode I_d as 2. If other information is available above 250 mb, encode the 200 mb wind group as "/////."

(4) When the highest mandatory level for which the wind is reported is 150 mb, encode I_d as 1. If other information is available above 150 mb, encode the 100 mb wind group as "/////."

(5) When no winds are reported for any level, encode I_d as "/," encode the surface wind group as "/////," and omit all wind groups above the surface.

99 Indicator for data on position follow.

$L_aL_aL_a$ Latitude, in tenths of a degree.

Q_c Quadrant of the globe. The earth is divided by the Greenwich meridian and the equator into quadrants. The code figure reported depends on the latitude and longitude of the observation position.

$L_oL_oL_oL_o$ Longitude, in tenths of a degree.

MMM Marsden square. The number of the marsden square for aircraft position at the time of the observation is reported for MMM. Always report three digits for MMM, with zeros reported for the hundreds and tens digits when required. When an observation is within a depicted 10 degree square, report the number of that square. When on an even 10 degree latitude or longitude circle, the marsden square for MMM is obtained by moving in the direction of larger latitude and/or longitude. EXAMPLE: Assuming a position of 18.1N, 131.4W, MMM is 050; assuming a position of 30.0N, 140.0E, MMM is 130. At the equator or on the prime meridian, report the marsden square compatible with the Q_c reported.

U_{La} Units digit in the reported latitude.

U_{Lo} Units digit in the reported longitude.

SECTION 2 - SURFACE AND STANDARD ISOBARIC SURFACES

99 Indicator for data for the surface level follow.

$P_oP_oP_o$ Pressure of specified levels in whole millibars, thousands digits omitted. ($P_oP_oP_o$ is always surface level.)

P_1P_1 Pressure of standard isobaric surfaces in units of tens of millibars. (1000mbs=00,
P_nP_n 925mbs=92, 850mbs=85, 700mbs=70, etc.)

$h_1h_1h_1$ Height of the standard pressure level in geopotential meters or decameters above the surface. Encoded in meters up to but not including 500mbs. Encoded in decameters at and
$h_nh_nh_n$ above 500mbs omitting, if necessary, the thousands or tens of thousands digits. Add 500to hhh for negative 1000mb heights. Report 1000mb groups as 00/// ///// when surface pressure is less than 950mbs.

T_oT_o Tens and units digit of air temperature (not rounded off) in degrees Celsius, at specified
T_1T_1 levels beginning with surface.
T_nT_n

T_{ao} Approximate tenths value and sign (plus or minus) of the air temperature.
T_{al} Even = plus; Odd = minus.
T_{an}

D_oD_o Dewpoint depression (with respect to water) at standard isobaric surfaces beginning with surface level. When the depression is 4.9C or less encode the units and tenths digits of the depression. Encode depressions of 5.0C through 5.4C as 50. Encode depressions of 5.5C through 5.9C as 56. Dewpoint depressions of 6.0C and above are encoded in tens and units with 50 added. Dewpoint depressions for relative humidities less than 20% are encoded as 80. When air temperature is below -40C report D_nD_n as two solidi.

D_1D_1

D_nD_n

d_od_o True direction from which wind is blowing rounded to nearest 5 degrees. Report hundreds and tens digits. The unit digit (0 or 5) is added to the hundreds digit of wind speed.

d_1d_1

d_nd_n

$f_of_of_o$ Wind speed in knots. Hundreds digit is sum of hundreds digit of speed and unit digit of direction, i.e. 29$\underline{5}^{o}$ at $\underline{1}$25 kts encoded as 29$\underline{6}$25. (Notes 1&2)

$f_1f_1f_1$

$f_nf_nf_n$

NOTE: 1. When flight level is just above a standard surface and in the operator's best meteorological judgement, the winds are representative of the winds at the standard surface, then the operator may encode the standard surface winds using the data from flight level. If the winds are not representative, then encode /////.

2. The wind group relating to the surface level ($d_od_of_of_of_o$) will be included in the report; when the corresponding wind data are not available, the group will be encoded/////.

SECTION 3 - DATA FOR TROPOPAUSE LEVELS

88 Indicator for data for tropopause level(s) follow.

$P_tP_tP_t$ Pressure at the tropopause level reported in whole millibars.

