

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

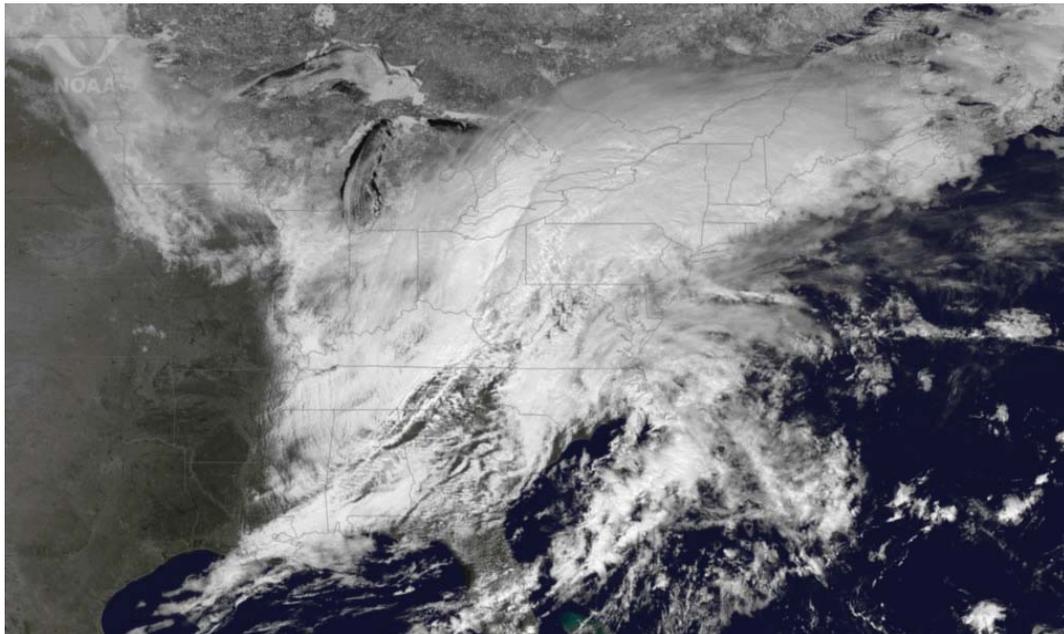
OFCM



OFFICE OF THE FEDERAL COORDINATOR FOR
METEOROLOGICAL SERVICES AND SUPPORTING RESEARCH

National Winter Storms Operations Plan

FCM-P13-2014



Washington, DC
December 2014

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NATIONAL WINTER STORMS OPERATIONS PLAN
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CHANGE AND REVIEW LOG

Use this page to record changes and notices of reviews.

Change Number	Page Numbers	Date Posted	Initial
1			
2			
3			
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Review Date	Comments	Initial

FOREWORD

The purpose of the *National Winter Storms Operations Plan (NWSOP)* 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. This plan focuses on the coordination of requirements for winter storm reconnaissance observations provided by the Air Force Reserve Command's 53rd Weather Reconnaissance Squadron and NOAA's Aircraft Operations Center.

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.

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. This year marks the 32nd edition of the *National Winter Storms Operations Plan*.

The national winter storm mission is a team effort, and as we strive to be a “Weather-Ready Nation,” the effective coordination of the Federal agencies involved, local emergency managers, and others help, through improved forecast and warning services, to protect lives and property and reduce our Nation’s vulnerability to these high-impact events.

//SIGNED//

Paul A. Roelle, Colonel, USAF
Executive Secretary,
Working Group for Hurricane and Winter Storm
Operations and Research

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CHAPTER 1

RESPONSIBILITIES OF COOPERATING AGENCIES

1.1 General. Every year, winter storms cause significant disruptions to travel and commerce, and threaten life and property. However, accurate forecasts can mitigate the disruption, allowing time for local officials and the general public to plan for the event. Large forecast errors often occur when observations in certain upstream “sensitive” regions over the Pacific, Gulf of Mexico, and Western Atlantic are lacking or inaccurate. The main purpose of Winter Storm Reconnaissance (WSR) is to collect data in these “sensitive” oceanic regions where conventional upper-air observations are lacking and satellites are unable to effectively resolve the vertical structure of the atmosphere (usually within cloudy regions). The data collected from the WSR program by the NOAA G-IV and US Air Force C-130 aircraft are transmitted to operational forecast centers, and assimilated into global numerical prediction models.

The WSR program in the Pacific basin focuses on targeting large-scale extratropical systems that could potentially influence major weather events downstream. These events are predicted to affect the continental U.S. in medium-range time scales on the order of about three to six days by the global models but with a large degree of uncertainty. The Pacific missions generally require long-term deployments of staff and equipment from the NOAA Aircraft Operations Center and the U.S. Air Force Reserve Command's 53rd Weather Reconnaissance Squadron to remote operating bases. For the area of responsibility, the program concentrates on targeting specific surface low-pressure systems containing a defined central core that have the potential to rapidly intensify and cause major impacts to heavily populated areas in the Eastern U.S. These WSR missions are executed on short-range time scales within 72 hours of the forecasted impact. The 53rd flies the Gulf and Western Atlantic missions from its headquarters at Keesler Air Force Base in Biloxi, MS, and deployments are not necessary.

The results from seven research and operational field programs between 1999 and 2005 indicated that in 70-90% of the cases, adaptive observations improved the forecasts for the targeted weather events. On average, a 10-20% error reduction was observed in the targeted forecasts. As a result, numerical forecast guidance issued 48 hours prior to the events became as accurate as 36 hour lead time forecasts without the use of adaptive observations.¹ Also, an analysis of the impacts from the 2012 WSR season by Dr. Ron Gelaro, NASA Global Modeling and Assimilation Office, initially indicated that, in some cases, these adaptive observations, provided substantial improvement to a global measure of 24-hour forecast errors. However, a more recent report from 2013 by Dr. Thomas Hamill et al, NOAA Earth System Research Laboratory, countered this hypothesis based on studies of 2011 WSR data. It showed that differences with vs. without targeted observations are not statistically significant in the localized verification region.² With the development of better satellite data, combined with new and improved data-

¹ See http://www.aoc.noaa.gov/article_winterstorm.htm and <http://www.emc.ncep.noaa.gov/gmb/targobs/target/publications.html>

² See Hamill, T.M., F. Yang, C. Cardinali, and S.J. Majumdar, 2013: Impact of Targeted Winter Storm Reconnaissance

assimilation schemes, the contribution of these targeted data to the global models may be diminished. Due to this uncertainty and the large cost associated with obtaining these data during remote deployments, operations in the Pacific basin have been suspended, following directives of NOAA National Weather Service management. WSR operations are continuing for the Gulf and Western Atlantic.

Additional studies are being conducted to assess how effective targeted observations are on improving global-model prediction of major winter weather events. New data-assimilation and targeting schemes are also being evaluated. Results from these investigations will help justify whether or not the Pacific WSR program should be resumed. They will also be used to determine if Gulf and Western Atlantic operations should be maintained. Until such results are available, Pacific WSR operations will remain dormant. This plan still though includes information about them in case they are reinstated in the future.

1.1.1 National Oceanic and Atmospheric Administration's National Weather Service (NWS). The 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: <http://www.nws.noaa.gov/directives/010/010.htm>, then 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 USN, through the Naval Meteorology and Oceanography Command (NAVMETOCOM), 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 NAVMETOCOM Instruction 3140.1 series.

1.1.3 U.S. Air Force (USAF). The USAF, through centralized weather units, is responsible for issuing military weather watches, warnings, and advisories 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), may:

- 1.2.1.1** Furnish aircraft from the NOAA Aircraft Operations Center (AOC) to support the following operational reconnaissance objectives:
- To provide additional real-time meteorological data, made available to operational forecasters and for assimilation into global numerical

prediction models, to improve the forecasts of U.S. high-impact winter weather events over the continental U.S. (including Alaska) one to six days in advance through the application of adaptive observation techniques over data-sparse regions.

- To provide the data and analyses to better understand the structure and dynamics of these winter storm systems.

- 1.2.1.2** Coordinate with the Department of Defense (DOD), through the Air Force Reserve Command's 53rd Weather Reconnaissance Squadron (WRS), by 15 August, on the proposed upcoming winter storm reconnaissance plan and requirements, to include desired deployed locations and the number of flying hours.
- 1.2.1.3** Provide all East Coast/Atlantic and West Coast/Pacific winter-storm aircraft reconnaissance requirements to the Chief, Aerial Reconnaissance, All Hurricanes (CARCAH) through the Senior Duty Meteorologist (SDM) at NCEP Central Operations (NCO) Product Management Branch.
- 1.2.1.4** Provide basic surface, upper air, and radar observations from its network of stations making such observations.
- 1.2.1.5** Provide additional observations, when required, making available all reports to any requesting agency.
- 1.2.1.6** Provide basic analyses and forecasts through the National Centers for Environmental Prediction (NCEP), College Park, Maryland.
- 1.2.1.7** Provide products under the multitier concept from Weather Forecast Offices (WFO) which will provide outlooks, watches, warnings, and advisories, when appropriate.
- 1.2.1.8** Operate satellite systems capable of providing coverage of the coastal areas of the contiguous United States during the winter storm season.
- 1.2.1.9** Coordinate with the National Aeronautics and Space Administration (NASA) to obtain pertinent meteorological data from NASA research and development experimental satellites.
- 1.2.1.10** Coordinate with the Department of Defense (DOD) to obtain pertinent meteorological data from the Defense Meteorological Satellite Program.
- 1.2.1.11** Provide satellite data for selected situations to authorized research facilities.

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

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

- 1.2.2.1 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.
- 1.2.2.2 Furnish to NWS, aircraft reconnaissance observations supporting the objectives listed in paragraph 1.2.1.1 that are within its capabilities and in accordance with established reconnaissance priorities, and special observations detailed in Chapter 2 of this plan.
- 1.2.2.3 Designate CARCAH as the point of contact for coordination with the NCEP/NCO SDM for aircraft reconnaissance required in support of this plan.
- 1.2.2.4 Provide weather reconnaissance data monitor services through CARCAH to evaluate and disseminate reconnaissance reports.
- 1.2.2.5 Provide the necessary communications to relay reconnaissance reports from the aircraft to CARCAH.
- 1.2.2.6 Provide warnings to all DOD facilities and military units of weather that threatens to impact their operations or damage their installations.
- 1.2.2.7 Maintain situational awareness of weather reconnaissance forces providing support to NOAA. The situational awareness should be maintained through the appropriate combatant commander whose area of responsibility the mission is being conducted.

1.2.3 Department of Transportation (DOT)/Federal Aviation Administration (FAA).

The FAA will:

- 1.2.3.1 Provide Air Traffic Control (ATC) services as appropriate to support this plan.
- 1.2.3.2 Disseminate PIREPs and AIREPs.
- 1.2.3.3 Provide hourly and special weather observations at selected terminal and flight service station locations.

1.2.4 Department of Homeland Security/U.S. Coast Guard (USCG). The USCG will:

- 1.2.4.1 Provide surface observations to NWS from its coastal facilities and vessels.
- 1.2.4.2 Collect special weather observations from surface ships of opportunity and provide them to the NWS.
- 1.2.4.3 Provide personnel, vessel, and communications support to the National Data Buoy Center for development, deployment, and operation of environmental data buoy systems.

1.3 Reconnaissance Organization Contact Information. A summary of reconnaissance organization contact information is listed in Appendix L.

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 November 1 through March 31. As outlined in the Air Force Reserve Command (AFRC)/National Oceanic and Atmospheric Administration's National Weather Service (NOAA/NWS) Memorandum of Agreement (see Appendix J), the DOC has identified a requirement for winter storm aerial reconnaissance. In this agreement, the Department of Defense (DOD)/AFRC maintains aircraft to support up to two operational weather reconnaissance sorties per day in the Atlantic. When aircraft are deployed to the Pacific, up to two additional operational sorties for the Pacific Theater may be requested, resources permitting. 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 (AFRC), 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. If required to respond to DOC Pacific Winter Storm requirements, the 53rd Weather Reconnaissance Squadron (53 WRS) will typically deploy to Pacific locations during the January and February timeframe.

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).

At a minimum, combatant commanders (COCOMs) should maintain situational awareness of weather reconnaissance forces providing support to NOAA. The situational awareness should be maintained through the appropriate combatant commander whose area of responsibility the mission is being conducted.

2.2.2 DOC. The DOC, through the NOAA Aircraft Operations Center (AOC), is responsible for aircraft surveillance operations in the Pacific that will be used in support of National Centers for Environmental Prediction line offices or as backup for 53 WRS aircraft reconnaissance for an East Coast storm or storm threat. AOC provides operational aircraft for winter storm synoptic tracks in the North Pacific Ocean, and can deploy to Alaska, Hawaii, Japan, or other locations. 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) when provided to CARCAH before 1830 UTC.

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. If Pacific aircraft reconnaissance operations are being conducted, the NCEP/NCO SDM will monitor all operational model guidance using tools developed by the Environmental Modeling Center (EMC), with particular attention on North America, Hawaii, and Alaska. Regions upstream of the US over the North Pacific Ocean, where the models have a higher degree of disagreement, are then examined and it is determined if additional target observations supplied by aircraft would positively affect the forecast. After consultation and coordination with other NCEP units, NWS field offices, and/or DOD forecasters, the SDM determines whether or not a flight would be beneficial and then forward all DOC/NOAA mission requirements to CARCAH for tasking in the WSPOD within the responsibilities stated above. This coordinated request will be considered the agency's request for assistance (RFA) to DOD.

The SDM will be responsible for requesting all East Coast/Atlantic and West Coast/Pacific reconnaissance flights and will provide information as specified in paragraph 2.4.5 for the next 24-hour period (1100 UTC of the next day to 1100 UTC of the following day) and an outlook for the succeeding 24 hours to CARCAH before 1830 UTC (preferably by 1600 UTC). 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:

2.4.2.1 53 WRS.

- 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) 11-2C-130J Vol. 3, paragraph 3.11.2.2.
 - 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.

2.4.2.2 NOAA AOC.

- Recommend the use of published NWSOP tracks whenever possible.
- ‘Track 99’ or customized tracks are permitted; however, they are to be limited to 3,500 nautical miles in length. AOC will determine the direction of flight around the pattern for maximum efficiency.

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 transmitted (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. In order to be ingested into the model run, sondes must be released NET 3.5 hours before the “synoptic control time”, and NLT 2.5 after. In addition, the drop message must be received by 2+40 after the synoptic time. As a result, plan for the last sonde to be released with sufficient time for the sonde to fall, work up, and transmit from aircraft to CARCAH to NCEP before the window closes. Example:

Window for 00Z: 2031-0229Z, transmit to NCEP NLT 0240Z

Window for 12Z: 0831-1429Z, transmit to NCEP NLT 1440Z

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, and/or an NWS WFO, may 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 or emailed to CARCAH at:

CARCAH
National Hurricane Center
11691 SW 17th Street
Miami, FL 33165-2149
ncep.nhc.carcah@noaa.gov

MISSION EVALUATION FORM

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.

2.4.4.4 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. The NCEP/NCO SDM will coordinate with other NCEP units and the appropriate NWS field offices as needed and provide WSPOD information (Figure 2-2) to CARCAH before 1830 UTC for both Atlantic and Pacific 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 (NAVLANTMETOCEN) through their Norfolk Command Duty Officer. The NCEP/NCO SDM will provide the following data to CARCAH when applicable:

- Track number.
- Selected track point (control point) and time (control time) the aircraft is required to be at the point.
- Dropsonde release and special requirements.
- Expiration time of requirement (latest time at the control point when the mission requirement is regarded as satisfied).
- Succeeding day outlook and optional additional day outlook (anticipated tracks, control points, control times if available).

2.4.5.2 Preparation. Using requirements stated by NCEP/NCO SDM, the 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, unless specified otherwise. If a specific direction is desired (clockwise or counterclockwise), it should be indicated in the WSPOD (e.g., Track 32 CW or Track 64 CCW). Tasking agencies should not use the terminology “Reverse” indicated by an “R” when requesting a track. Amendments to the WSPOD will only be published when requirements change. When amended, the impact on each flight listed will be identified (i.e., No Changes, Change Added, or Canceled).

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

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/NCO SDM _____ 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.

- The coordinated WSPOD is NOAA's Request for Assistance (RFA) to DOD. Since DOD's support to NOAA is congressionally mandated and funded through the DOD Appropriations Act, the coordinated WSPOD is considered a validated and approved RFA.
- Combatant command headquarters and their air component command headquarters will coordinate on missions by reviewing the proposed WSPOD posted at <http://www.nhc.noaa.gov/recon.php> link, and then click "For Tomorrow" under "Plan of the Day."
- Combatant command headquarters and their air component command headquarters will pull current DOD missions from <http://www.nhc.noaa.gov/recon.php> link, and then click "For Today" under "Plan of the Day."

2.4.5.3 Dissemination. The WSPOD will be made available in message form to all appropriate agencies, such as the 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. Normally, this should be by 1830 UTC each day, including weekends and holidays. If there are no current day or succeeding-day reconnaissance requirements, a negative report, which covers the appropriate time frame, will be disseminated. Transmitted WSPODs will be serially numbered each winter storm season. 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 TCPOD is disseminated under the header "MIAREPRED" for AWIPS users and "NOUS42 KNHC" for AWDS users. The TCPOD can be accessed via the Internet at the National Hurricane Center homepage at <http://www.nhc.noaa.gov/>, then click 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 "resources permitting."
- If requirements beyond the succeeding day are anticipated, an additional day outlook may be included.

2.5 Reconnaissance Flights.

2.5.1 General Storm Tracks.

2.5.1.1 Mission Track/Flight Plan Names. Established winter storms aircraft reconnaissance tracks are published in Appendices E - I and are available from the Office of the Federal Coordinator for Meteorological Services and Supporting Research (OFCM) upon request from an authorized user. The nomenclature for the storm tracks is “WSRP-A##” for Atlantic basin tracks and “WSRP-P##” for Pacific basin tracks, where WSRP is an abbreviation for “Winter Storm Reconnaissance Program.” In WSPOD tasking specifications (Figure 2-3), this will be shortened to “A##” or “P##” in Item A and “TRACK##” for the mission identifier in Item B. Track numbers are currently assigned as follows:

- A61-66: Western Atlantic and Gulf of Mexico tracks (see Appendix E)
- P01-30: Central Pacific—Alaskan tracks (see Appendix F & G)
- P31-56: Central Pacific—Hawaiian tracks (see Appendix F & H)
- P68-90: Western Pacific—Japanese tracks (see Appendix F & I)

For example, a mission to be flown might be “WSRP-P33” and tasked as “TRACK33” in the WSPOD. Unpublished tracks will be assigned a track number of 99.

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 established winter storm reconnaissance tracks in Appendices E - I 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.

Winter Storm Plan of the Day (WSPOD)

NOUS42 KHNC _____ (DATE/UTC TIME)
WEATHER RECONAISSANCE FLIGHTS
CARCAH, NATIONAL HURRICANE CENTER, MIAMI, FL
_____ (LOCAL TIME) _____ (DAY) _____ (MONTH/DATE), _____ (YEAR)

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

I. ATLANTIC REQUIREMENTS

1. FLIGHT ONE – TEAL or NOAA _____ (number) or (NEGATIVE RECON RQMTS)

- A. _____ (TRACK/CONTROL POINT/CONTROL TIME)
- B. _____ (MISSION IDENTIFIER)
- C. _____ (ESTIMATED DEPARTURE TIME)
- D. _____ (DROPS REQUIRED/ADDED POSITIONS)
- E. _____ (ALTITUDE/EXPIRATION TIME)
- F. _____ (REMARKS, if needed)

FLIGHT TWO (if applicable, same format as FLIGHT ONE)

2. OUTLOOK FOR SUCCEEDING DAY

- A. _____ (ANTICIPATED TRACKS/CONTROL POINTS/CONTROL TIMES OR (NEGATIVE))
- B. _____ (REMARKS, if needed)

II. PACIFIC REQUIREMENTS (same format as Atlantic if requested NCEP/NCO SDM)

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

2.5.2.1 Prior Coordination. The 53 WRS or the AOC Operations Division Project Officers, as appropriate, will contact the International Operations Manager (IOM) at the Air Traffic Control System Command Center (ATCSCC). The 53 WRS or AOC officials may, upon receipt of tasking, coordinate directly with the affected ARTCCs.

- Mission call-sign.
- WSPOD number.
- Departure airfield / ETD.
- Route of flight.
- Aircraft SATCOM #.
- HF Selcal (if applicable).
- Requested NORAD transponder code.
- ARTCCs, FIRs Affected.
- Any special requests or deviations from published routes.
- Point of contact information.

2.5.2.1.1 The ATCSCC will then coordinate this information with all FAA facilities impacted.

2.5.2.1.2. The 53 WRS and/or AOC shall transmit the information in Appendix D to the U.S. NOTAM office no later than 2 hours prior to departure or as soon as possible.

2.5.2.1.3 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 planned and flown at the highest altitude feasible. When operating under an Instrument Flight Rules (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), the 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 aircrew 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.

2.5.5.4 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.

2.5.6.1 Recco and Dropsonde Observations. Manual flight-level observations will be encoded and transmitted as standard reconnaissance code (RECCO) messages. Dropsonde sounding data consisting of upper-level pressure, temperature, humidity, and wind observations will be encoded and transmitted in World Meteorological Organization TEMP DROP format. See Appendix K for details on these aircraft messages.

2.5.6.2. High-Density/High-Accuracy Aircraft Observations. The HD/HA data include UTC time, aircraft latitude, longitude, static pressure, geopotential height, extrapolated sea-level pressure or D-Value, air temperature, dew point temperature, flight-level (FL) wind direction, FL wind speed, peak 10-second (10-s) average FL wind speed, peak 10-s average surface wind speed from the stepped frequency microwave radiometer (SFMR), SFMR-derived rain rate, and quality control flags. Except for the peak values noted above, all data provided in HDOB messages are 30-second averages, regardless of the interval at which the HDOB messages are reported. See Appendix K for HDOB message formats.

Note: Although HDOB aircraft messages are received by NCEP, there is currently no capability of ingesting the data into its Global Data Assimilation System (GDAS) for forecast model initialization.

2.5.6.3 Accuracy. The accuracy requirements for elements of the vertical sounding are as follows:

- Pressure: within 2 mb.
- Geopotential Height of Each Mandatory Level:
 - Within 10 meters at or below 500 mb.
 - Within 20 meters above 500 mb.
- Temperature: within 1°C.
- Dew point temperature:
 - From -20° to +40°C: within 1°C.
 - Less than -20°C: within 3°C.
- Wind direction: within 10 deg.
- Wind speed: within 5 kt.