T_tT_t Air temperature in whole degrees Celsius, at the tropopause level.

T_{at} Approximate tenths value and sign (plus or minus) of the air temperature at the tropopause level.

D_tD_t Dew point depression at the tropopause level.

d_td_t True direction at the tropopause level rounded to nearest 5 degrees. Report hundreds and tens digits. The unit digit (0 or 5) is added to the hundreds digit of wind speed.

$f_tf_tf_t$ Wind speed in knots. Hundreds digit is sum of hundreds digit of speed and unit digit of direction, i.e. 29$\underline{5}^{o}$ at $\underline{1}$25 kts encoded as 29$\underline{6}$25.

88999 Indicator that tropopause data have not been observed.

SECTION 4 - MAXIMUM WIND DATA

66 Indicator that data for maximum wind level and for vertical wind shear follow when max wind occurs at flight level.

77 Indicator that data for maximum wind level and for vertical wind shear follow when max wind level does not coincide with flight level.

$P_mP_mP_m$ Pressure at maximum wind level in whole millibars.

d_md_m True direction from which wind is blowing at the maximum wind level rounded to nearest 5 degrees. Report hundreds and tens digits. The unit digit (0 or 5) is added to the hundreds digit of wind speed.

$f_mf_mf_m$ Wind speed in knots. Hundreds digit is sum of hundreds digit of speed and unit digit of direction, i.e. 29$\underline{5}^{o}$ at $\underline{1}$25 kts encoded as 29$\underline{6}$25.

4 Data for vertical wind sheer follow.

v_bv_b Absolute value of vector difference between max wind and the wind 3000 feet BELOW the level of maximum wind, reported to the nearest knot. Use "//" if missing and 4 group is reported. A vector difference of 99 knots or more is reported with the code figure "99".

v_av_a Absolute value of vector difference between max wind and the wind 3000 feet ABOVE the level of maximum wind, reported to the nearest knot. Use"//" if missing and 4 group is reported. A vector difference of 99 knots or more is reported with the code figure "99".

77999 Indicator that maximum wind data have not been observed.

SECTION 10 - NATIONAL PRACTICES

61616 Mission identifier followed by the observation number (e.g., AF968 WSWSC TRACK 51 OB 23)

- Agency/Aircraft Identifier (first group): For the U.S. Air Force, use AF plus the last three digits of the aircraft's tail number; for NOAA, use NOAA plus the last digit of the aircraft registration number.

- Mission Indicator (type of mission being flown) (second group): For a training mission, the mission indicator is WXWXX; for an operational mission, the indicator is WSWSX. The fifth letter "X" is used to distinguish where the mission is being flown. The "A" indicates that the flight is in the Atlantic basin. The letter "C" indicates the Central Pacific area, and the letter "E" indicates the Eastern Pacific.

- Third group will be TRAIN (for a training mission) or the flight track tasked (TRACK XX).

- The fourth group is the observation number (both vertical and horizontal) as transmitted from the aircraft (OB XX).

62626 National practice group indicator preceding a free form character string containing specific sonde or mission-related remarks. Remarks include:

- SPL XXXXNXXXXXW - Impact location of the sonde based on its last GPS position.
- MBL WND dddff - The mean wind in the lowest 500 meters of the sounding.
- LAST WND XXX - Height of the last reported wind. If a surface wind is reported, the Last Wind remark is omitted. XXX will never be less than 13 meters.
- AEV XXXXX - This is the software version being used for the sounding.
- DLM WND ddfff bbbttt - the average wind over the depth of the sounding. Where ddfff is the wind averaged from the first to the last available wind (these would correspond to the first and last significant levels for wind); ttt is the pressure at the top of the layer, and bbb is the pressure at the bottom of the layer (in whole mbs, with thousands digit omitted).
- WL150 ddfff zzz - Average wind over the lowest available 150 m of the wind sounding. Where ddfff is the mean wind over the 150 m layer centered at zzz m.

CODE FORM:

PART B

SECTION 1 $M_iM_iM_jM_j$ YYGG/ $99L_aL_aL_a$ $Q_cL_oL_oL_o$ $MMMU_{La}U_{Lo}$

SECTION 5 $n_on_oP_oP_oP_o$ $T_oT_oT_{ao}D_oD_o$

$n_1n_1P_1P_1P_1$ $T_1T_1T_{a1}D_1D_1$

$n_nn_nP_nP_nP_n$ $T_nT_nT_{an}D_nD_n$

SECTION 6 21212 $n_on_oP_oP_oP_o$ $d_od_of_of_of_o$

$n_1n_1P_1P_1P_1$ $d_1d_1f_1f_1f_1$

$n_nn_nP_nP_nP_n$ $d_nd_nf_nf_nf_n$

SECTION 7 31313 $s_pr_ar_as_as_a$ 8GGgg

SECTION 9 51515 $101A_{df}A_{df}$ or

$101A_{df}A_{df}$ $0P_nP_nP'_nP'_n$. or

$101A_{df}A_{df}$ $P_nP_nh_nh_nh_n$

SECTION 10 61616 Repeat national practice encoded in Part A.
62626 Repeat national practice encoded in Part A.

PART B

SECTION - 1 IDENTIFICATION AND POSITION

M_jM_j Identification letters of the part of the report = BB.

/ Filler figure for last digit of YYGG group. No wind groups reported for any of the significant isobaric surfaces.

All other groups are the same as reported in Part A - Section 1

SECTION 5 - DATA FOR SIGNIFICANT TEMPERATURE AND RELATIVE HUMIDITY LEVELS

n_on_o Number of level, starting with surface level. Only surface level will be numbered as "00."
n_1n_1 When a standard level is also selected as significant, repeat the level in section 5. Encode
n_nn_n significant levels to indicate missing data as nn/// /////.

$P_oP_oP_o$ Pressure at specified levels in whole millibars, beginning with surface.
$P_1P_1P_1$
$P_nP_nP_n$

Temperature and humidity data groups are reported in the same manner as the temperature and humidity data in Part A - Section 2.

SECTION 6 - DATA FOR SIGNIFICANT WIND LEVELS

21212 Data for significant levels with respect to wind follow. Wind data groups are reported in the same manner as the wind data in Part A - Section 2.

SECTION 7 - SOUNDING SYSTEM INDICATION

31313 Data on sounding system.

s_r Identifies solar and infrared radiation correction. Always report as zero--no correction.
$r_a r_a$ Identifies dropsonde/sounding system used. Always report as "96"--descending radiosonde.
$s_a s_a$ Identifies tracking technique/status of system used. Reported as "00" or "08."
"0" - Aircraft system has no windfinding capability.
"8" - Automatic satellite navigation.

8 Indicator for time of observation.
GGgg Actual time of dropsonde launch in hours (GG) and minutes (gg) UTC.

SECTION 9 - ADDITIONAL DATA GROUPS

$101A_{df}\,A_{df}$ Specifications of regional additional data being reported.

0 Group indicator.
P_nP_n Pressure of specified levels in tens of millibars. (1007 mb=01, 945 mb=95, 726 mb=73).
$P'_nP'_n$

$P_nP_nh_nh_nh_n$ Data reported in the same manner as in Part A - Section 2.

51515 Additional data in regional code follow.

10166 Geopotential data are doubtful between the following levels, $0P_nP_nP'_nP'_n$. This code figure is used only when geopotential data are doubtful from a level to termination of the descent. NOTE: When radar altimeter is inoperative and surface reference is used, or if the ARWO advises that geopotential platform data is doubtful, a 10166 is reported for the entire run.

10167 Temperature data are doubtful between the following levels: $0P_nP_nP'_nP'_n$. This code figure shall be reported when only temperature data are doubtful for a portion of the descent. If a 10167 group is reported a 10166 will also be reported. EXAMPLE: Temperature is doubtful from 540mbs to 510mbs. SLP is 1020mbs. The additional data groups would be: 51515 10166 00251 10167 05451.

10190 Extrapolated altitude data follows:

1. When the sounding begins within 25mbs below a standard surface, the height of the surface is reported in the format 10190 $P_nP_nh_nh_nh_n$. The temperature group is not reported. EXAMPLE: Assume the release was made from 310mbs, and the 300mb height was 966 decameters. The last reported standard level in Part A is the 400mb level. The data for the 300mb level is reported in Part B as 10190 30966.