2.5.6.4. Observational Frequency. Vertical atmospheric soundings will be obtained via dropsonde at or near the geographical positions or the time intervals specified in the flight track. CARCAH should be notified of deviations to the drop requirements and coordinate all modifications.

RECCOs sent during pattern execution are recommended to be staggered approximately midway between the drop points. High-density observation records will be created at 30-second intervals and transmitted in bursts every 10 minutes from aircraft capable of sending them.

2.5.7 Mission Identifiers. All weather messages will include the five-character agency/ aircraft indicator, followed by the CARCAH-assigned mission indicator, followed by the track number. The five-character CARCAH-assigned mission indicator will consist of the sequential number of the mission being flown in the given basin, followed by the letters “WS” to signify a winter storm mission, followed by a location identifier based on the mission departure point: A = Atlantic; E = Eastern Pacific; C = Central Pacific; and W = Western Pacific. Due to computer requirements for processing the data, there is no space between “Track” and the number signifying the track being flown.

--EXAMPLES--

AF302 03WSA TRACK64 (USAF aircraft 5302 on the 3rd winter storm mission in the Atlantic basin flying track 64)

NOAA9 11WSC TRACK35 (NOAA aircraft 49RF on the 11th winter storm mission in the Central Pacific basin flying track 35)

2.5.8 Transmission of Observations.

2.5.8.1. Observation Numbering and Content. All RECCO and TEMP DROP messages from the first to the last during a mission will be numbered sequentially. HDOBs will also be numbered sequentially but separately from other observations. Air Force movement information (i.e., departure time and location and ETAs to locations) will not be included in observation remarks. That information should be passed to CARCAH via SATCOM administrative messages. The mission identifier will be the first mandatory remark, followed by the observation number.

2.5.8.2. Corrections to Observations. A correction indicator should be appended to the WMO abbreviated header after the date/time group and to any lines containing the mission identifier and observation number within corrected aircraft messages. This includes the first remark line in a RECCO, each of the 61616 lines in a sonde TEMP DROP code, and the second line in an HDOB data message. The first corrected message will have an indicator of CCA; subsequent corrections will have indicators of CCB, CCC, etc. Examples of corrected observations are in Table 2-1 below:

2.6.3.1 Satellite Antenna Communications Failure at NHC. If an outage occurs, CARCAH will coordinate with the 53 WRS to have operators man the ground station located at the backup site. They will be responsible for maintaining contact with airborne reconnaissance aircraft and relaying data via land line to the CARCAH ground station. In the event communications lines between the backup site and NHC are also severed, the 53 WRS ground station will be configured to transmit data directly to the WPMDS server.

2.6.3.2 Internet Communications Failure. In the event there is a long-term network communications outage between NHC and AFWA, the CARCAH ground station will still be able to receive aircraft data. If Internet access problems originate at NHC, the CARCAH ground station will be configured to relay the data to the backup site ground station via SATCOM. The 53 WRS ground station will in turn be configured to automatically transmit them to the AFWA WPMDS server. However, if Internet disruptions occur at AFWA, no data can be sent to the AWN, NWS servers, and external users until service is restored.

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 Federal Meteorological Handbooks and agency directives, which include:

- Federal Meteorological Handbook No. 1, Surface Weather Observations and Reports
<http://www.ofcm.noaa.gov/fmh-1/fmh1.htm>
- Federal Meteorological Handbook No. 2, Surface Synoptic Codes
<http://www.ofcm.noaa.gov/fmh2/fmh2.htm>
- Federal Meteorological Handbook No. 3, Rawinsonde and Pibal Observations
<http://www.ofcm.noaa.gov/fmh3/fmh3.htm>
- Federal Meteorological Handbook No. 11, Doppler Radar (Parts A, B, C, and D) to include section 3.15, Snow Accumulation Algorithm.
<http://www.ofcm.noaa.gov/fmh11/fmh11.htm>
<http://www.ofcm.noaa.gov/fmh11/fmh11B.htm>
<http://www.ofcm.noaa.gov/fmh11/fmh11C.htm>
- Various National Weather Service (NWS) Operations & Services directives (e.g., NWS Instructions 10-13XX series; NWS Instructions 10-14XX series)
<http://www.weather.gov/directives/010/010.htm>.

The only two observational programs that will be highlighted further, using references from the applicable chapters of the National Hurricane Operations Plan (NHOP) (which has similar information regarding observations for tropical cyclones), are two data sources that provide unique capabilities to support winter storm analysis and forecasting - satellite observations and buoys/coastal stations in the deep ocean and coastal areas.

3.2 Satellite Observations. For satellite observation information available to support winter storm analysis and forecasting, refer to the NHOP, Chapter 7 located at:
<http://www.ofcm.noaa.gov/nhop/12/pdf/07-chap7.pdf>

3.3 National Data Buoy Capabilities. For information on the National data buoy capabilities to support winter storm analysis and forecasting, refer to the NHOP, Chapter 9, paragraphs 9.1 and 9.3 located at: <http://www.ofcm.noaa.gov/nhop/12/pdf/09-chap9.pdf>

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. 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. Headquarters Air Force Weather Agency (AFWA) posts winter storm bulletins received from the National Weather Service on the Air Force Weather-Web Services (AFW-WEBS) where they are accessible by DOD users worldwide.

4.2.2 Weather Reconnaissance. Weather reconnaissance observations will be transmitted to CARCAH via satellite down link, checked for accuracy, and then transmitted to NOAA and AFWA for processing. See paragraph 2.6 for more information regarding aircraft and ground station communications systems used to transmit observations.

4.2.3 U.S. Navy. For the maritime environment, the primary means of dissemination for gale, storm, high-seas warnings, other winter storm advisories, and special observations is via the classified and unclassified web pages of the Naval Meteorology and Oceanography Center, Norfolk, VA, for the Atlantic and Mediterranean basins ([https://www.nlmoc.navy.\(smil\).mil](https://www.nlmoc.navy.(smil).mil)) and the Naval Meteorology and Oceanography Center, Pearl Harbor, Hawaii, for the Pacific and Indian Ocean basins ([https://www.npmoc.navy.\(smil\).mil](https://www.npmoc.navy.(smil).mil)). Both graphical and alphanumeric warnings are posted. In addition, the Defense Message Service (DMS) is also used to distribute alphanumeric data and gale, storm, and high-seas graphics. Unclassified DISN ATM Services (DATMS-U) will be used for exchange of data between National Weather Service (NWS) and the Navy's Fleet Numerical Meteorology and Oceanography Center.

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 METEEO messages from merchant and Coast Guard vessels on a routine basis. The METEEO data are then passed directly to the NCEP on the Coast Guard Data Network (CGDN).

CHAPTER 5

PUBLICITY

5.1 News Media Releases. 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, whenever possible.

5.2 Public Affairs Points of Contact. Copies of these releases, along with any pertinent information, are highly encouraged and are requested to be forwarded to the following winter storm aerial reconnaissance agencies:

NOAA Office of Marine and Aviation Operations (OMAO): david.l.hall@noaa.gov

NOAA Aircraft Operations Center (AOC): lori.bast@noaa.gov

NOAA/National Weather Service (NWS): Christopher.Vaccaro@noaa.gov

NOAA/Office of the Federal Coordinator for Meteorology (OFCM): ofcm.mail@noaa.gov

Office of the Director of Air Force Weather (HQ USAF/A3O-W):
usaf.pentagon.af-a3.mbx.a3w-weather-workflow@mail.mil

403rd Wing Public Affairs (AFRC 403 WG/PA), includes the 53rd Weather Reconnaissance Squadron (53 WRS): 403WG.PA2@us.af.mil

5.3 Public Affairs Web Pages. Media releases can also be found at:

National Oceanographic and Atmospheric Administration (NOAA)
<http://www.noaa.gov/media.html>
<http://www.noaa.gov/mediasvy.html>

National Weather Service (NWS)
<http://www.nws.noaa.gov/pa/>

Air Force Reserve Command (AFRC)
<http://www.dobbins.afrc.af.mil/units/pa/index.asp>

Federal Aviation Administration (FAA)
http://www.faa.gov/news/contact_information/

Office of the Federal Coordinator for Meteorology (OFCM)
<http://www.ofcm.noaa.gov/>

APPENDIX A

ABBREVIATIONS

-A-

AFB	Air Force Base
AFRC	Air Force Reserve Command
AFWA	Air Force Weather Agency
AIREP	Aircraft Report
AOC	Aircraft Operations Center
ARINC	Aeronautical Radio, Incorporated
ARTCC	Air Route Traffic Control Center
ATC	Air Traffic Control
ATCSCC	Air Traffic Control System Command Center
AWIPS	Advanced Weather Interactive Processing System

-C-

C	Celsius
CA	Commander, Atlantic Area (USCG)
CARCAH	Chief, Aerial Reconnaissance Coordination, All Hurricanes
CARF	Central Altitude Reservations Function
Class G Airspace	Uncontrolled airspace

-D-

DOC	Department of Commerce
DOD	Department of Defense
DOT	Department of Transportation
DSN	Defense Switched Network (AUTOVON)

-E-

ETA	Estimated Time of Arrival
ETD	Estimated Time of Departure

-F-

FAA	Federal Aviation Administration
FL	Flight Level
ft	Foot, Feet

-H-

HF	High Frequency
hr	Hour

-I-

ICAO	International Civil Aviation Organization
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-W-

WBC	Identifier for NCEP
WG	Working Group or an AF Organization (wing)
WG/HWSOR	Working Group for Hurricane and Winter Storms Operations and Research (OFCM-sponsored)
WFO	Weather Forecast Office (NOAA/NWS)
WMO	World Meteorological Organization
WPC	Weather Prediction Center
WPMDS	Weather Product Management and Distribution System (AFWA)
WRS	Weather Reconnaissance Squadron
WS	Weather Squadron (USAF)
WSFO	Weather Service Forecast Office
WSO	Weather Service Office
WSPOD	Winter Storm Plan of the Day
WSRP	Winter Storm Reconnaissance Program

-Z-

Z	Zulu Time (UTC)
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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, and extends 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: Due regard is an 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 2 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 (WSPOD): The WSPOD is 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 are 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

5 December 2009

MEMORANDUM FOR CARCAH

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

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 6.2.1.7., Backup ARTCC Communications Procedures

PROCEDURES:

1. *Alternative method to acquire a clearance when aircrew is unable to contact Air Traffic Control*

- o 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.

- o 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

- o 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 J. STANTON, Lt Col, USAF
Airspace Manager

Attachment: ATC Phone Numbers

AIR TRAFFIC CONTROL PHONE NUMBERS

	OCEANIC SUPERVISOR	MISSIONS COORDINATOR
ANCHORAGE	(907) 269-1108 FAX (907) 269-1343	
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) 716-1589 (DSN 434-1910)
NEW YORK ARTCC	(305) 716-1782 (BAHAMAS & NORTH) (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

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.

ATTENTION

Flight track information is **not** available for online distribution. Appendices E, F, G, H, and I are only available to personnel that have an operational need. If you need to obtain access to the full version of the NWSOP, please send an email to ofcm.mail@noaa.gov or call 301-628-0112.

APPENDIX E
WESTERN ATLANTIC AND GULF OF MEXICO
FLIGHT TRACKS

This appendix contains the Western Atlantic and Gulf of Mexico winter storm flight tracks.

WSRP A61						
Point	Identifier	Lat	Long	Drop #	Enroute	
Keesler	KBIX	N 30 24.63	W088 55.47		# mins	
SEMMES	SJI	N 30 43.56	W088 21.56		11	
CATLN	CATLN	N 31 18.43	W087 34.80		11	
MONTGOMERY	MGM	N 32 13.34	W086 19.18		16	
MACON	MCN	N 32 41.47	W083 38.83		26	
TWINS	TWINS	N 32 46.71	W082 18.73		13	
TYDOE	TYDOE	N 32 49.28	W081 33.70		7	
CHARLESTON	CHS	N 32 53.66	W080 02.27		14	
WILMINGTON	ILM	N 34 21.10	W077 52.46		26	
TOMMZ	TOMMZ	N 35 24.15	W075 03.83		29	
LEXAD	LEXAD	N 36 45.33	W072 23.64	1	29	
SAVIK	SAVIK	N 37 42.69	W070 59.03	2	17	
		N 38 15.00	W069 00.00	3	19	
		N 37 00.00	W067 45.00	4	18	
DRYED	DRYED	N 38 37.94	W066 40.05	5	21	
JOBOC	JOBOC	N 40 07.00	W067 00.00	6	17	
		N 39 50.00	W070 00.00	7	26	
BERGH	BERGH	N 39 07.95	W072 03.10	8	20	
		N 37 30.00	W074 00.00	9	25	
TOMMZ	TOMMZ	N 35 24.15	W075 03.83	10	25	
WILMINGTON	ILM	N 34 21.10	W077 52.46		29	
CHARLESTON	CHS	N 32 53.66	W080 02.27		26	
TYDOE	TYDOE	N 32 49.28	W081 33.70		14	
TWINS	TWINS	N 32 46.71	W082 18.73		7	
MACON	MCN	N 32 41.47	W083 38.83		13	
MONTGOMERY	MGM	N 32 13.34	W086 19.18		26	
CATLN	CATLN	N 31 18.43	W087 34.80		16	
SEMMES	SJI	N 30 43.56	W088 21.56		10	
Keesler	KBIX	N 30 24.63	W088 55.47		10	
					Elapsed Time	8+41

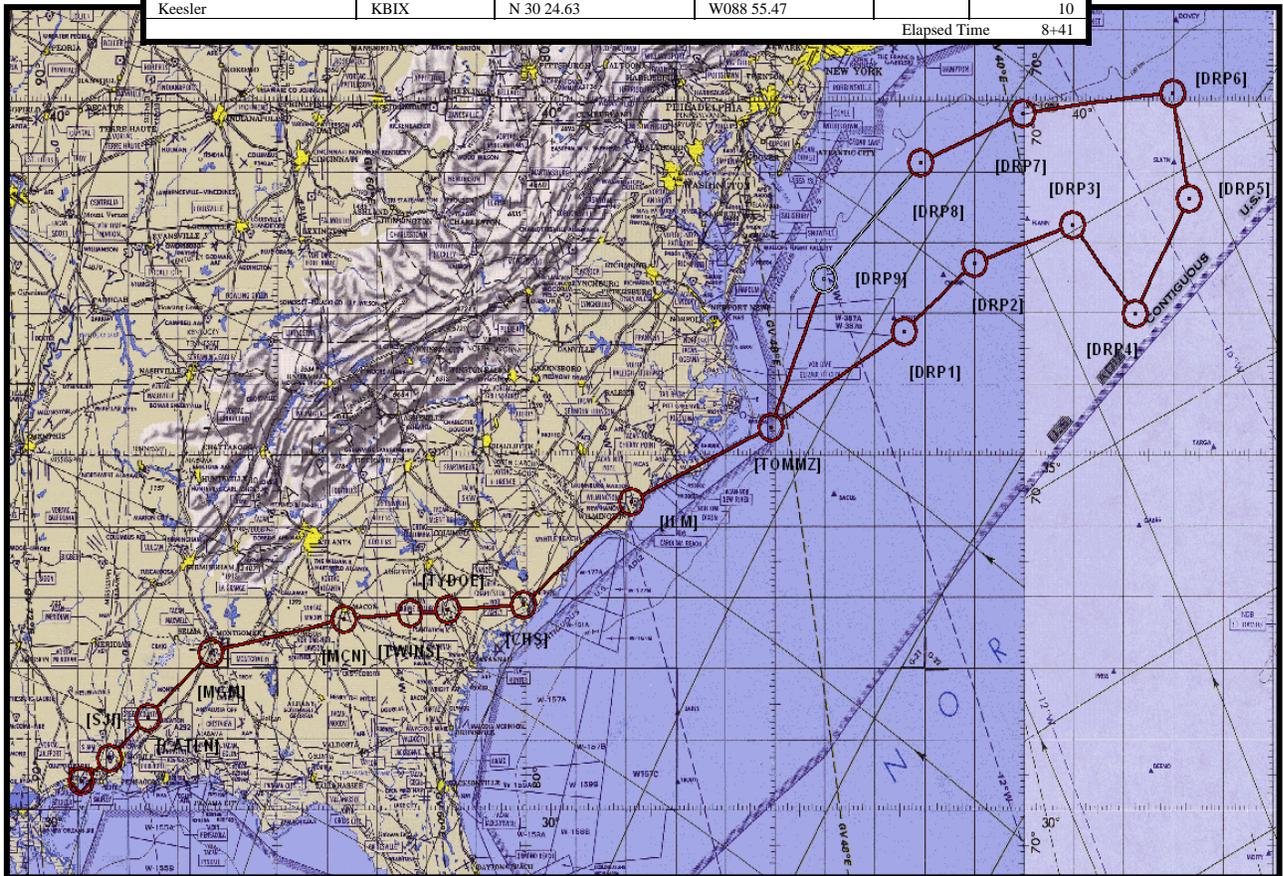


Figure E-1. Western Atlantic Flight Track WSRP-A61

WSRP A62					
Point	Identifier	Lat	Long	Drop #	Enroute
Keesler	KBIX	N 30 24.63	W088 55.47		# mins
SEMMES	SJI	N 30 43.56	W088 21.56		6
CATLN	CATLN	N 31 18.43	W087 34.80		10
MONTGOMERY	MGM	N 32 13.34	W086 19.18		16
AJFEB	AJFEB	N 33 38.42	W084 10.23		26
COLLIERS	IRQ	N 33 42.44	W082 09.72		19
COLUMBIA	CAE	N 33 51.44	W081 03.23		10
FLORENCE	FLO	N 34 13.98	W079 39.43		13
DWYTE	DWYTE	N 34 15.67	W079 16.02		4
MULLS	MULLS	N 34 16.73	W079 00.89		2
BARTL	BARTL	N 34 18.19	W078 39.09		3
WILMINGTON	ILM	N 34 21.10	W077 52.46		7
N3430W07445		N 34 30.00	W074 45.00	1	27
N3710W07254		N 37 10.00	W072 54.00	2	34
AZEU	AZEU	N 37 52.47	W072 22.72		9
KENDA	KENDA	N 39 21.18	W070 29.97	3	21
LACKS	LACKS	N 40 00.00	W068 11.96		18
SLATN	SLATN	N 39 07.00	W067 00.00	4	13
N39W065		N 39 00.00	W065 00.00		15
N37W067		N 37 00.00	W067 00.00	5	30
TILED	TILED	N 37 15.97	W068 58.40		21
N3550W07026		N 35 50.00	W070 26.00	6	22
ONGOT	ONGOT	N 33 58.91	W072 18.10	7	28
WILYY	WILYY	N 32 18.71	W073 06.21	8	20
N3122W07558		N 31 22.00	W075 58.00	9	31
CARPX	CARPX	N 30 24.48	W077 45.00		21
OHLAA	OHLAA	N 30 24.88	W078 05.90		3
OZENA	OZENA	N 30 25.17	W078 20.90		2
SNABS	SNABS	N 30 25.22	W078 31.22		2
TORRY	TORRY	N 30 25.33	W078 51.82	10	3
BAHAA	BAHAA	N 30 25.38	W078 59.68		1
JAWSS	JAWSS	N 30 26.83	W080 47.30		17
DINNS	DINNS	N 30 27.90	W081 48.10		10
TAYLOR	TAY	N 30 30.28	W082 33.17		7
ZOOS	ZOOS	N 30 32.11	W083 31.02		9
CAPPS	CAPPS	N 30 32.72	W083 54.30		4
SEMINOLE	SZW	N 30 33.37	W084 22.44		5
OJHAP	OJHAP	N 30 47.63	W085 08.24		8
DEFUN	DEFUN	N 30 48.85	W086 07.88		9
CRESTVIEW	CEW	N 30 49.57	W086 40.75		5
INBRD	INBRD	N 30 48.50	W087 00.45		3
SEMMES	SJI	N 30 43.56	W088 21.56		13
Keesler	KBIX	N 30 24.63	W088 55.47		10

Elapsed Time 8+58

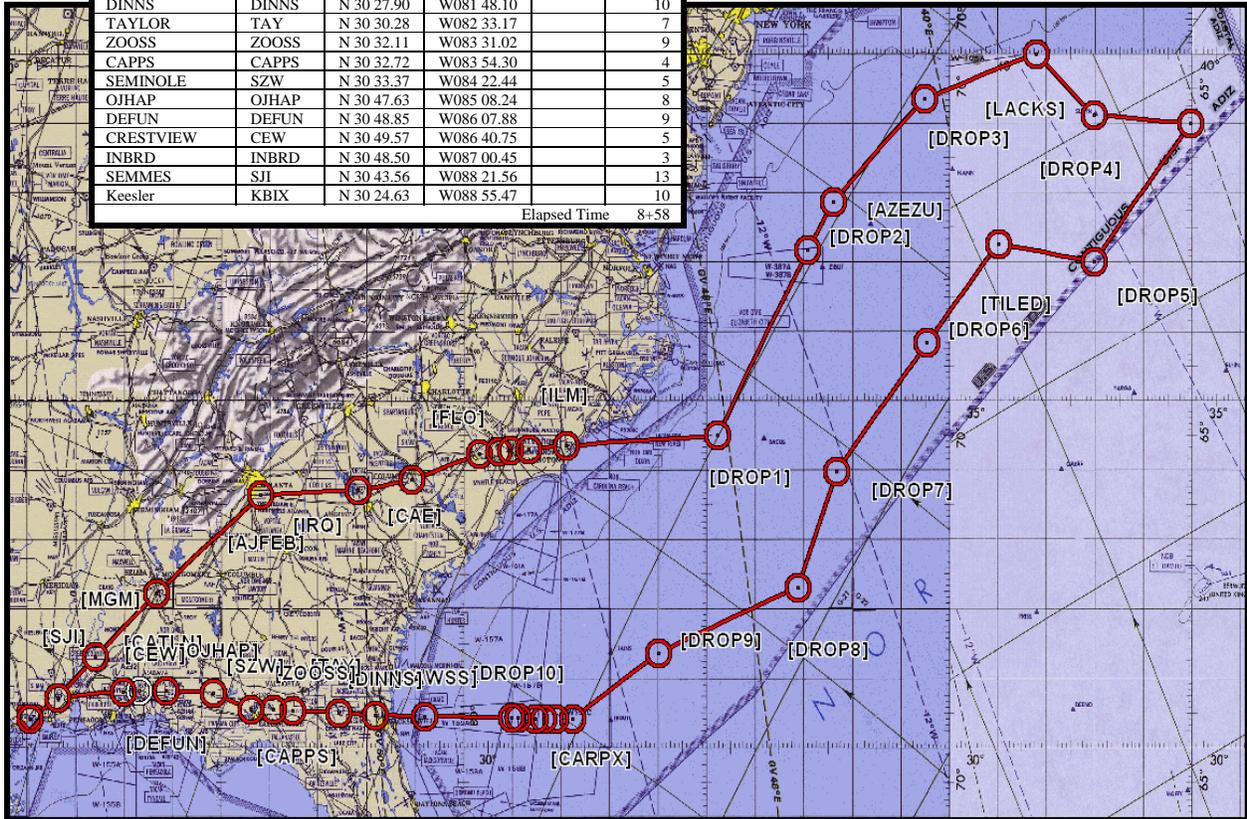


Figure E-2. Western Atlantic Flight Track WSRP-A62

P A63					
Point	Identifier	Lat	Long	Drop #	Enroute # mins
Keesler	KBIX	N 30 24.63	W088 55.47		
SEMMES	SJI	N 30 43.56	W088 21.56		7
CATLN	CATLN	N 31 18.43	W087 34.80		10
MONTGOMERY	MGM	N 32 13.34	W086 19.18		16
AJFEB	AJFEB	N 33 38.42	W084 10.23		26
GREENWOOD	GRD	N 34 15.09	W082 09.25		20
DARRL	DARRL	N 34 47.82	W081 03.36		12
BEAUU	BEAUU	N 35 46.94	W078 58.79		22
RALEIGH-DURHAM	RDU	N 35 52.35	W078 47.00		2
FRANZ	FRANZ	N 35 57.47	W077 54.47		8
TAR RIVER	TYI	N 35 58.60	W077 42.23		2
ELIZABETH CITY	ECG	N 36 15.45	W076 10.54		14
N36W07430		N 36 00.00	W074 30.00	1	16
BOJAN	BOJAN	N 38 10.90	W072 58.57	2	28
N40W071		N 39 40.00	W071 00.00	3	24
LACKS	LACKS	N 40 00.00	W068 11.96	4	25
DRYED	DRYED	N 38 37.94	W066 40.05	5	20
N3830W06930		N 38 30.00	W069 30.00	6	25
N37W06930		N 37 00.00	W069 30.00	7	17
N36W072		N 36 00.00	W072 00.00	8	25
RUNDY	RUNDY	N 34 05.87	W073 46.23	9	27
OTNG	OTNG	N 32 04.28	W077 00.00	10	38
CHARLESTON	CHS	N 32 53.66	W080 02.27		30
TYDOE	TYDOE	N 32 49.28	W081 33.70		14
TWINS	TWINS	N 32 46.71	W082 18.73		7
MACON	MCN	N 32 41.47	W083 38.83		13
MONTGOMERY	MGM	N 32 13.34	W086 19.18		26
CATLN	CATLN	N 31 18.43	W087 34.80		16
SEMMES	SJI	N 30 43.56	W088 21.56		10
Keesler	KBIX	N 30 24.63	W088 55.47		10

Elapsed Time 8+30

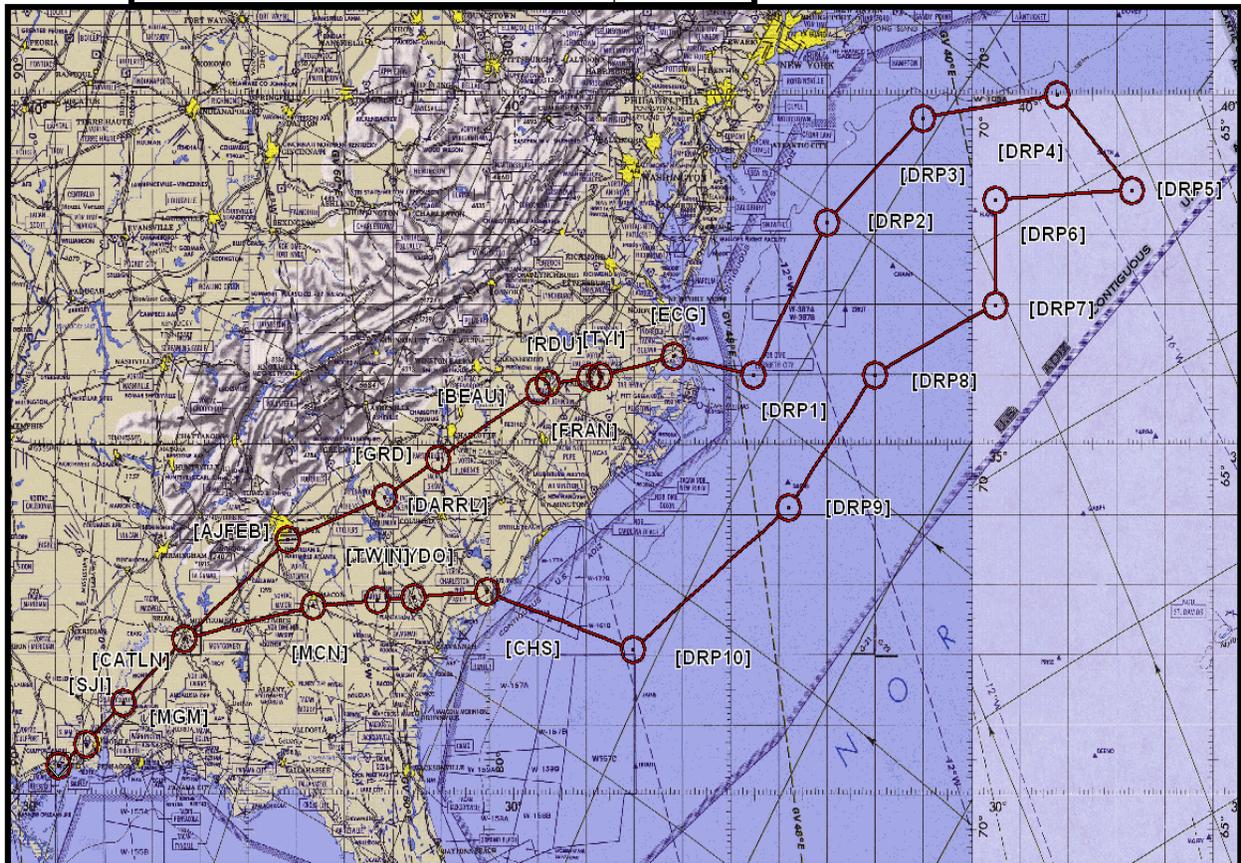


Figure E-3. Western Atlantic Flight Track WSRP-A63

WSRP A64					
Point	Identifier	Lat	Long	Drop #	Enroute
Keesler	KBIX	N 30 24.63	W088 55.47		# mins
SEMMES	SJI	N 30 43.56	W088 21.56		7
INBRD	INBRD	N 30 48.50	W087 00.45		13
CRESTVIEW	CEW	N 30 49.57	W086 40.75		3
DEFUN	DEFUN	N 30 48.85	W086 07.88		5
OJHAP	OJHAP	N 30 47.63	W085 08.24		10
SEMINOLE	SZW	N 30 33.37	W084 22.44		8
CAPPS	CAPPS	N 30 32.72	W083 54.30		5
ZOOSS	ZOOSS	N 30 32.11	W083 31.02		4
TAYLOR	TAY	N 30 30.28	W082 33.17		9
BAHAA	BAHAA	N 30 25.38	W078 59.68		35
JENKS	JENKS	N 30 38.12	W078 41.73		4
EMCEE	EMCEE	N 30 47.56	W078 27.55		3
LANIE	LANIE	N 30 56.50	W078 14.14		3
PERIE	PERIE	N 31 13.72	W077 47.81		5
HANRI	HANRI	N 31 45.88	W077 00.00	1	10
PAEPR	PAEPR	N 35 02.52	W072 24.99	2	57
RESQU	RESQU	N 37 28.76	W071 26.83	3	29
WEBBB	WEBBB	N 37 40.29	W071 58.92		5
AZEU	AZEU	N 37 52.47	W072 22.72		4
LYNUS	LYNUS	N 38 00.88	W072 39.24		3
AGUNE	AGUNE	N 38 06.48	W072 50.03		2
BOJAN	BOJAN	N 38 10.90	W072 58.57	4	2
BERGH	BERGH	N 39 07.95	W072 03.10	5	13
KENDA	KENDA	N 39 21.18	W070 29.97	6	14
N3730W070		N 37 30.00	W070 00.00	7	21
N3630W070		N 36 30.00	W070 00.00	8	11
N34W070		N 34 00.00	W070 00.00	9	28
N3020W075		N 30 20.00	W075 00.00	10	63
TROUT	TROUT	N 30 23.00	W077 00.00		19
CARPX	CARPX	N 30 24.48	W077 45.00		7
OHLAA	OHLAA	N 30 24.88	W078 05.90		3
OZENA	OZENA	N 30 25.17	W078 20.90		2
SNABS	SNABS	N 30 25.22	W078 31.22		2
TORRY	TORRY	N 30 25.33	W078 51.82		3
BAHAA	BAHAA	N 30 25.38	W078 59.68		1
JAWSS	JAWSS	N 30 26.83	W080 47.30		17
DINNS	DINNS	N 30 27.90	W081 48.10		10
TAYLOR	TAY	N 30 30.28	W082 33.17		7
ZOOSS	ZOOSS	N 30 32.11	W083 31.02		9
CAPPS	CAPPS	N 30 32.72	W083 54.30		4
SEMINOLE	SZW	N 30 33.37	W084 22.44		5
OJHAP	OJHAP	N 30 47.63	W085 08.24		8
DEFUN	DEFUN	N 30 48.85	W086 07.88		10
CRESTVIEW	CEW	N 30 49.57	W086 40.75		5
INBRD	INBRD	N 30 48.50	W087 00.45		3
SEMMES	SJI	N 30 43.56	W088 21.56		13
Keesler	KBIX	N 30 24.63	W088 55.47		10

Elapsed Time 8+34

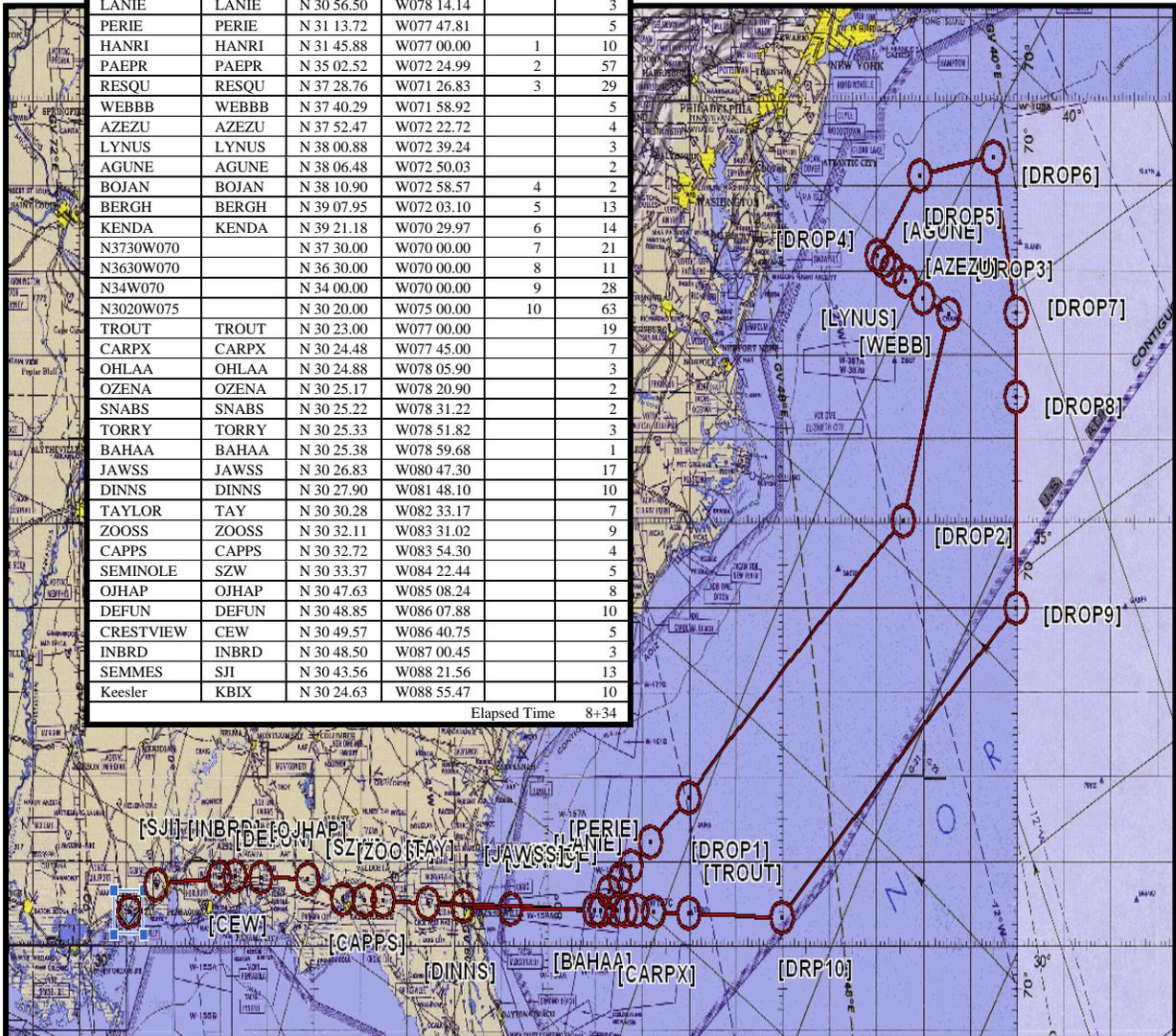


Figure E-4. Western Atlantic Flight Track WSRP-A64

WSRP A65					
Point	Identifier	Lat	Long	Drop #	Enroute # mins
Keesler	KBIX	N 30 24.63	W088 55.47		
SEMMES	SJI	N 30 43.56	W088 21.56		7
INBRD	INBRD	N 30 48.50	W087 00.45		13
CRESTVIEW	CEW	N 30 49.57	W086 40.75		3
DEFUN	DEFUN	N 30 48.85	W086 07.88		5
OJHAP	OJHAP	N 30 47.63	W085 08.24		10
SEMINOLE	SZW	N 30 33.37	W084 22.44		8
CAPPS	CAPPS	N 30 32.72	W083 54.30		5
ZOOSS	ZOOSS	N 30 32.11	W083 31.02		4
TAYLOR	TAY	N 30 30.28	W082 33.17		9
JAWSS	JAWSS	N 30 26.83	W080 47.30		17
LANIE	LANIE	N 30 56.50	W078 14.14	1	25
N33W07720		N 33 00.00	W077 20.00	2	25
N34W07530		N 34 00.00	W075 30.00	3	21
TOMMZ	TOMMZ	N 35 24.15	W075 03.83	4	16
N3525W073		N 35 25.00	W073 00.00	5	19
N3415W072		N 34 15.00	W072 00.00	6	16
N3240W07215		N 32 40.00	W072 15.00	7	18
N30W075		N 30 00.00	W075 00.00	8	40
SUMRS	SUMRS	N 28 42.70	W076 33.51	9	21
STIFF	STIFF	N 27 36.31	W078 38.77	10	24
PALM BEACH	PBI	N 26 40.80	W080 05.19		18
PAHOKEE	PHK	N 26 46.96	W080 41.49		6
LA BELLE	LBV	N 26 49.69	W081 23.49		7
CHRR1	CHRR1	N 27 03.01	W081 39.25		4
MMDUQ	MMDUQ	N 27 15.77	W081 54.43		3
SARASOTA	SRQ	N 27 24.42	W082 33.82		7
REMIS	REMIS	N 27 53.04	W085 15.47		27
ROZZI	ROZZI	N 28 18.87	W086 42.31		15
REDFN	REDFN	N 28 52.98	W088 42.11		21
EYEKO	EYEKO	N 29 33.74	W089 30.57		11
GULFPORT	GPT	N 30 24.41	W089 04.61		10
Keesler	KBIX	N 30 24.63	W088 55.47		

Elapsed Time 7+25

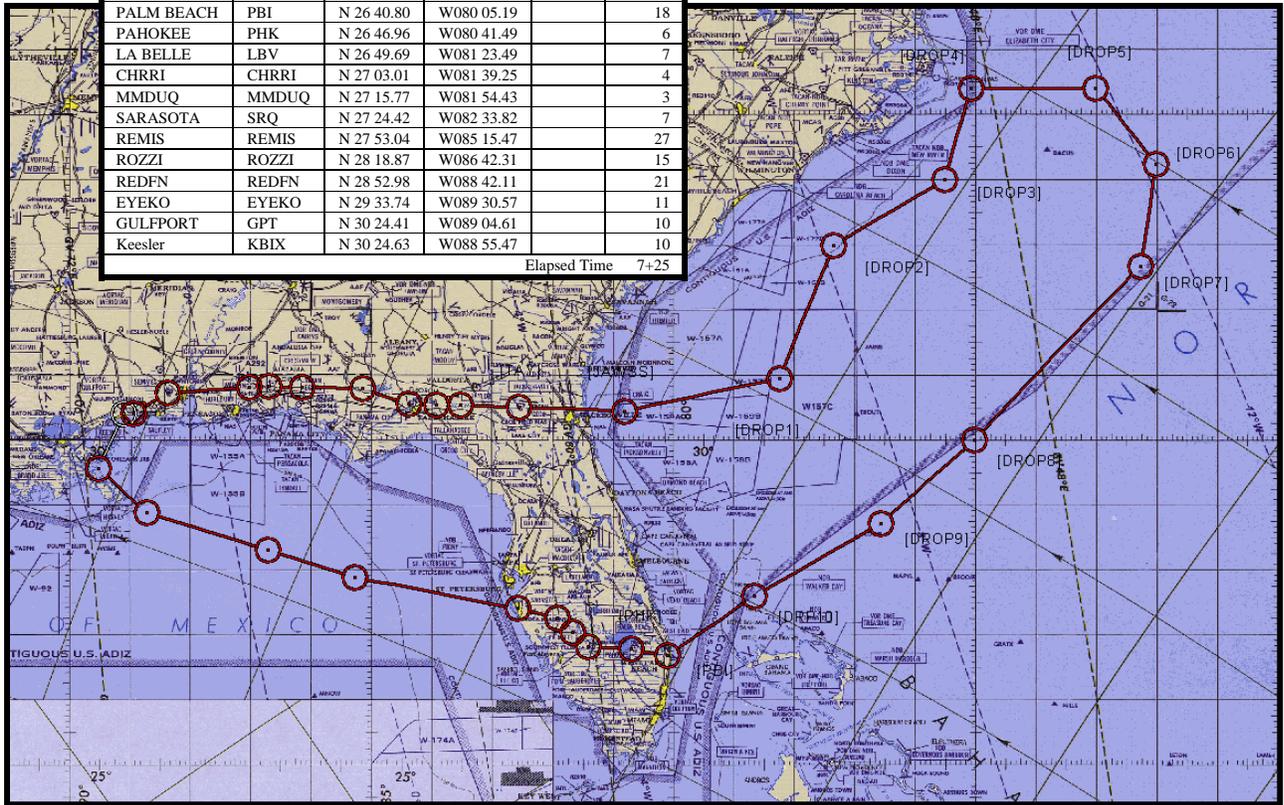


Figure E-5. Western Atlantic Flight Track WSRP-A65

WSRP A66					
Point	Identifier	Lat	Long	Drop #	Enroute
Keesler	KBIX	N 30 24.63	W088 55.47		# mins
EYEKO	EYEKO	N 29 33.74	W089 30.57		17
REDFN	REDFN	N 28 52.98	W088 42.11	1	12
ROZZI	ROZZI	N 28 18.87	W086 42.31		21
N2814W08628		N 28 14.00	W086 28.00	2	3
REMIS	REMIS	N 27 53.04	W085 15.47		13
CIGAR	CIGAR	N 27 29.61	W084 46.99		6
N2657W08514		N 26 57.00	W085 14.00	3	8
MINOW	MINOW	N 26 02.79	W085 58.98		13
N2530W08655		N 25 30.00	W086 55.00	4	11
ELIOM	ELIOM	N 25 03.46	W087 41.03		9
SWORD	SWORD	N 24 30.00	W088 37.00		11
N2430W08912		N 24 30.00	W089 12.00	5	6
KEHLI	KEHLI	N 24 29.06	W089 50.50		7
MARTE	MARTE	N 24 30.00	W091 47.09	6	20
COKER	COKER	N 24 57.80	W093 52.89	7	22
N2630W09500		N 26 30.00	W095 00.00	8	21
MUSYL	MUSYL	N 28 10.23	W094 07.75		21
N2812W09350		N 28 12.00	W093 50.00	9	3
KLAMS	KLAMS	N 28 15.00	W092 49.66		10
BOGGY	BOGGY	N 28 15.03	W091 27.76	10	14
LEEVILLE	LEV	N 29 10.51	W090 06.24		17
EYEKO	EYEKO	N 29 33.74	W089 30.57		7
GULFPORT	GPT	N 30 24.41	W089 04.61		10
KEESLER AFB	BIX	N 30 24.63	W088 55.47		10

Elapsed Time 4:52

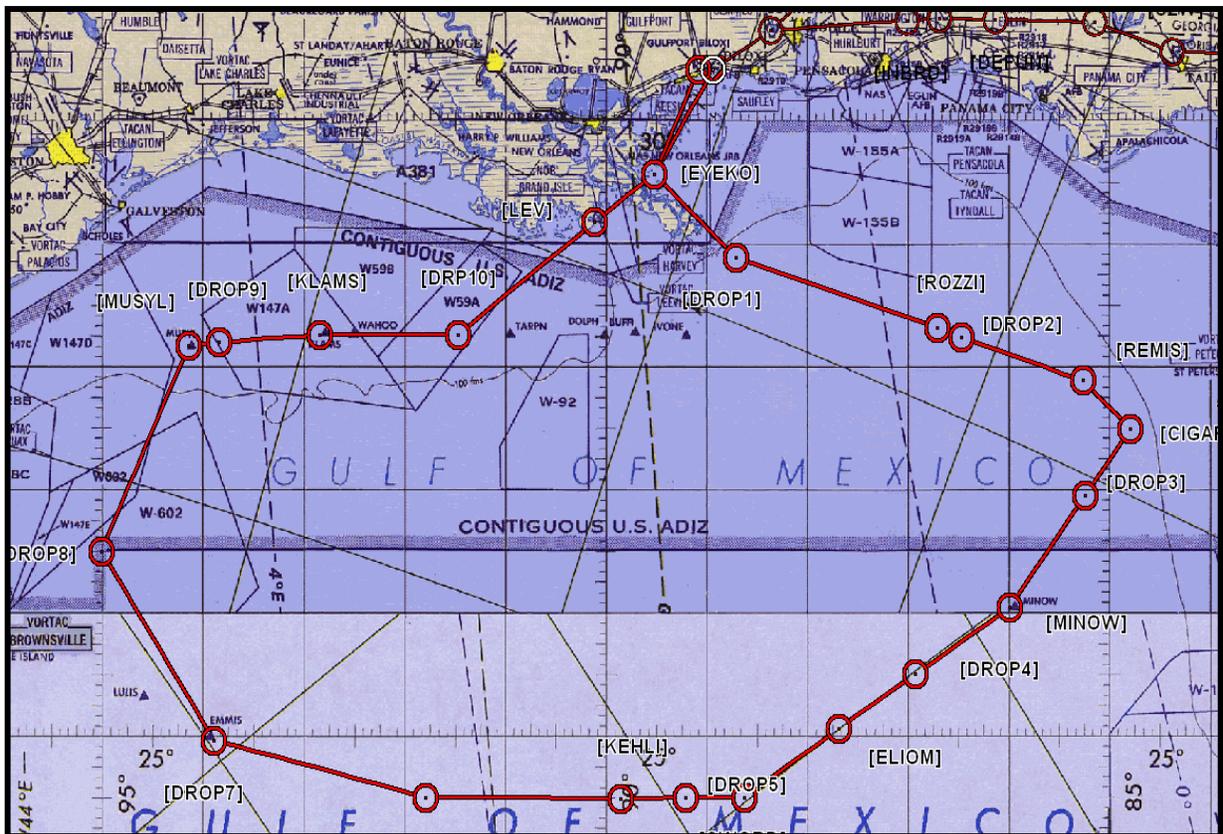


Figure E-6. Western Atlantic Flight Track WSRP-A66

APPENDIX F
OVERVIEW OF THE PACIFIC REGION FLIGHT TRACKS

This appendix contains an overview of the Pacific region winter storm flight tracks.