2. When the sounding does not reach surface but terminates within 25mbs of a standard surface, the height of the standard surface is reported in Part A of the code in standard format and in Part B of the code in the format 10190 $P_nP_nh_nh_nh_n$. EXAMPLE: Assume termination occurred at 980mbs, and the extrapolated height of the 1000mb level was 115 meters. The 1000mb level would be reported in Part A of the code as 00115 ///// and in Part B as 10190 00115.

10191 Extrapolated surface pressure precedes. Extrapolated surface pressure is only reported when the termination occurs between 850mbs and surface. Surface pressure is reported in Part A as $99P_oP_oP_o$ ///// and in Part B as $00P_oP_oP_o$ /////. When surface pressure is extrapolated, the 10191 group is the last additional data group reported in Part B.

61616 Same as Part A.

62626 Same as Part A.

FIGURE K-1. Example TEMP DROP Message.

```
UZPN13 KNHC 010211
XXAA  51023 99450 71352 15855 99994 08635 24030 00548 ///// /////
92592 03817 23552 85273 00916 24555 70803 06366 25055 50539 16957
24631 40702 29757 24634 30900 465// 25148 88999 66298 25149 419//
61616 AF968 WSWSC TRACK 51      OB 23
62626 SPL 4510N13483W MBL WND 23542 AEV 20108 DLM WND 23035 994314
WL150 2335 075=
XXBB  51028 99450 71352 15855 00994 08635 11850 00916 22742 07124
33729 05162 44664 07396 55640 06599 66562 12598 77557 12777 88551
12961 99538 13561 11481 18957 22449 23346 33406 28757 44356 36756
55298 46732
21212 00994 24030 11983 23037 22967 24040 33957 23548 44946 24046
55892 24558 66850 24555 77742 24045 88656 24079 99575 24588 11497
24632 22314 25136 33298 25149
31313 09608 80158
61616 AF968 WSWSC TRACK 51      OB 23
51515 10166 09430
62626 SPL 4510N13483W MBL WND 23542 AEV 20108 DLM WND 23035 994314
WL150 23535 075=
```

APPENDIX L

DISTRIBUTION

DEPARTMENT OF COMMERCE

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Director, Office of Aircraft Operations (AOC)	5
Deputy Assistant Administrator for Satellite and Information Services (E)	2
Assistant Administrator for Environmental Satellite, Data, and Information Services (Ex1)	1
Chief, Information Service Division, National Climatic Data Center E/CC4)	2
NOAA Central Library (E/OC4)	4
Chief, Satellite Services Division (E/SP2)	1
Assistant Administrator for Ocean Services and Coastal Zone Management (N)	1
Director, Office of Marine and Aviation Operations (OAMO)	1
Director, Office of Public Affairs, NOAA (PA)	2
Deputy Assistant Administrator, Office of Oceanic and Atmospheric Research (R)	1
Director, Atlantic Oceanographic and Meteorological Laboratory (R/AOML)	5
Director, Program Development and Coordination Staff (R/PDC)	1
Deputy Assistant Administrator for Weather Services (W)	1
Director, National Data Buoy Center (W/DB)	3
Director, National Centers for Environmental Prediction (W/NP)	5
Director, NCEP Central Operations (W/NP1)	3
Director, Environmental Modeling Center (W/NP2)	1
Director, Hydrometeorological Prediction Center (W/NP3)	10
Director, Marine Prediction Center (W/NP4)	2
Director, Aviation Weather Center (W/NP6)	2
Director, Storm Prediction Center (W/NP7)	2
Director, Tropical Prediction Center (W/NP8)	2
Director, Office of Climate, Water, and Weather Services (W/OS)	1
Chief, Meteorological Services Division (W/OS2)	10
Director, NWS Eastern Region (W/ER)	20
Director, NWS Central Region (W/CR)	2
Director, NWS Southern Region (W/SR)	5
Director, NWS Western Region (W/WR)	2
Director, NWS Alaska Region (W/AR)	2
Director, NWS Pacific Region (W/PR)	2
WSFO, Boston, MA (W/ER09)	2
WSFO, Sterling, VA (W/ER)	2
WSFO, San Juan, PR (W/SR72)	2
NOAA Budget Officer, Office of Management and Budget	1