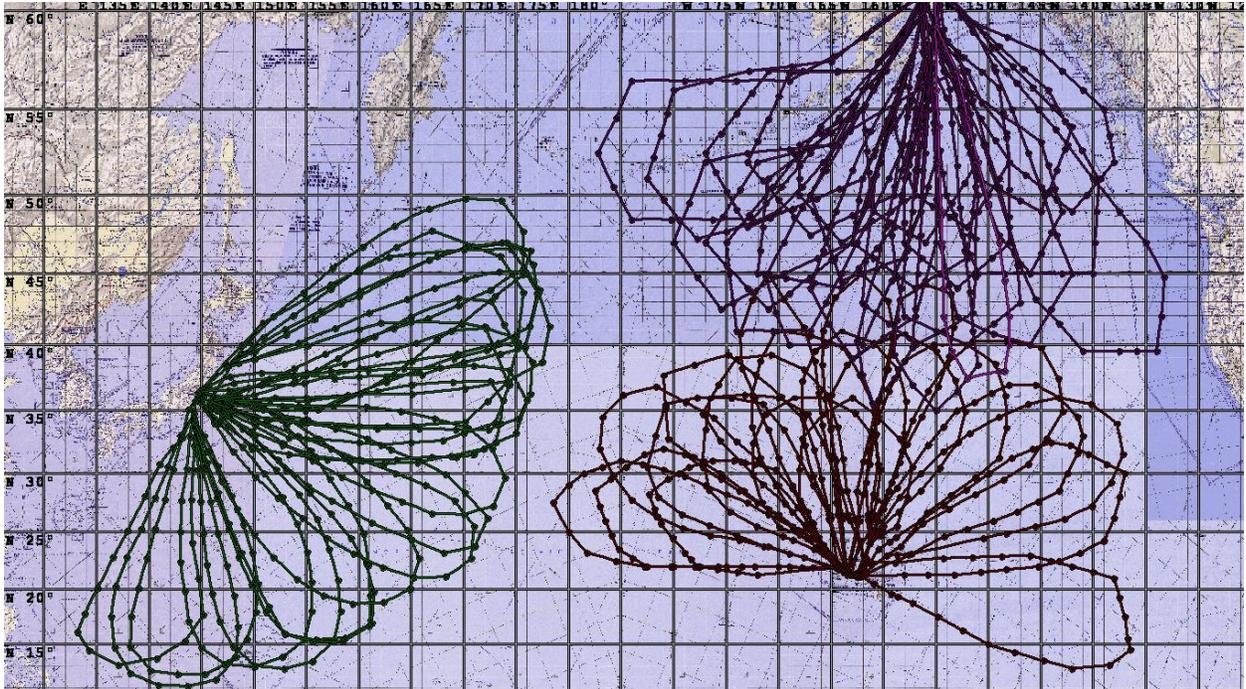


Figure F-1. Overview of Alaskan, Hawaiian, and Japanese Flight Tracks

APPENDIX G
ALASKAN FLIGHT TRACKS

This appendix contains the Alaskan winter storm flight tracks.

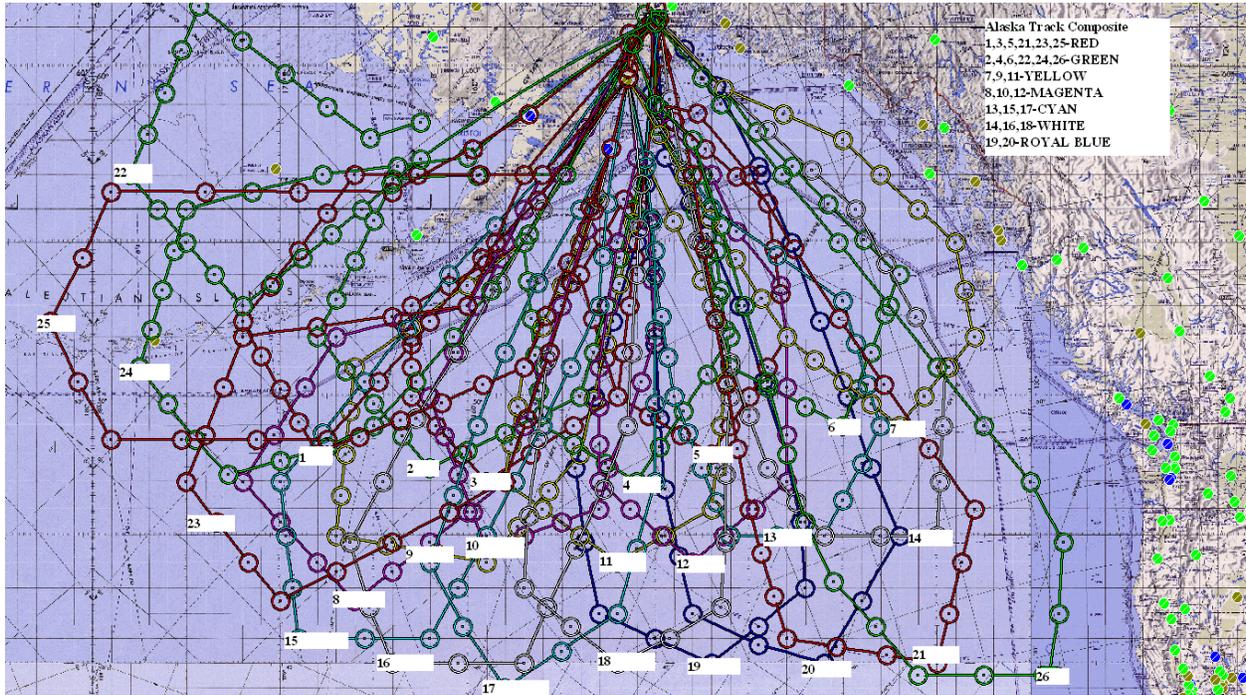


Figure G-1. Composite of Alaskan Flight Track WSRP P1-26

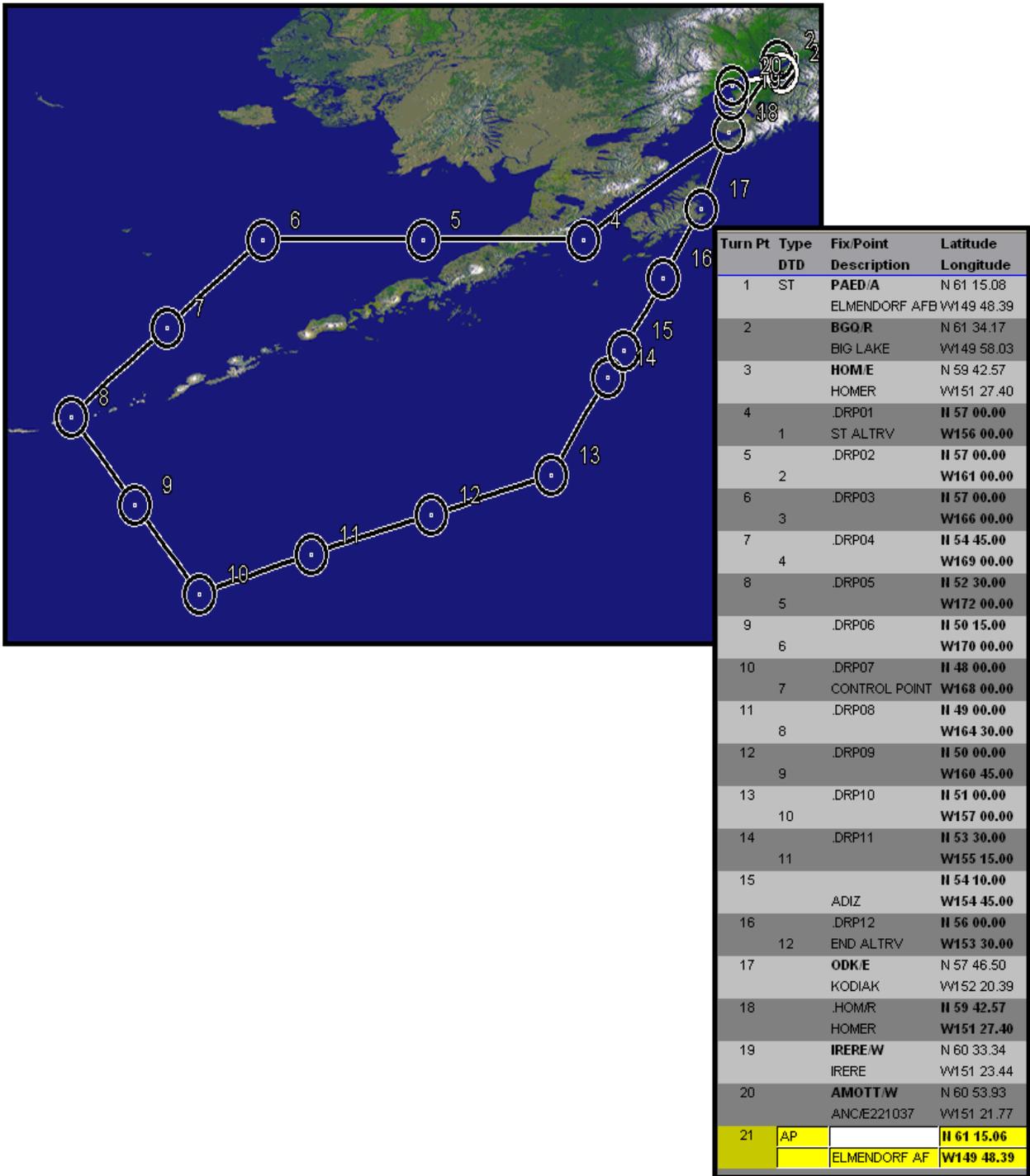


Figure G-2. Alaskan Flight Track WSRP-P1

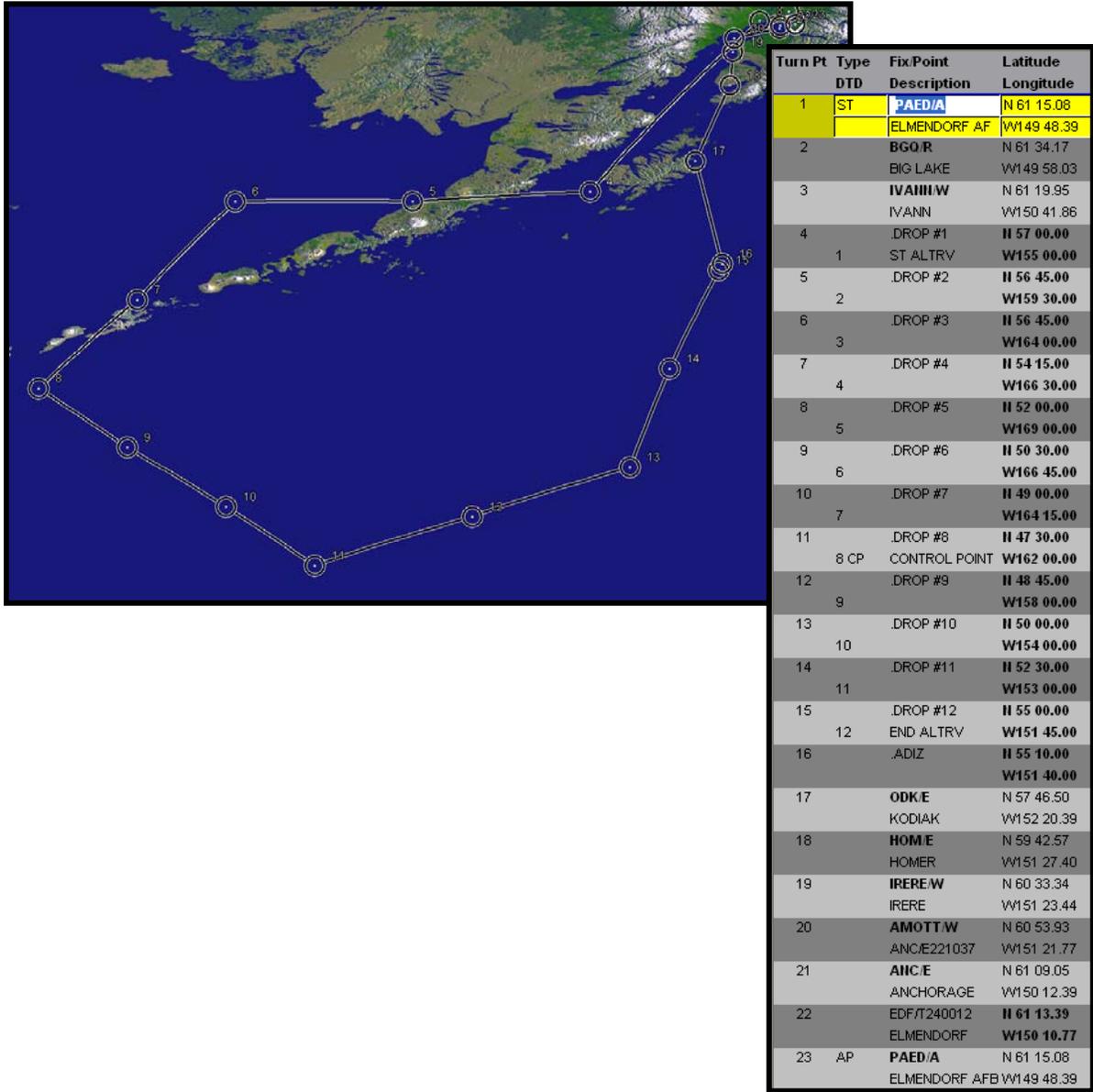


Figure G-3. Alaskan Flight Track WSRP-P2

Turn Pt	Type	Fix/Point DTD Description	Latitude Longitude
1	ST	PAED/A	N 61 15.08
		ELMENDORF AF	W149 48.39
2		BGOR	N 61 34.17
		BIG LAKE	W149 58.03
3		AMOTT W	N 60 53.93
		ANCE221037	W151 21.77
4		.DROP #1	H 59 15.00
5	1	ST ALTRV	W152 30.00
		.DROP #2	H 57 00.00
6	2	.DROP #3	H 54 45.00
			W155 00.00
7	3	.DROP #4	H 53 45.00
			W160 45.00
8	4	.DROP #5	H 52 45.00
			W164 00.00
9	5	.DROP #6	H 50 00.00
			W163 45.00
10	6	.DROP #7	H 47 45.00
			W161 45.00
11	7	.DROP #8	H 46 45.00
			W158 30.00
12	8 CP	CONTROL POINT	W158 30.00
		.DROP #9	H 48 00.00
13	9	.DROP #10	H 49 30.00
			W155 30.00
14	10	.DROP #11	H 52 15.00
			W152 15.00
15	11	.DROP #12	H 54 45.00
			W151 30.00
16	12	.ADIZ	H 55 25.00
			W150 50.00
17	13	.DROP #13	H 57 15.00
			W150 30.00
18		SEWAR W	N 60 16.01
		SEWAR	W149 40.06
19		AIIC E	N 61 09.05
		ANCHORAGE	W150 12.39
20	AP	PAED/A	N 61 15.08
		ELMENDORF AFB	W149 48.39

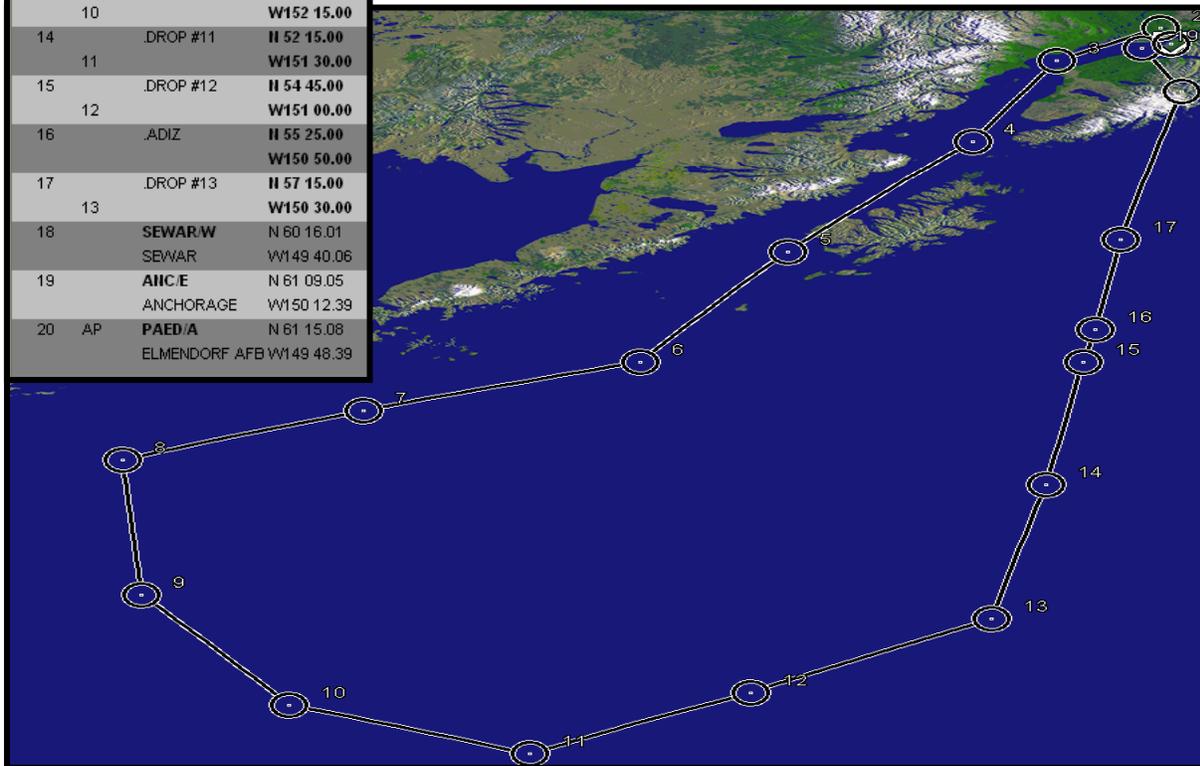


Figure G-4. Alaskan Flight Track WSRP-P3

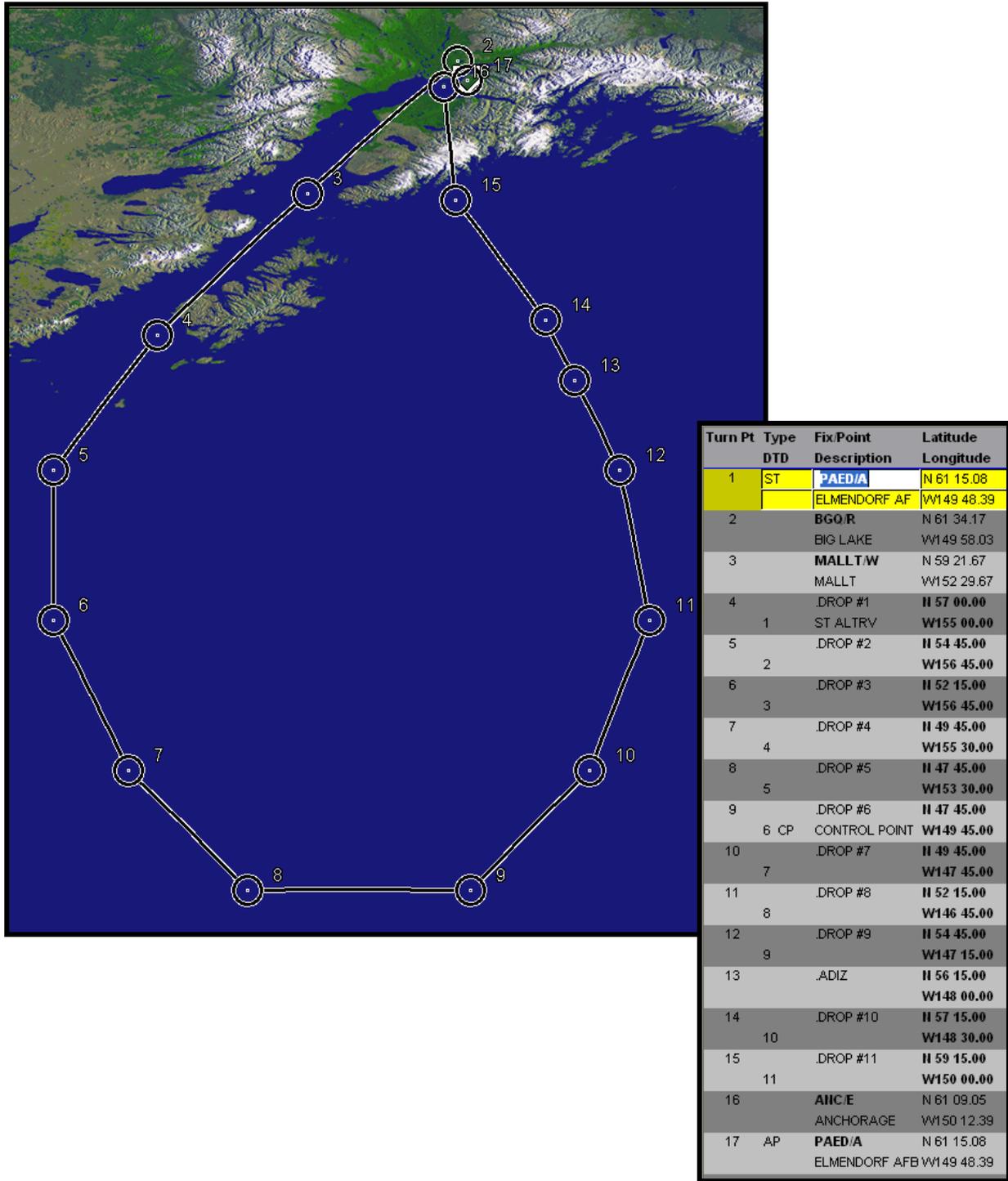
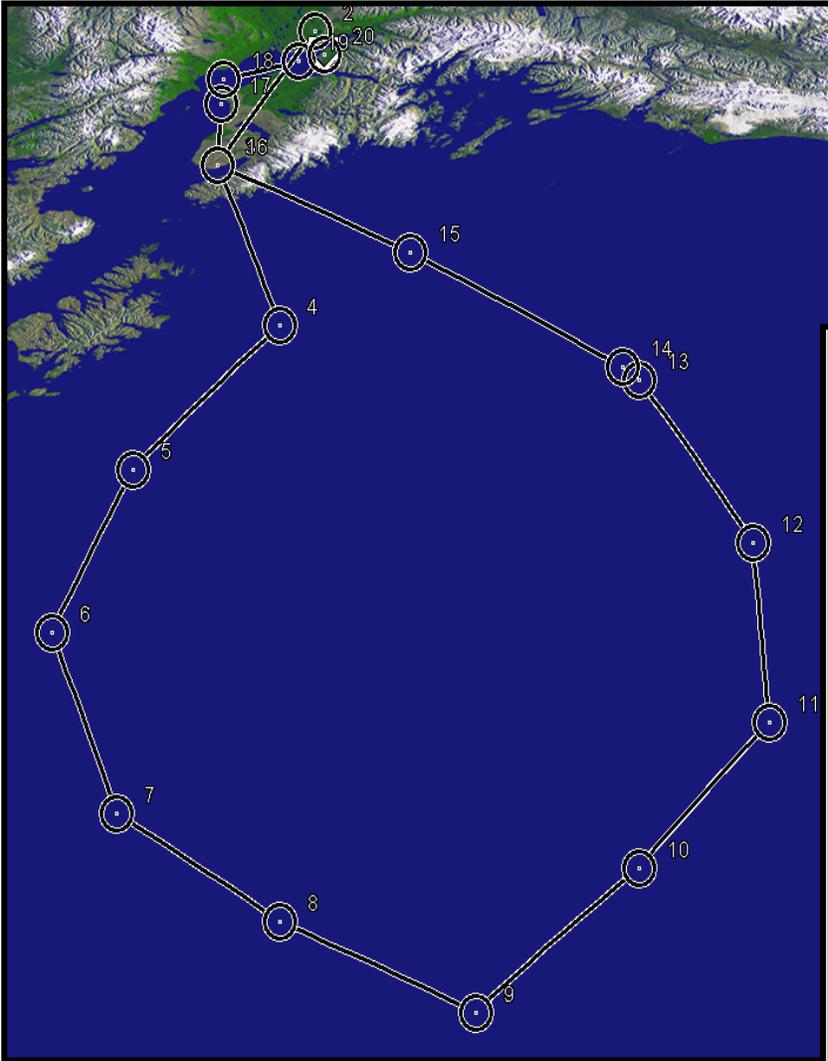


Figure G-5. Alaskan Flight Track WSRP-P4



Turn Pt	Type	FixPoint Description	Latitude Longitude
1	ST	PAEDIA	N 61 15.08
		ELMENDORF AF	W149 48.39
2		BGO.R	N 61 34.17
		BIG LAKE	W149 58.03
3		HOME	N 59 42.57
		HOMER	W151 27.40
4		.DROP #1	H 57 30.00
	1	ST ALTRV	W150 30.00
5		.DROP #2	H 55 30.00
	2		W152 45.00
6		.DROP #3	H 53 15.00
	3		W154 00.00
7		.DROP #4	H 50 45.00
	4		W153 00.00
8		.DROP #5	H 49 15.00
	5		W150 30.00
9		.DROP #6	H 48 00.00
	6 CP	CONTROL POINT	W147 30.00
10		.DROP #7	H 50 00.00
	7		W145 00.00
11		.DROP #8	H 52 00.00
	8		W143 00.00
12		.DROP #9	H 54 30.00
	9		W143 15.00
13		.DROP #10	H 56 45.00
	10		W145 00.00
14		.ADIZ	H 56 55.00
			W145 15.00
15		.DROP #11	H 58 30.00
	11	END ALTRV	W148 30.00
16		HOME	N 59 42.57
		HOMER	W151 27.40
17		IRERE.W	N 60 33.34
		IRERE	W151 23.44
18		AMOTT.W	N 60 53.93
		ANC/E221037	W151 21.77
19		AHC.E	N 61 09.05
		ANCHORAGE	W150 12.39
20	AP	PAEDIA	N 61 15.08
		ELMENDORF AFB	W149 48.39

Figure G-6. Alaskan Flight Track WSRP-P5

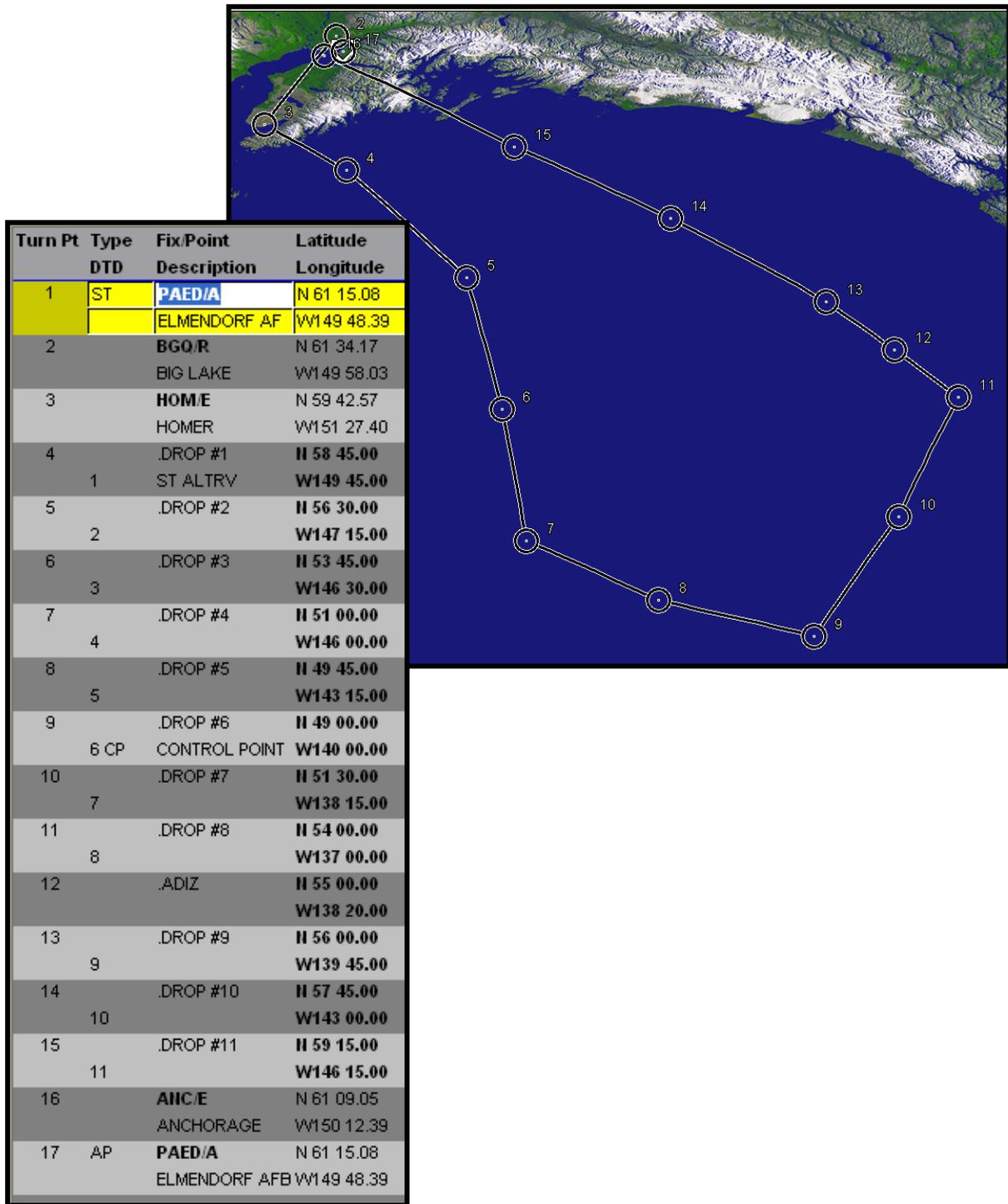


Figure G-7. Alaskan Flight Track WSRP-P6

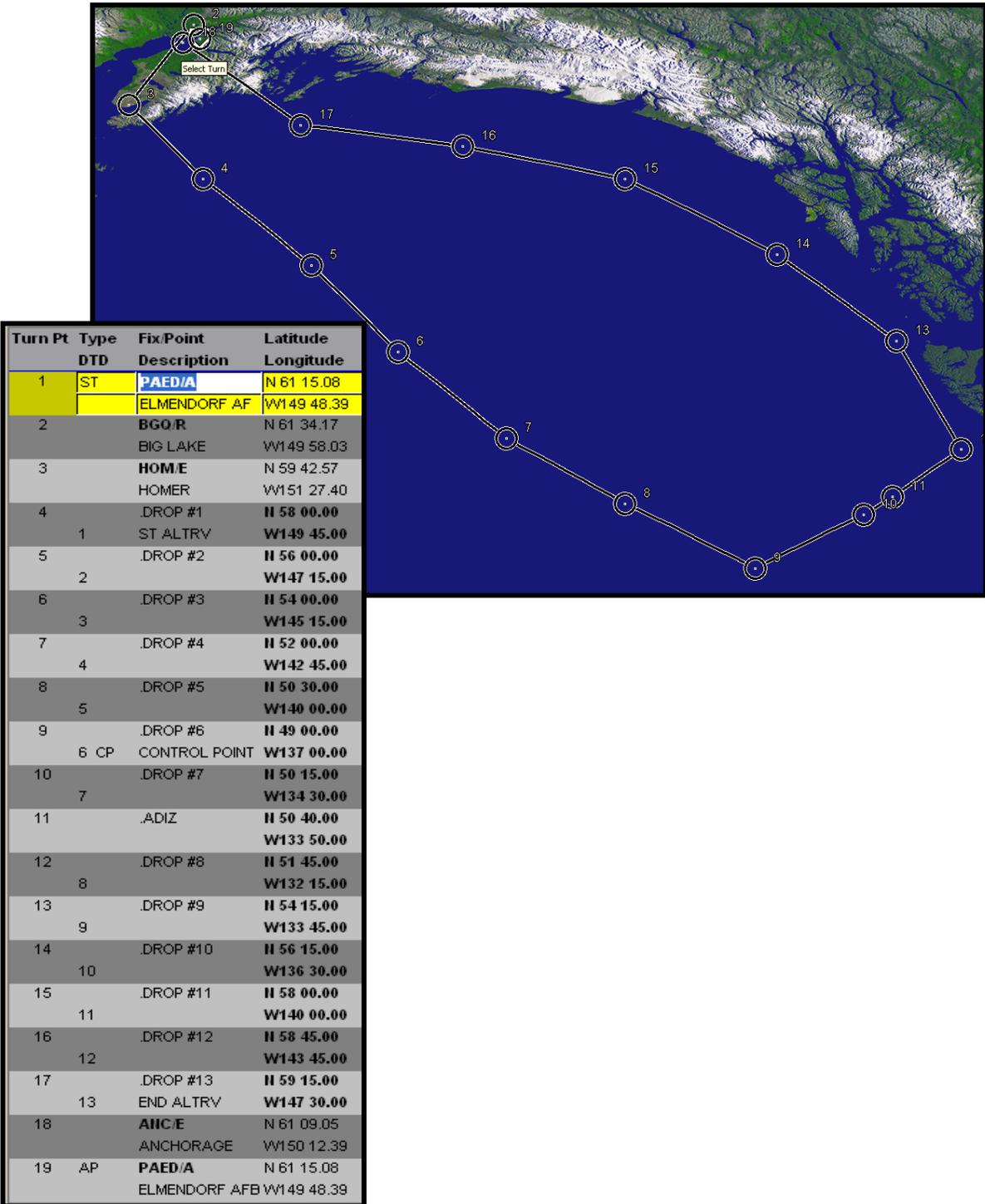


Figure G-8. Alaskan Flight Track WSRP-P7

Turn Pt	Type	Fix Point Description	Latitude Longitude
1	ST	PAEDIA	N 61 15.08
		ELMENDORF AFB	W149 48.39
2		BGO/R	N 61 34.17
		BIG LAKE	W149 58.03
3		DROP #1	H 58 15.00
	1	ST ALTRV	W153 45.00
4		DROP #2	H 56 15.00
	2		W156 30.00
5		DROP #3	H 54 00.00
	3		W159 15.00
6		DROP #4	H 52 30.00
	4		W163 15.00
7		DROP #5	H 51 45.00
	5		W167 30.00
8		DROP #6	H 49 30.00
	6		W170 00.00
9		DROP #7	H 47 15.00
	7 CP	CONTROL POINT	W172 00.00
10		DROP #8	H 45 00.00
	8		W169 15.00
11		DROP #9	H 42 45.00
	9		W166 30.00
12		DROP #10	H 44 00.00
	10		W163 15.00
13		DROP #11	H 45 30.00
	11		W160 45.00
14		DROP #12	H 47 00.00
	12		W158 00.00
15		DROP #13	H 49 30.00
	13		W156 45.00
16		DROP #14	H 52 00.00
	14		W155 30.00
17		DROP #15	H 54 30.00
	15	ADIZ	W154 15.00
18		DROP #16	H 57 00.00
	16		W152 45.00
19		ODK/E	N 57 46.50
		KODIAK	W152 20.39
20		HOME	N 59 42.57
		HOMER	W151 27.40
21		IRERE/W	N 60 33.34
		IRERE	W151 23.44
22		AHC/E	N 61 09.05
		ANCHORAGE	W150 12.39
23	AP	PAEDIA	N 61 15.08
		ELMENDORF AFB	W149 48.39

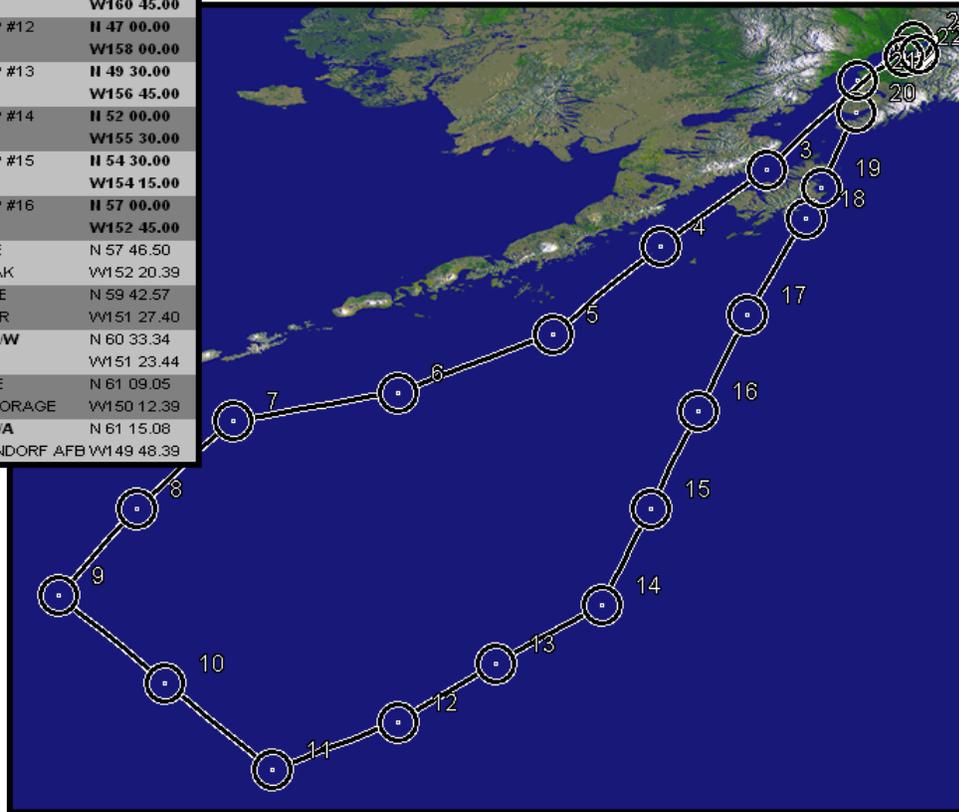


Figure G-9. Alaskan Flight Track WSRP-P8

Turn Pt	Type	Fix/Point Description	Latitude Longitude
1	ST	PAED/A	N 61 15.08
		ELMENDORF AF	W149 48.39
2		BGO/R	N 61 34.17
		BIG LAKE	W149 58.03
3		.DROP #1	H 57 00.00
	1	ST ALTRV	W155 00.00
4		.DROP #2	H 55 00.00
	2		W157 00.00
5		.DROP #3	H 53 30.00
	3		W160 00.00
6		.DROP #4	H 52 15.00
	4		W163 00.00
7		.DROP #5	H 51 00.00
	5		W166 00.00
8		.DROP #6	H 48 00.00
	6		W166 30.00
9		.DROP #7	H 45 00.00
	7 CP	CONTROL POINT	W167 00.00
10		.DROP #8	H 44 30.00
	8		W163 30.00
11		.DROP #9	H 44 00.00
	9		W159 45.00
12		.DROP #10	H 45 30.00
	10		W156 45.00
13		.DROP #11	H 47 30.00
	11		W154 15.00
14		.DROP #12	H 50 00.00
	12		W153 15.00
15		.DROP #13	H 52 30.00
	13		W152 00.00
16		.DROP #14	H 55 00.00
	14		W151 00.00
17		.ADIZ	H 55 25.00
			W150 50.00
18		.DROP #15	H 57 30.00
	15		W150 15.00
19		HOM/W	N 59 42.57
		HOMER	W151 27.40
20		IRERE/W	N 60 33.34
		IRERE	W151 23.44
21		AHC/E	N 61 09.05
		ANCHORAGE	W150 12.39
22	AP	PAED/A	N 61 15.08
		ELMENDORF AFB	W149 48.39

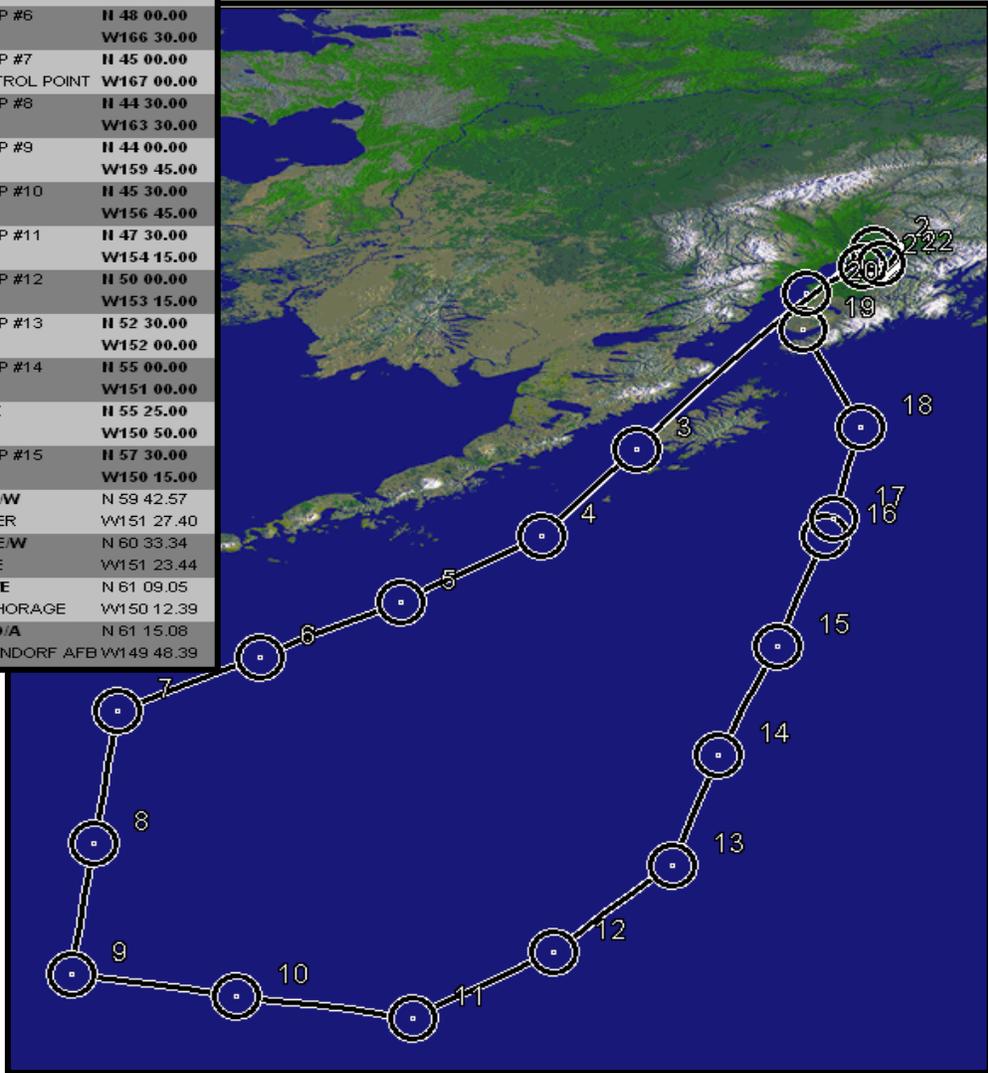


Figure G-10. Alaskan Flight Track WSRP-P9

Turn Pt	Type	Fix/Point Description	Latitude Longitude
1	ST	PAED/A	N 61 15.08
		ELMENDORF AF	W149 48.39
2		BGQ/R	N 61 34.17
		BIG LAKE	W149 58.03
3	1	.DROP #1	11 57 00.00
		ST ALTRV	W155 15.00
4	2	.DROP #2	11 54 45.00
			W158 00.00
5	3	.DROP #3	11 52 30.00
			W160 00.00
6	4	.DROP #4	11 50 00.00
			W162 00.00
7	5	.DROP #5	11 47 30.00
			W160 30.00
8	6 CP	.DROP #6	11 45 00.00
		CONTROL POINT	W159 00.00
9	7	.DROP #7	11 45 15.00
			W156 00.00
10	8	.DROP #8	11 46 00.00
			W153 00.00
11	9	.DROP #9	11 48 30.00
			W151 45.00
12	10	.DROP #10	11 51 00.00
			W150 30.00
13	11	.DROP #11	11 53 30.00
			W150 30.00
14		.ADIZ	11 55 30.00
			W150 30.00
15	12	.DROP #12	11 56 00.00
			W150 30.00
16	13	.DROP #13	11 58 15.00
		END ALTRV	W150 45.00
17		HOM/W	N 59 42.57
		HOMER	W151 27.40
18		IRERE/W	N 60 33.34
		IRERE	W151 23.44
19		ANIC/E	N 61 09.05
		ANCHORAGE	W150 12.39
20	AP	PAED/A	N 61 15.08
		ELMENDORF AFB	W149 48.39