DEPARTMENT OF DEFENSE

JOINT/UNIFIED/SPECIFIED COMMANDS

The Joint Staff (J3/DDGO-ROD)	2
USCINCPAC/J316 Env Group	1
USFORSCOM/SWO	1
USSTRATCOM/J-315	2
CINCUSACOM (J33 2WX)	1

DEPARTMENT OF THE AIR FORCE

HQ USAF/XOO-WX	3
HQ USAF/XOOOW	1
HQ USAF/REO	3
HQ USAFE/DOW	1
HQ PACAF/DOW	1
HQ ACC/DOW	1
HQ ACC/DOLT	2
HQ AFMC/DOW	1
HQ AFRC/DOO	2
HQ AFRC/DOT/DOTA	3
HQ AFSPACECOM/DOW	1
HQ AMC/DOW	2
HQ AETC/DOSW	1
HQ AFWA/XO	6
HQ 22AF/DOT	2
HQ 22 AF/XP	1
HQ 22 AF/XPL	1
AFW Technical Library	1
403 WG/DO/XP	2
53 WRS	75
CARCAH (OL-A 53 WRS)	6
15 OSS/OSW	1
25 ASOS/DOW	1
45 WS/CC	1
45 WS/SPW/XP/SE	3
334 TTS/TTMV	1
374 OSS/WE	1
3246 TW/DOW	2
Det 4, 20 WS	1
Phillips Lab/GPAS	1

DEPARTMENT OF THE ARMY

Headquarters, Department of the Army/DAMI-POI	2

DEPARTMENT OF THE NAVY

Oceanographer of the Navy	2
Commandant of the Marine Corps (DC/S Aviation)	5
Commanding Officer, Naval Oceanographic Office (N2513)	10
Commanding Officer, NAVLANTMETOCCEN	1
CINCLANTFLT (N37, N526)	2
NRL Stennis Space Center	1
NRL Monterey	1
Office of Naval Research	1
Commander Operational Test and Evaluation Force/Staff Metoc Officer	1

DEPARTMENT OF TRANSPORTATION

FEDERAL AVIATION ADMINISTRATION

Air Traffic System Requirements Service ARS-1	1
Air Traffic System Requirements Service/Aerospace Weather ARS-1	1
Air Traffic Planning /Procedures ATP-1	3
Air Traffic Planning /Procedures ATP-110	1
Air Traffic Planning /Procedures ATP-130	3
Air Traffic Resource Management Program ATX-100/ATX-400	2
Air Traffic Control System Command Center (ATCSCC) ATT-1/ATT-130/ATT-260	9
FAA Regional Air Traffic Division Managers	
AAL-500 Anchorage	1
ACE-500 Kansas City	1
AEA-500 New York	1
AGL-500 Chicago	1
ANE-500 Boston	1
ANM-500 Seattle	1
ASO-500 Atlanta	1
ASW-500 Dallas/Fort Worth	1
AWP-500 Los Angeles	1
Albuquerque ARTCC	2
Atlanta ARTCC	3
Boston ARTCC	3
Honolulu ARTCC	3
Houston ARTCC	3
Jacksonville ARTCC	3
Los Angeles ARTCC	2
Memphis ARTCC	1
Miami ARTCC	3
New York ARTCC	3

Oakland ARTCC	2
San Juan ARTCC	3
Seattle ARTCC	2
Washington ARTCC	2
AMA-500, Oklahoma City, OK	1
AIA-100/AIA-200	3
AOP-4/AOP-8	1
APA-100/APA-300/APA-500	3
ARS-100/ARS-200	2
Miami (QAS) AIFSS	2
San Juan AIFSS	2