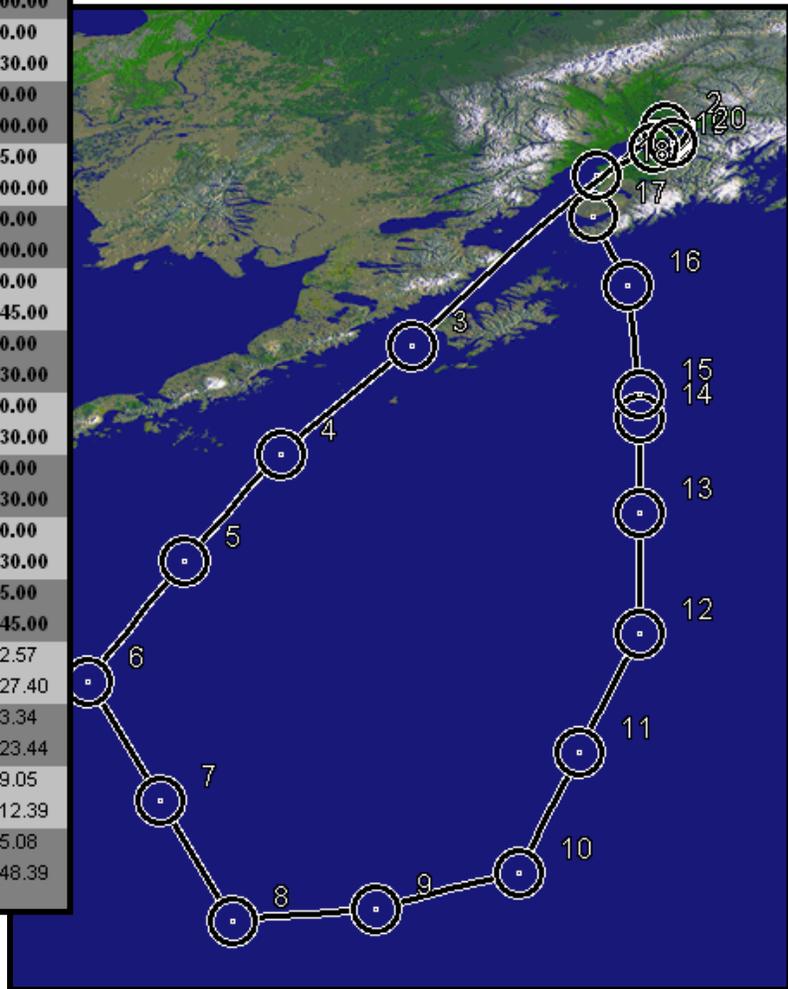


Figure G-11. Alaskan Flight Track WSRP-P10

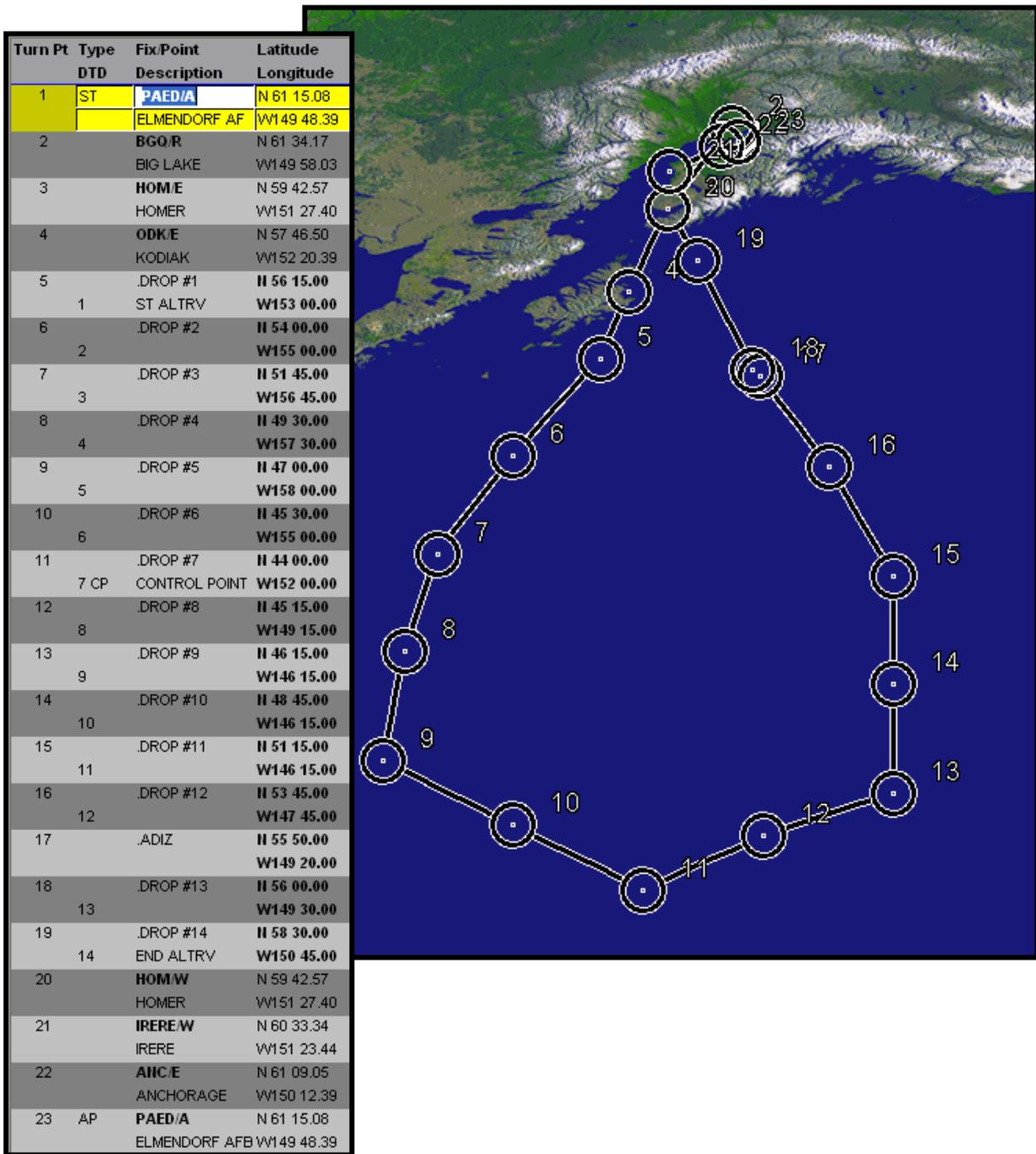


Figure G-12. Alaskan Flight Track WSRP-P11



Figure G-13. Alaskan Flight Track WSRP-P12

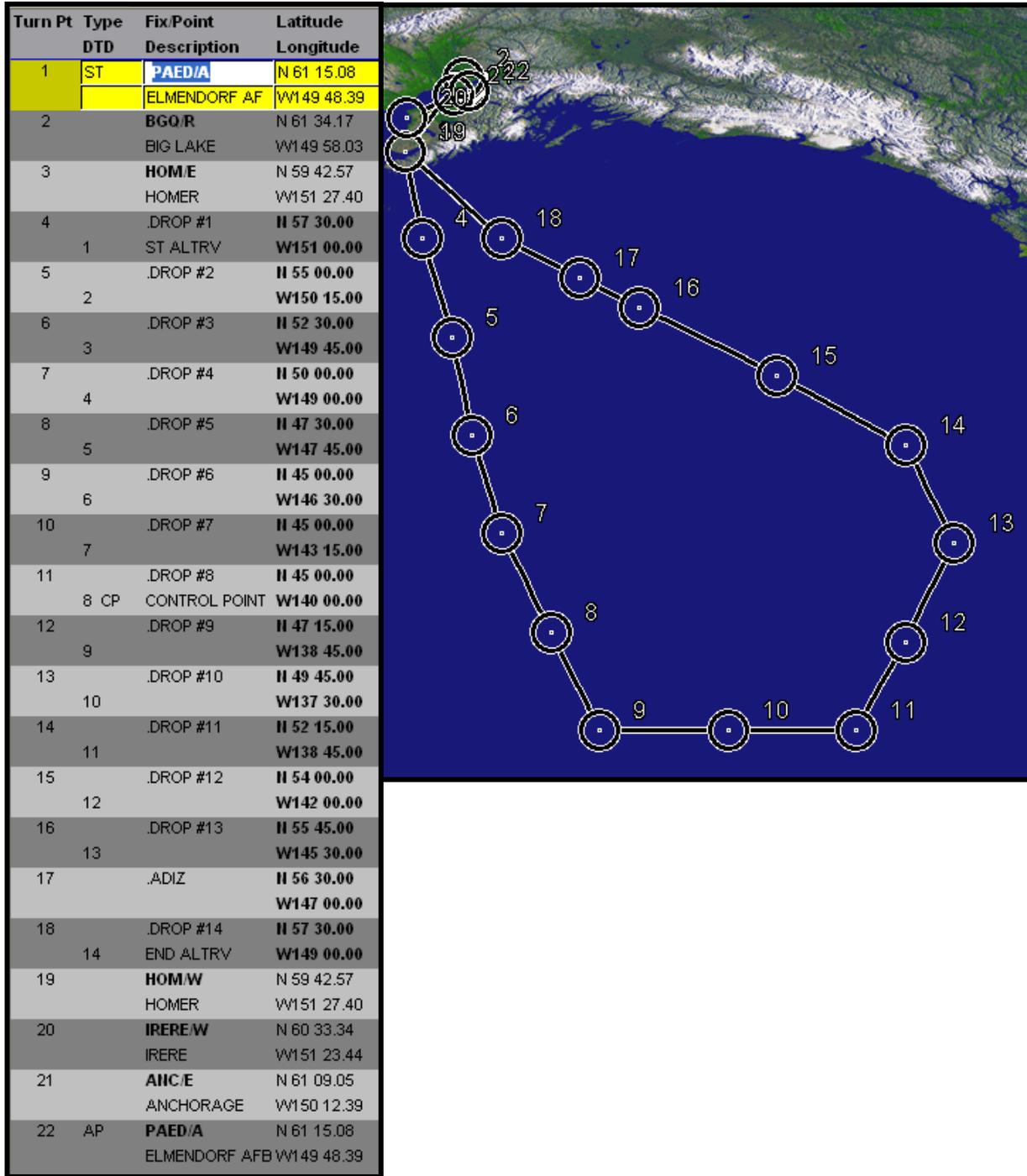


Figure G-14. Alaskan Flight Track WSRP-P13

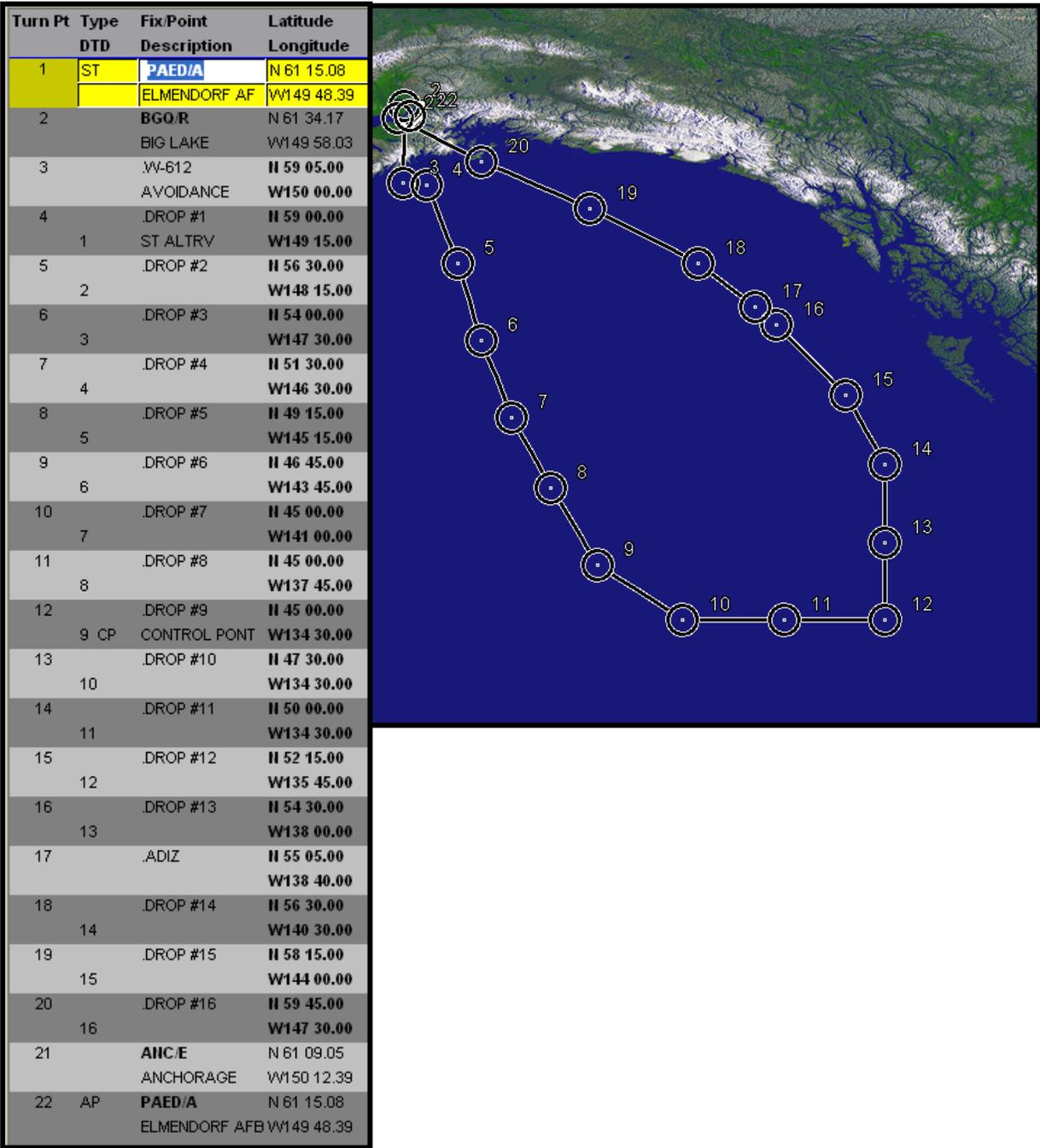


Figure G-15. Alaskan Flight Track WSRP-P14

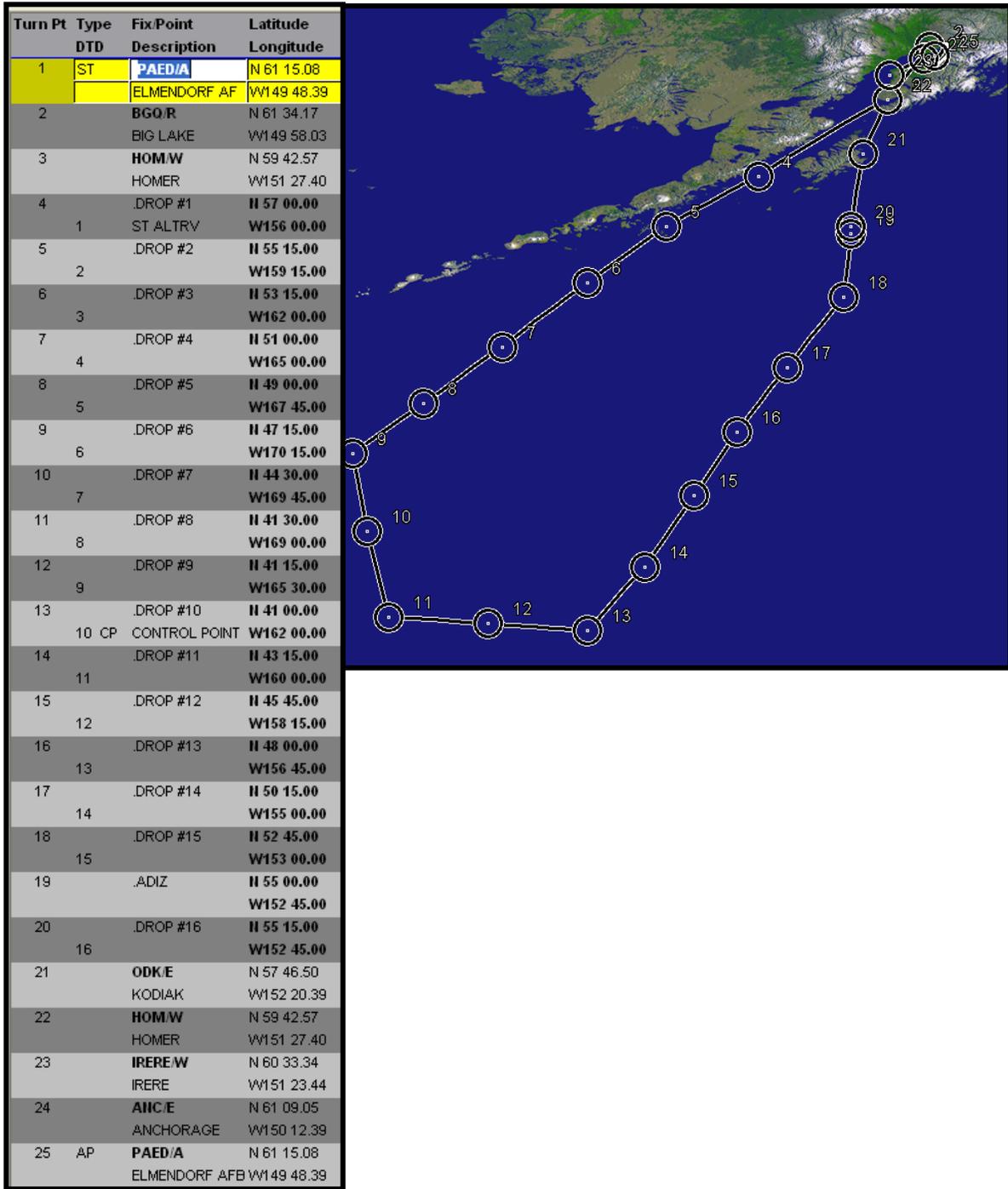


Figure G-16. Alaskan Flight Track WSRP-P15

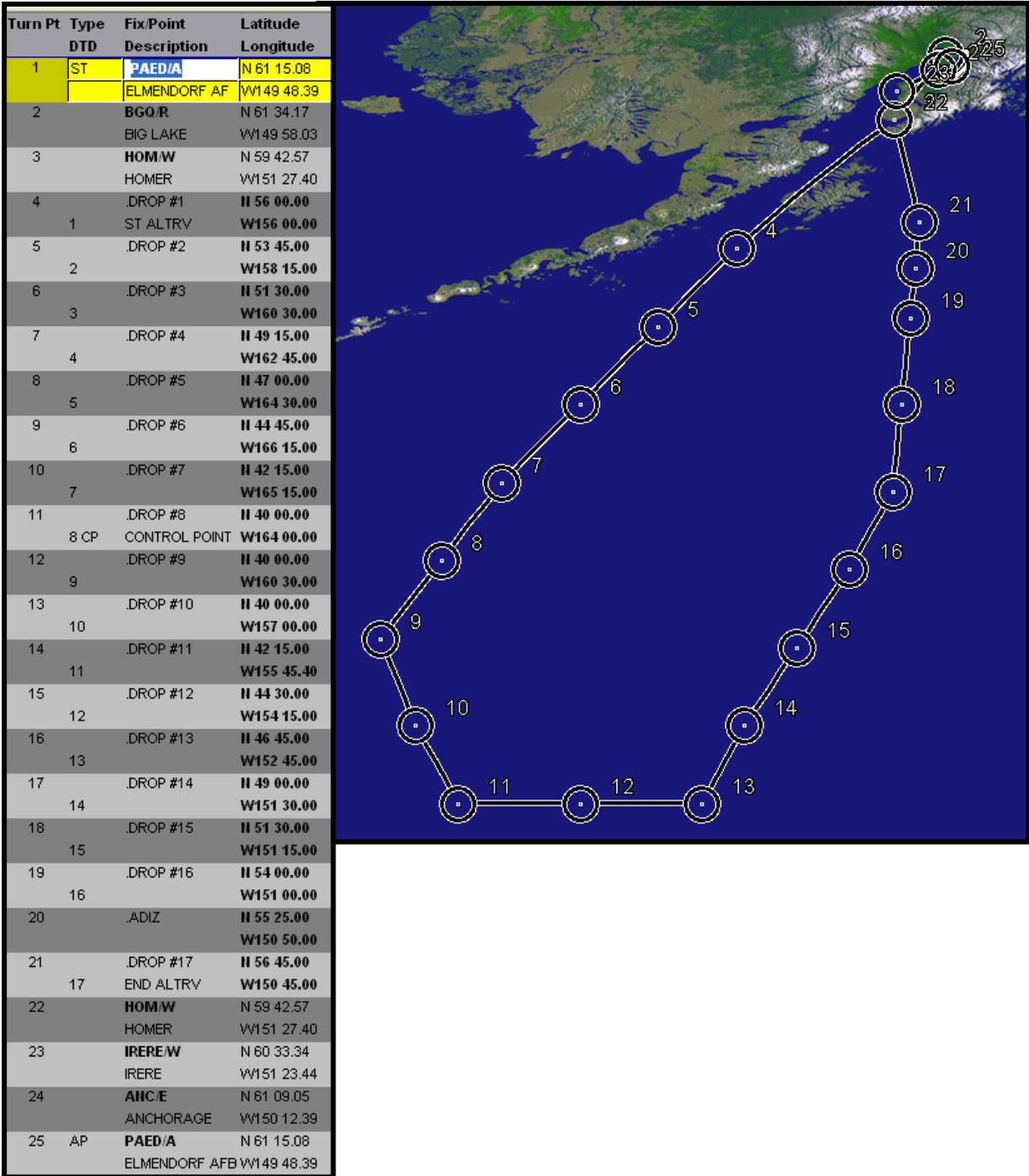


Figure G-17. Alaskan Flight Track WSRP-P16

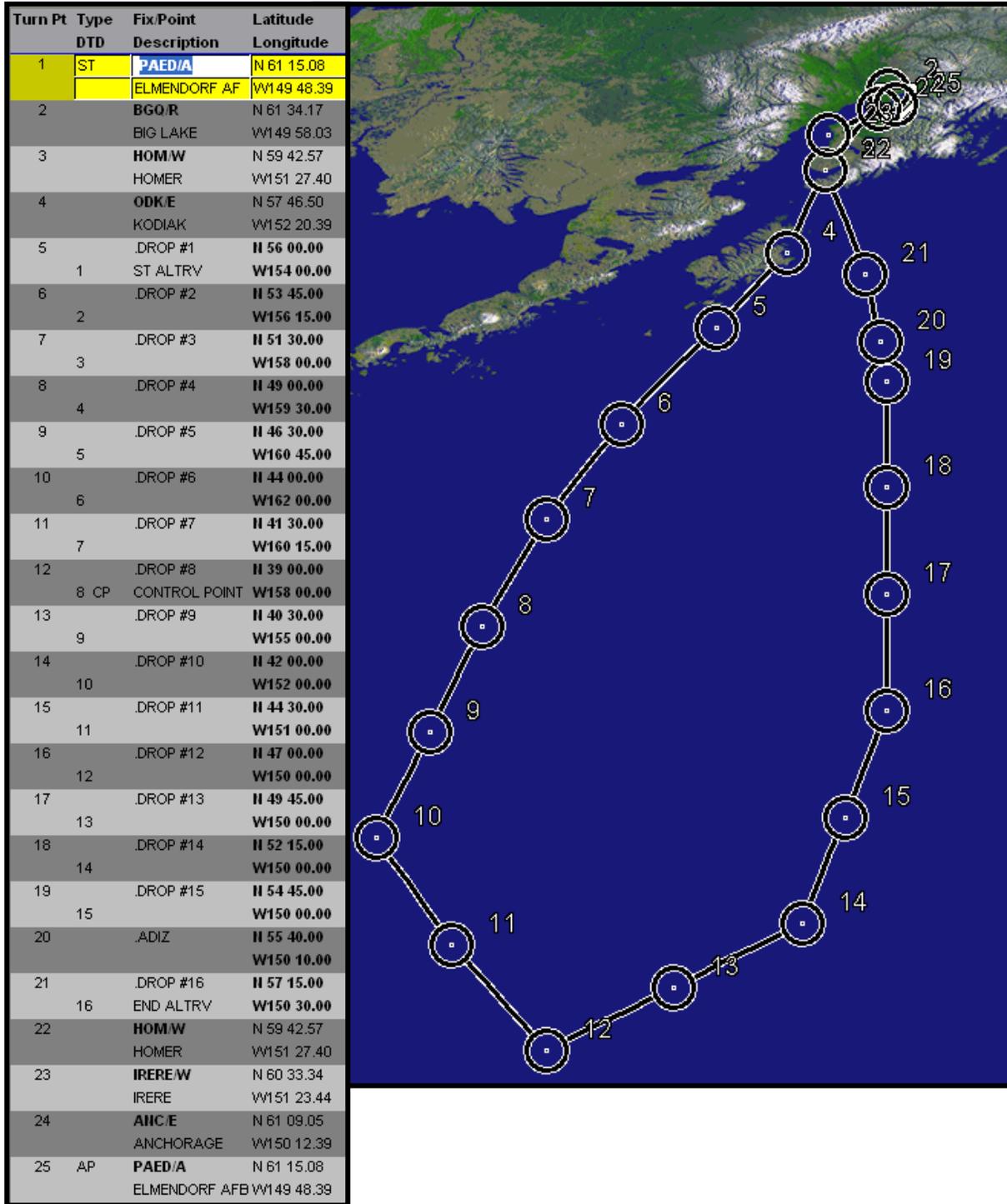


Figure G-18. Alaskan Flight Track WSRP-P17

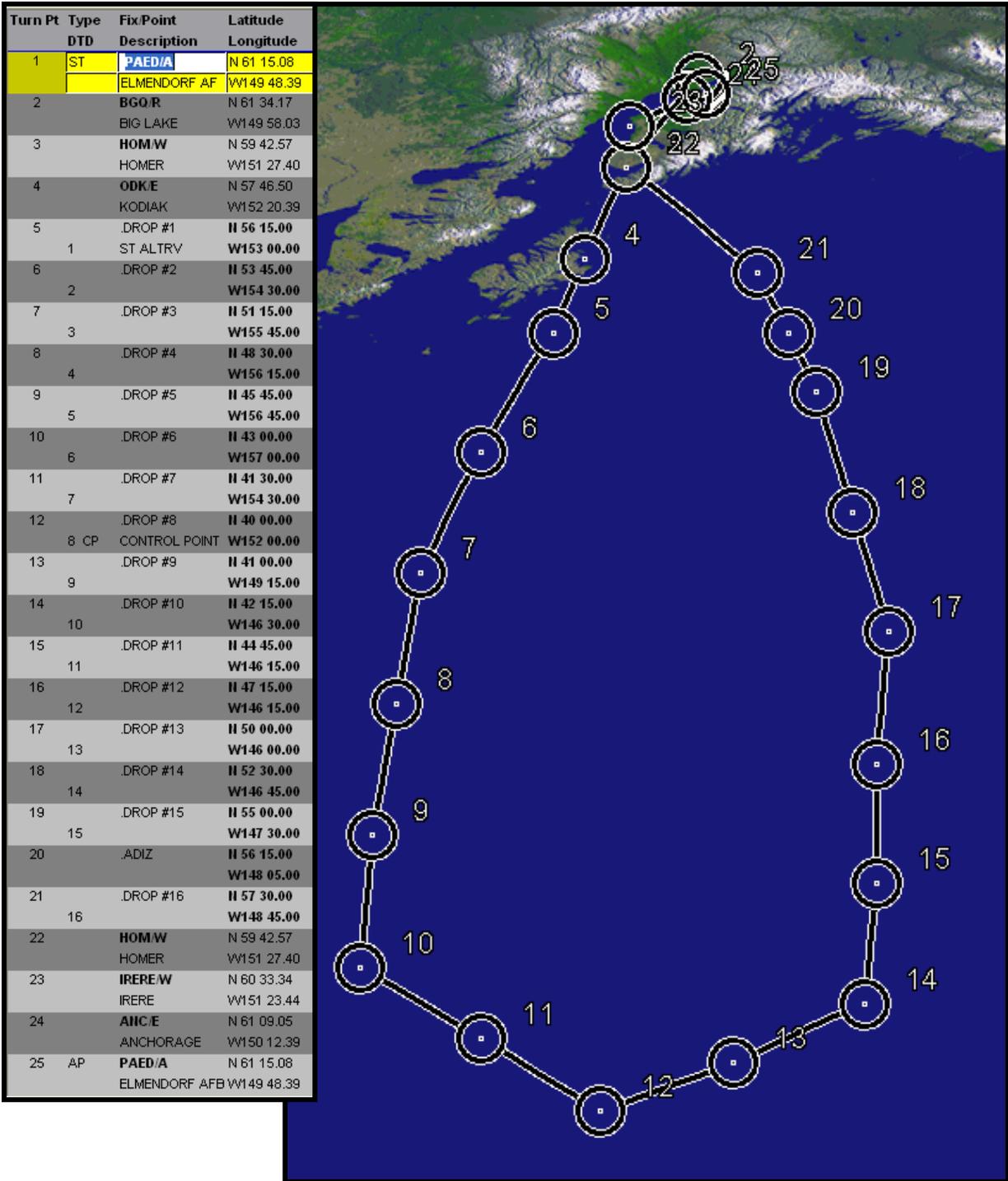


Figure G-19. Alaskan Flight Track WSRP-P18

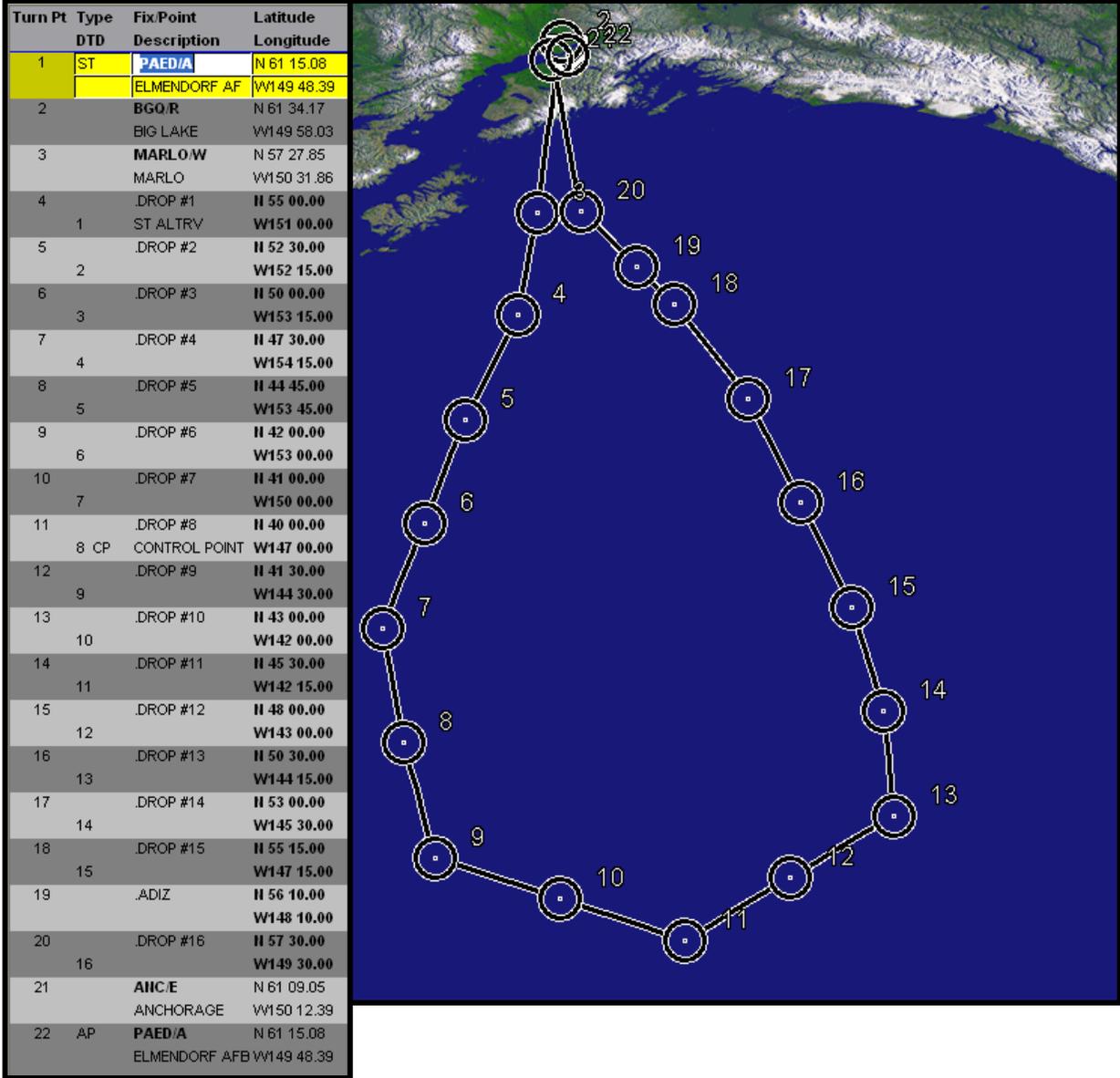


Figure G-20. Alaskan Flight Track WSRP-P19

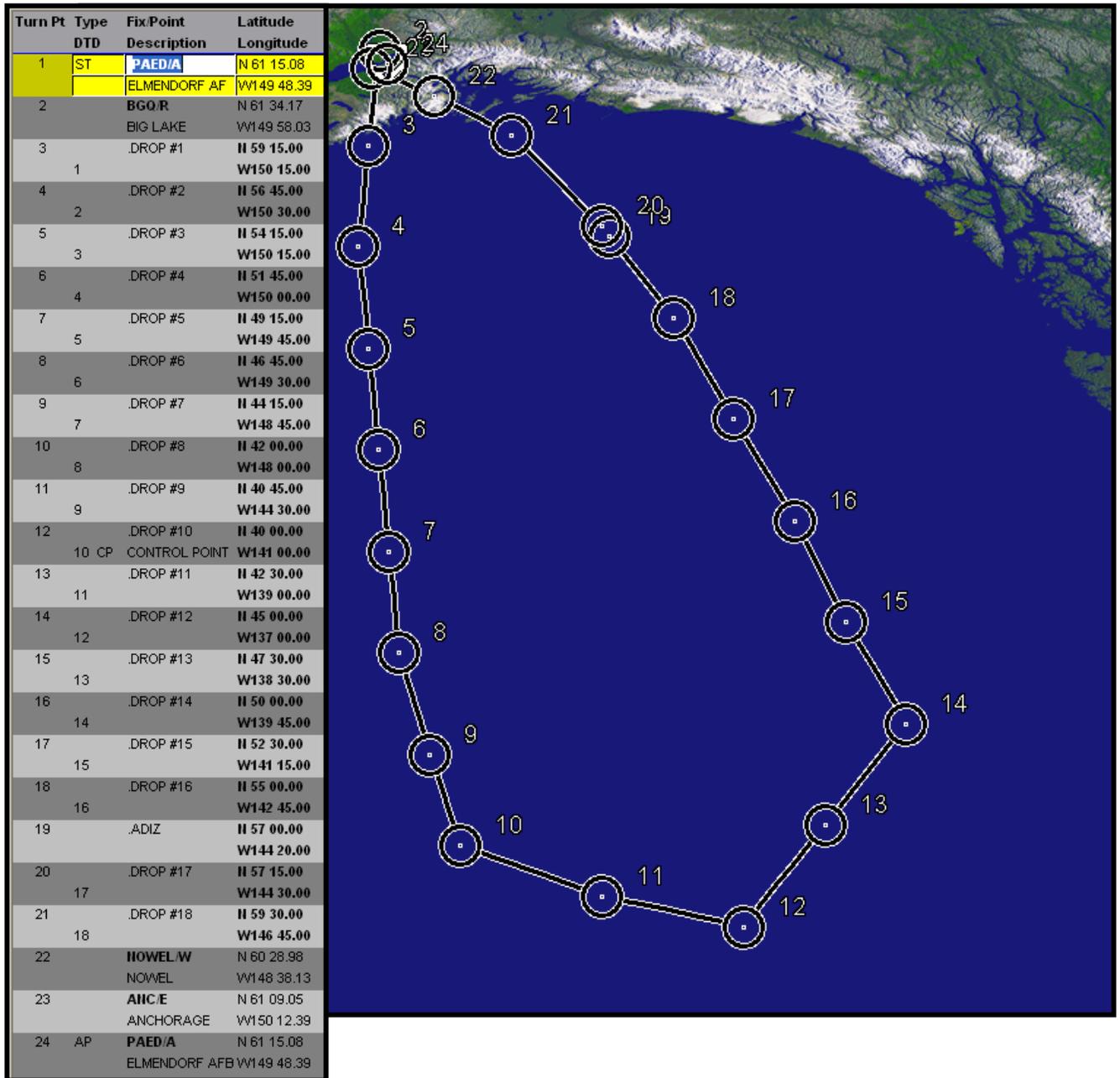


Figure G-21. Alaskan Flight Track WSRP-P20

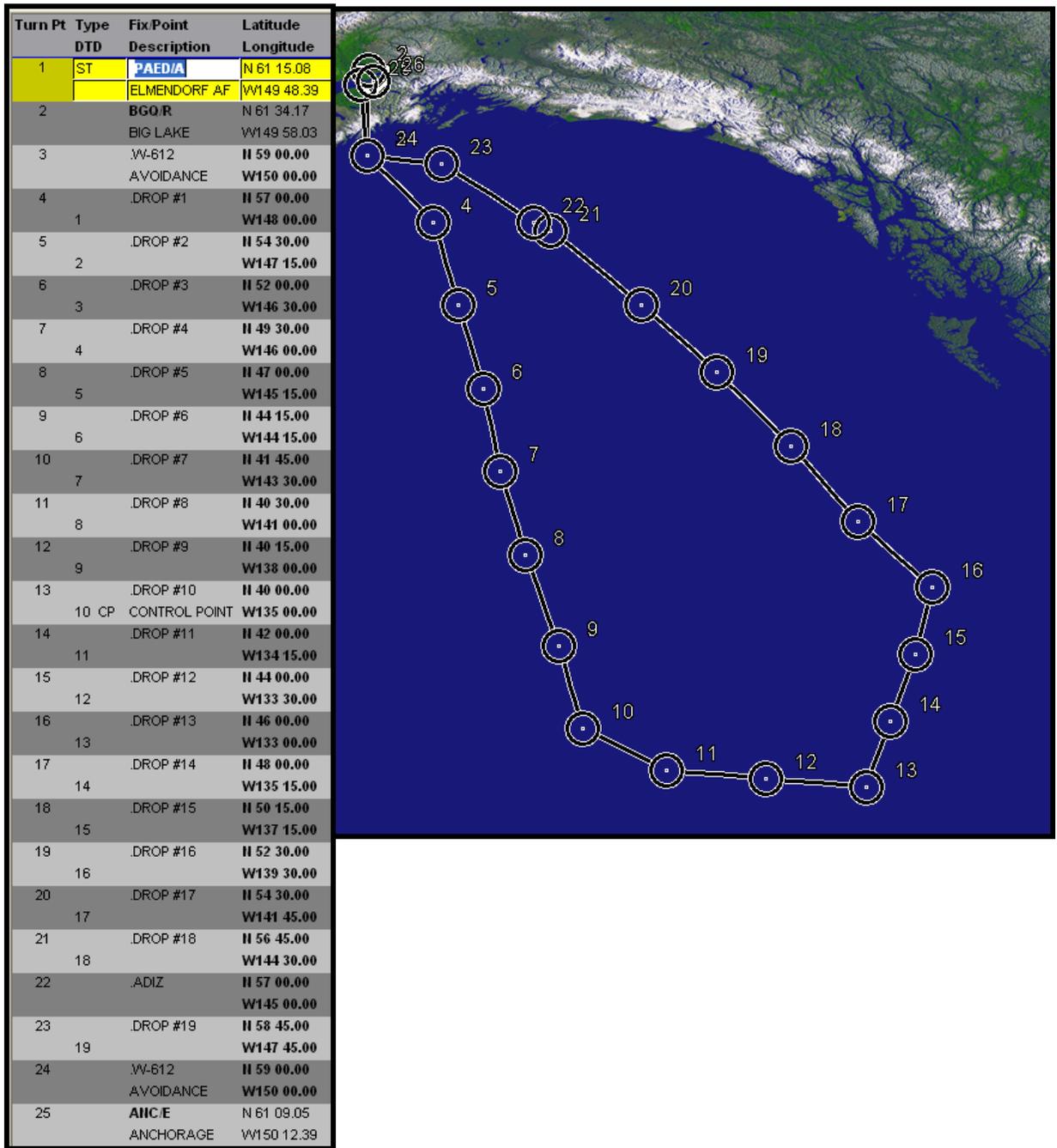


Figure G-22. Alaskan Flight Track WSRP-P21