U.S. COAST GUARD

Commandant, USCG Headquarters (G-NIO)	2
Commandant, USCG (FLAGPLOT)	1
Commander, Atlantic Area, USCG	2
Commander, Pacific Area, USCG	2
Commander, Maintenance and Logistics Command Atlantic	2
Commander, Maintenance and Logistics Command Pacific	1
Commander, First Coast Guard District	1
Commander, Fifth Coast Guard District	2
Commander, (RE) Seventh Coast Guard District	3
Commander, Eighth Coast Guard District	3
Commander, Eleventh Coast Guard District	1
Commander, Fourteenth Coast Guard District	2
Commanding Officer, USCG Air Station, Aquadilla, PR	1
Commanding Officer, USCG Air Station, Atlantic City, NJ	1
Commanding Officer, USCG Air Station, Kapolei, HI	1
Commanding Officer, USCG Air Station, Cape Cod, MA	1
Commanding Officer, USCG Air Station, Clearwater, FL	1
Commanding Officer, USCG Air Station, Corpus Christi, TX	1
Commanding Officer, USCG Air Station, Elizabeth City, NC	1
Commanding Officer, USCG Air Station, Kodiak, AK	1
Commanding Officer, USCG Air Station, McClellan AFB, CA	1
Commanding Officer, USCG Air Station, New Orleans, LA	1
Commanding Officer, USCG Air Station, North Bend, OR	1
Commanding Officer, USCG Air Station, Opa Locka, FL	1
Commanding Officer, USCG Air Station, San Diego, CA	1
Commanding Officer, USCG Air Station, Savannah, GA	1
Commanding Officer, USCG Air Station, Warrenton, OR	1
Commanding Officer, USCG Reserve Training Center	1

DEPARTMENT OF STATE

Office of Advanced Technology	1

DEPARTMENT OF THE INTERIOR

Office of Liaison, Bureau of Reclamation	1

FEDERAL EMERGENCY MANAGEMENT AGENCY

FEMA Region I	2
Emergency Management Agency, Westbrook, ME	1

NATIONAL SCIENCE FOUNDATION

Director, Division of Atmospheric Sciences	1
Director, Meteorology Program	1

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Atmospheric Sciences Division, MSFC	1

OTHER U.S.

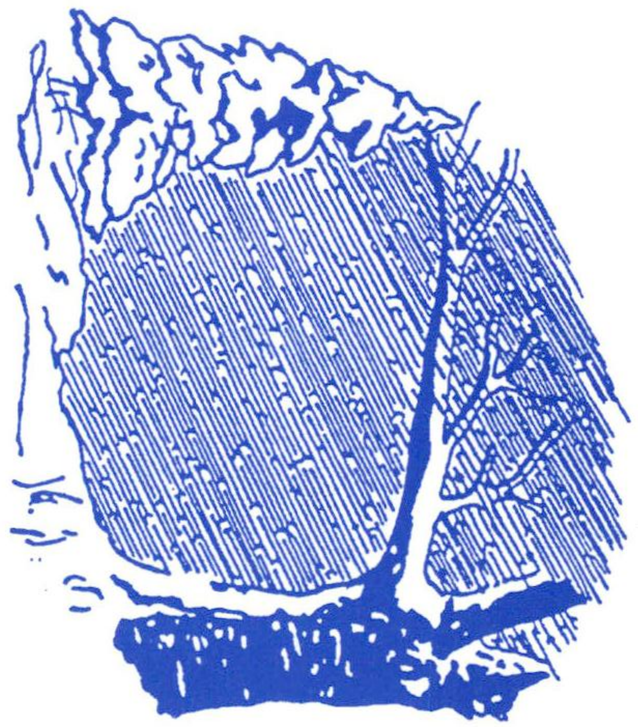
GSA Federal Information Center	1
Weather Coordinator, Cumberland Management Agency	2
Congressional Research Service, Library of Congress	1
University of Chicago Library, The Joseph Regenstein Library	1
Natural Hazards Research & Applications Information Center, University of Colorado	1

GOVERNMENT OF CANADA

Officer in Charge, METOC Centre, Maritime Command Headquarters, Halifax, NS	1
Director, Atmospheric Environment Service, Downsview, Ontario	1
Base Meteorological Officer, CFB Greenwood, NS	1
Transport Canada, Ottawa	1
Transport Canada, New Brunswick	1

UNITED KINGDOM

Assistant Director, Head of Defense Services, Meteorological Office	1



3 8398 1010 4191 5
NOAA CENTRAL LIBRARY