Turn Pt	Type	Fix/Point	Latitude
	DTD	Description	Longitude
1	ST	PAED/A	N 61 15.08
		ELMENDORF AFB	W149 48.39
2		BGO/R	N 61 34.17
		BIG LAKE	W149 58.03
3		DLGE	N 58 59.65
		DILLINGHAM	W158 33.13
4		.DROP #1	II 57 15.00
	1		W162 30.00
5		.DROP #2	II 55 30.00
	2		W166 00.00
6		.DROP #3	II 54 00.00
	3		W169 30.00
7		.DROP #4	II 52 30.00
	4		W172 30.00
8		.DROP #5	II 54 45.00
	5		W175 15.00
9		.DROP #6	II 57 00.00
	6 CP	CONTROL POINT	W178 00.00
10		.DROP #7	II 59 15.00
	7		W176 15.00
11		.DROP #8	II 61 30.00
	8		W174 15.00
12		.DROP #9	II 59 45.00
	9		W170 30.00
13		.DROP #10	II 58 15.00
	10		W166 00.00
14		.ADIZ/FIR	II 58 15.00
			W163 00.00
15		.DROP #11	II 58 15.00
	11		W161 30.00
16		DLGE	N 58 59.65
		DILLINGHAM	W158 33.13
17		JUMUL W	N 60 06.73
		JUMUL	W154 57.99
18		AMOTT W	N 60 53.93
		ANC/E221037	W151 21.77
19		AHC/E	N 61 09.05
		ANCHORAGE	W150 12.39
20		EDF/T240012	N 61 13.39
		ELMENDORF	W150 10.66
21	AP	PAED/A	N 61 15.08
		ELMENDORF AFB	W149 48.39

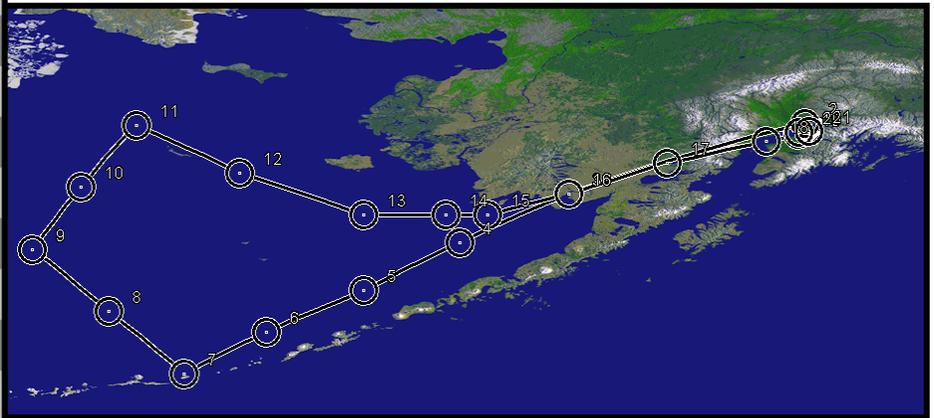


Figure G-23. Alaskan Flight Track WSRP-P22

Turn Pt	Type	FixPoint	Latitude
	DTD	Description	Longitude
2		BGO.R	N 61 34.17
		BIG LAKE	W149 58.03
3		HOM.W	N 59 42.57
		HOMER	W151 27.40
4		.DROP #1	H 57 30.00
1			W155 30.00
5		.DROP #2	H 55 15.00
2			W157 45.00
6		.DROP #3	H 53 00.00
3			W160 00.00
7		.DROP #4	H 52 45.00
4			W164 00.00
8		.DROP #5	H 52 30.00
5			W168 00.00
9		.DROP #6	H 52 00.00
6			W172 00.00
10		.DROP #7	H 49 30.00
7			W173 30.00
11		.DROP #8	H 47 00.00
8 CP		CONTROL POINT	W175 00.00
12		.DROP #9	H 44 45.00
9			W172 45.00
13		.DROP #10	H 42 30.00
10			W170 30.00
14		.DROP #11	H 43 45.00
11			W167 30.00
15		.DROP #12	H 45 00.00
12			W164 30.00
16		.DROP #13	H 46 00.00
13			W161 15.00
17		.DROP #14	H 47 00.00
14			W158 00.00
18		.DROP #15	H 49 30.00
15			W156 30.00
19		.DROP #16	H 52 00.00
16			W155 15.00
20		.DROP #17	H 54 30.00
17		ADIZ	W154 00.00
21		.DROP #18	H 57 00.00
18			W152 45.00
22		ODK.E	N 57 46.50
		KODIAK	W152 20.39
23		HOM.W	N 59 42.57
		HOMER	W151 27.40
24		IRERE.W	N 60 33.34
		IRERE	W151 23.44
25		AMOTT.W	N 60 53.93
		ANC/E221037	W151 21.77
26		AHC.E	N 61 09.05
		ANCHORAGE	W150 12.39

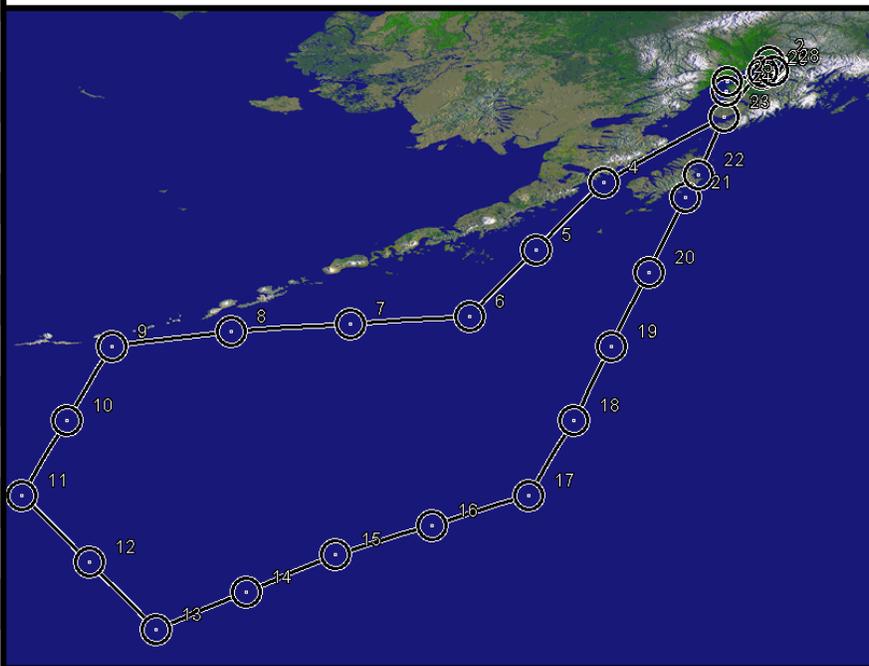


Figure G-24. Alaskan Flight Track WSRP-P23

Turn Pt	Type	Fix/Point Description	Latitude Longitude
1	ST	PAED/A	N 61 15.08
		ELMENDORF AF	W149 48.39
2		BGO/R	N 61 34.17
		BIG LAKE	W149 58.03
3		AKI/R	N 58 43.48
		KING SALMON	W156 45.14
4		.DROP #1	H 57 30.00
	1		W160 00.00
5		.DROP #2	H 57 15.00
	2		W165 15.00
6		.DROP #3	H 56 45.00
	3		W170 15.00
7		.DROP #4	H 56 00.00
	4		W175 00.00
8		.DROP #5	H 53 30.00
	5		W176 30.00
9		.DROP #6	H 51 00.00
	6 CP	CONTROL POINT	W177 30.00
10		.DROP #7	H 49 00.00
	7		W175 15.00
11		.DROP #8	H 47 15.00
	8		W172 45.00
12		.DROP #9	H 47 45.00
	9		W169 15.00
13		.DROP #10	H 48 30.00
	10		W165 30.00
14		.DROP #11	H 50 30.00
	11		W162 45.00
15		.DROP #12	H 52 30.00
	12	ADIZ	W160 30.00
16		.DROP #13	H 54 30.00
	13		W158 00.00
17		.DROP #14	H 56 45.00
	14		W155 15.00
18		HOM/E	N 59 42.57
		HOMER	W151 27.40
19		IRERE/W	N 60 33.34
		IRERE	W151 23.44
20		AMOTT/W	N 60 53.93
		ANCE221037	W151 21.77
21		AIIC/E	N 61 09.05
		ANCHORAGE	W150 12.39
22		EDF/T240012	H 61 13.39
		ELMENDORF	W150 10.77
23	AP	PAED/A	N 61 15.08
		ELMENDORF AFB	W149 48.39



Figure G-25. Alaskan Flight Track WSRP-P24

Turn Pt	Type	Fix/Point Description	Latitude Longitude
1	ST	PAED/A	N 61 15.08
		ELMENDORF AF	W149 48.39
2		BGOR	N 61 34.17
		BIG LAKE	W149 58.03
3		AKIIR	N 58 43.48
		KING SALMON	W156 45.14
4		.DROP #1	II 57 45.00
			W159 45.00
5		.DROP #2	II 56 30.00
			W164 00.00
6		.DROP #3	II 56 30.00
			W169 00.00
7		.DROP #4	II 56 30.00
			W174 00.00
8		.DROP #5	II 56 30.00
			W179 00.00
9		.DROP #6	II 54 30.00
			E179 30.00
10	7 CP	.DROP #7	II 52 30.00
		CONTROL POINT	E177 45.00
11		.DROP #8	II 50 30.00
			E179 15.00
12		.DROP #9	II 48 30.00
			W179 00.00
13		.DROP #10	II 48 30.00
			W175 15.00
14		.DROP #11	II 48 30.00
			W171 15.00
15		.DROP #12	II 48 30.00
			W167 30.00
16		.DROP #13	II 50 30.00
			W164 45.00
17		.ADIZ	II 51 45.00
			W163 00.00
18		.DROP #14	II 52 30.00
			W162 00.00
19		.DROP #15	II 54 30.00
			W159 15.00
20		.DROP #16	II 56 15.00
			W156 15.00
21	HOME	HOMER	N 59 42.57
			W151 27.40
22	IRERE/W	IRERE	N 60 33.34
			W151 23.44
23	AMOTT/W	ANC/E221037	N 60 53.93
			W151 21.77
24	AHC/E	ANCHORAGE	N 61 09.05
			W150 12.39
25	EDF/T240012	ELMENDORF	II 61 13.39
			W150 10.77



Figure G-26. Alaskan Flight Track WSRP-P25

Turn Pt	Type	FixPoint Description	Latitude Longitude
1	ST	PAED/A	N 61 15.08 W149 48.39
2		ELMENDORF AFB	N 61 34.17 W149 58.03
3		BIG LAKE	N 60 36.88 W151 11.71
4		W AREA AVOIDNCE	H 59 00.00 W150 00.00
5		DROP #1	H 58 00.00 W148 00.00
6		DROP #2	H 55 30.00 W146 30.00
7		DROP #3	H 53 00.00 W145 15.00
8		DROP #4	H 50 30.00 W144 00.00
9		DROP #5	H 48 00.00 W143 00.00
10		DROP #6	H 45 30.00 W142 00.00
11		DROP #7	H 43 15.00 W140 30.00
12		DROP #8	H 41 30.00 W138 15.00
13		DROP #9	H 39 30.00 W136 00.00
14		DROP #10	H 39 30.00 W132 30.00
15		DROP #11	H 39 30.00 W129 00.00
16		DROP #12	H 42 00.00 W128 30.00
17		DROP #13	H 44 45.00 W128 15.00
18		DROP #14	H 47 00.00 W130 00.00
19		DROP #15	H 49 00.00 W132 30.00
20		DROP #16	H 51 00.00 W135 00.00
21		DROP #17	H 53 00.00 W137 30.00
22		DROP #18	H 55 00.00 W140 15.00
23		ADIZ	H 56 25.00 W142 20.00
24		DROP #19	H 57 00.00 W143 15.00
25		DROP #20	H 59 00.00 W146 30.00
26		DEALS W DEALS	N 59 44.05 W147 31.18
27		ANC E ANCHORAGE	N 61 09.05 W150 12.39
28		EDF/T240012 ELMENDORF	N 61 13.39 W150 10.77
29	AP	PAED/A ELMENDORF AFB	N 61 15.08 W149 48.39

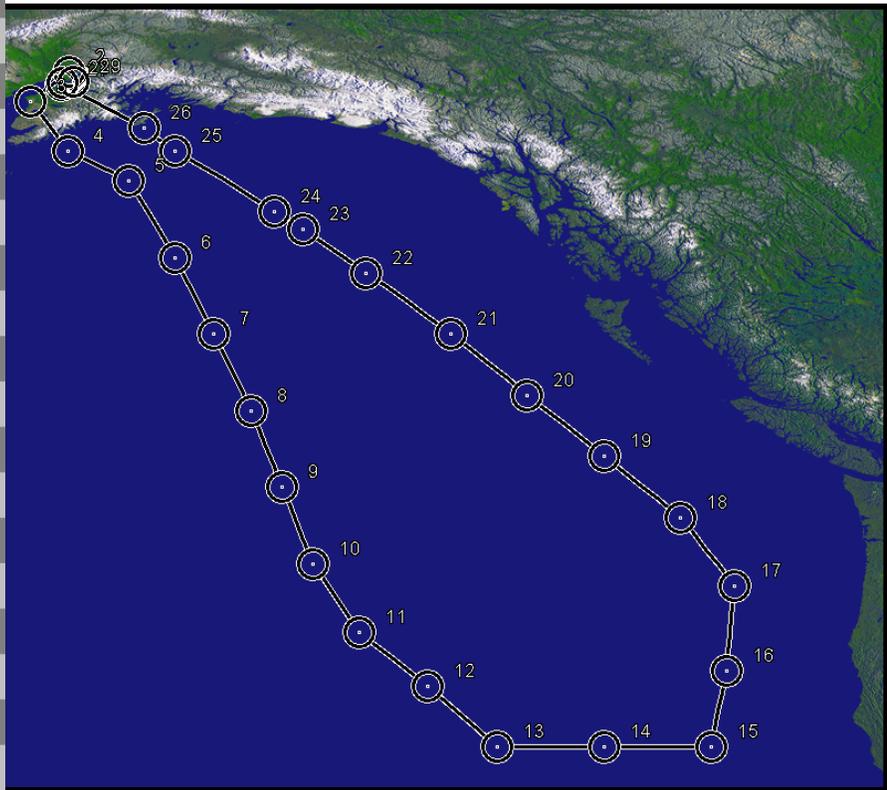


Figure G-27. Alaskan Flight Track WSRP-P26

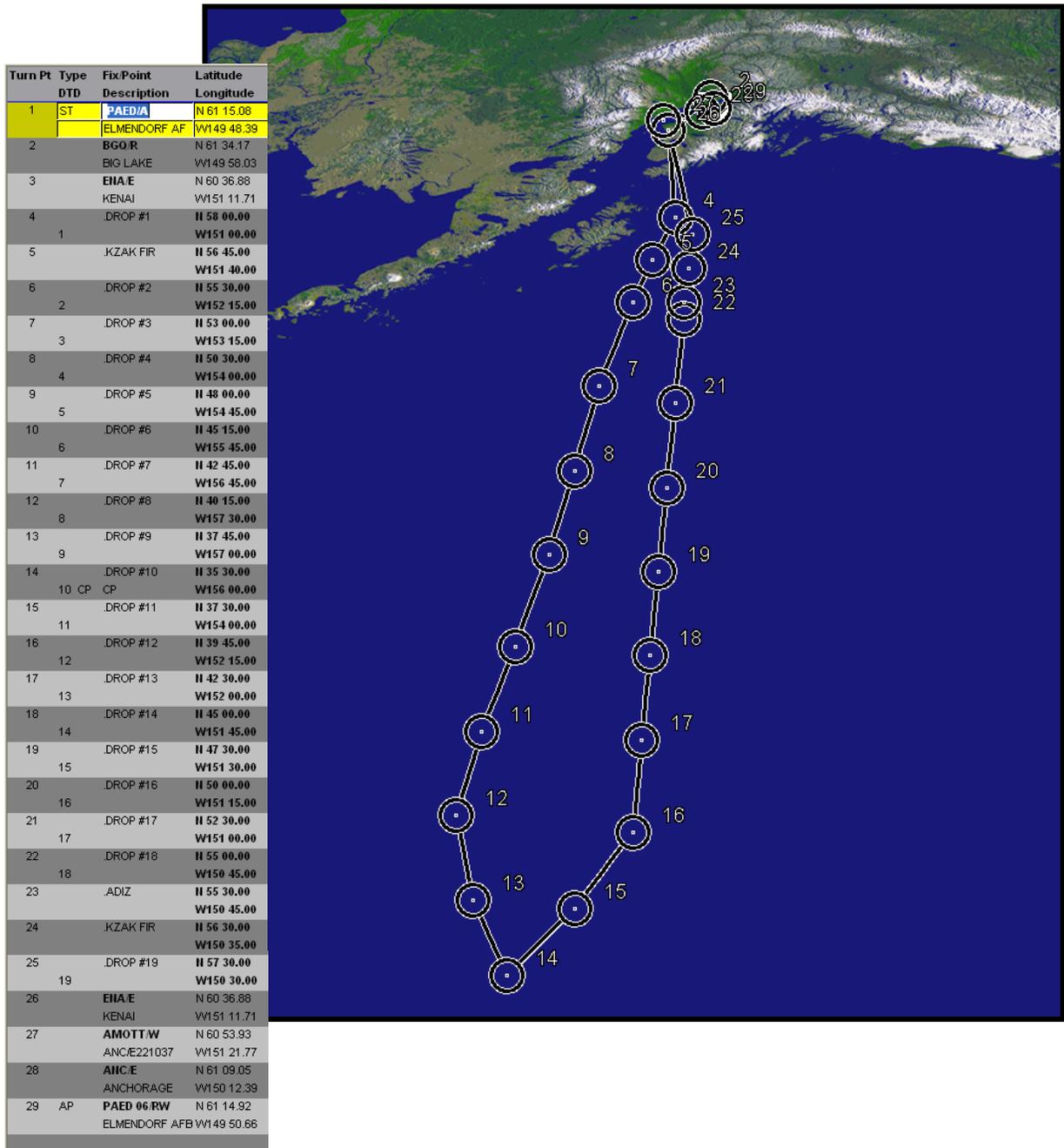


Figure G-28. Alaskan Flight Track WSRP-P27

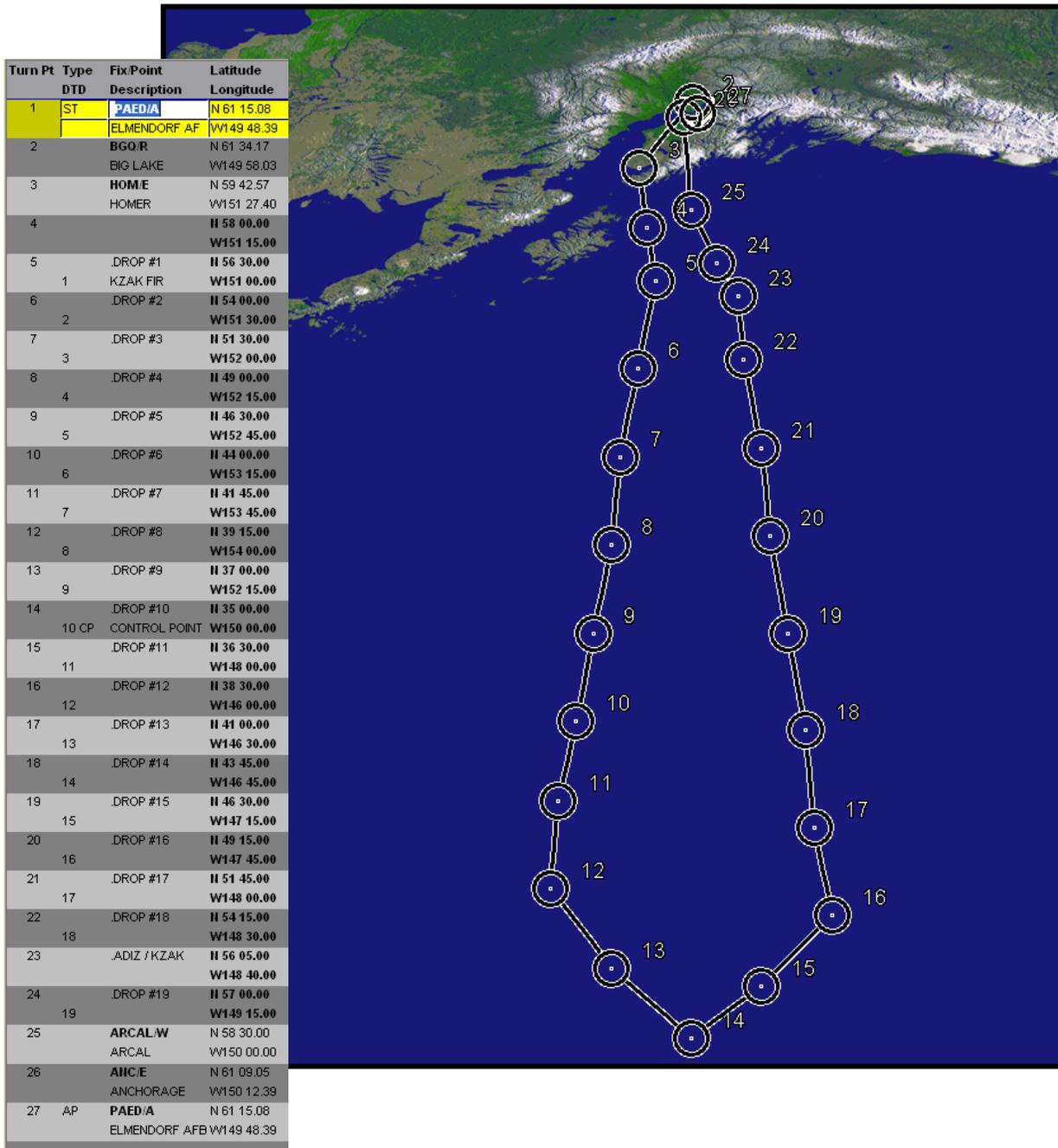


Figure G-29. Alaskan Flight Track WSRP-P28

Turn Pt	Type	FixPoint	Latitude
	DTD	Description	Longitude
1	ST	PAED/A	N 61 15.08
		ELMENDORF AFB	W149 48.39
2		AIIC.E	N 61 09.05
		ANCHORAGE	W150 12.39
3		BGO.R	N 61 34.17
		BIG LAKE	W149 58.03
4		ARCAL.W	N 58 30.00
		ARCAL	W150 00.00
5		.DROP #1	H 57 45.00
	1		W150 00.00
6		.DROP #2	H 55 15.00
	2		W149 45.00
7		.DROP #3	H 52 45.00
	3		W149 30.00
8		.DROP #4	H 50 15.00
	4		W149 30.00
9		.DROP #5	H 47 30.00
	5		W149 30.00
10		.DROP #6	H 44 45.00
	6		W149 30.00
11		.DROP #7	H 42 15.00
	7		W149 00.00
12		.DROP #8	H 39 45.00
	8		W148 15.00
13		.DROP #9	H 37 30.00
	9 CP	CONTROL POINT	W146 45.00
14		.DROP #10	H 38 45.00
	10		W143 45.00
15		.DROP #11	H 41 15.00
	11		W142 45.00
16		.DROP #12	H 43 45.00
	12		W143 15.00
17		.DROP #13	H 46 15.00
	13		W143 45.00
18		.DROP #14	H 48 45.00
	14		W144 30.00
19		.DROP #15	H 51 15.00
	15		W145 30.00
20		.DROP #16	H 53 45.00
	16		W146 30.00
21		.KZAK FIR	H 55 45.00
			W147 20.00
22		.DROP #17	H 56 20.00
	17	ADIZ	W147 40.00
23		.DROP#18	H 58 15.00
	18		W148 45.00
24		.W AREA	H 59 15.00
		AVOIDNCE	W150 00.00
25		AIIC.E	N 61 09.05
		ANCHORAGE	W150 12.39
26	AP	PAED/A	N 61 15.08
		ELMENDORF AFB	W149 48.39

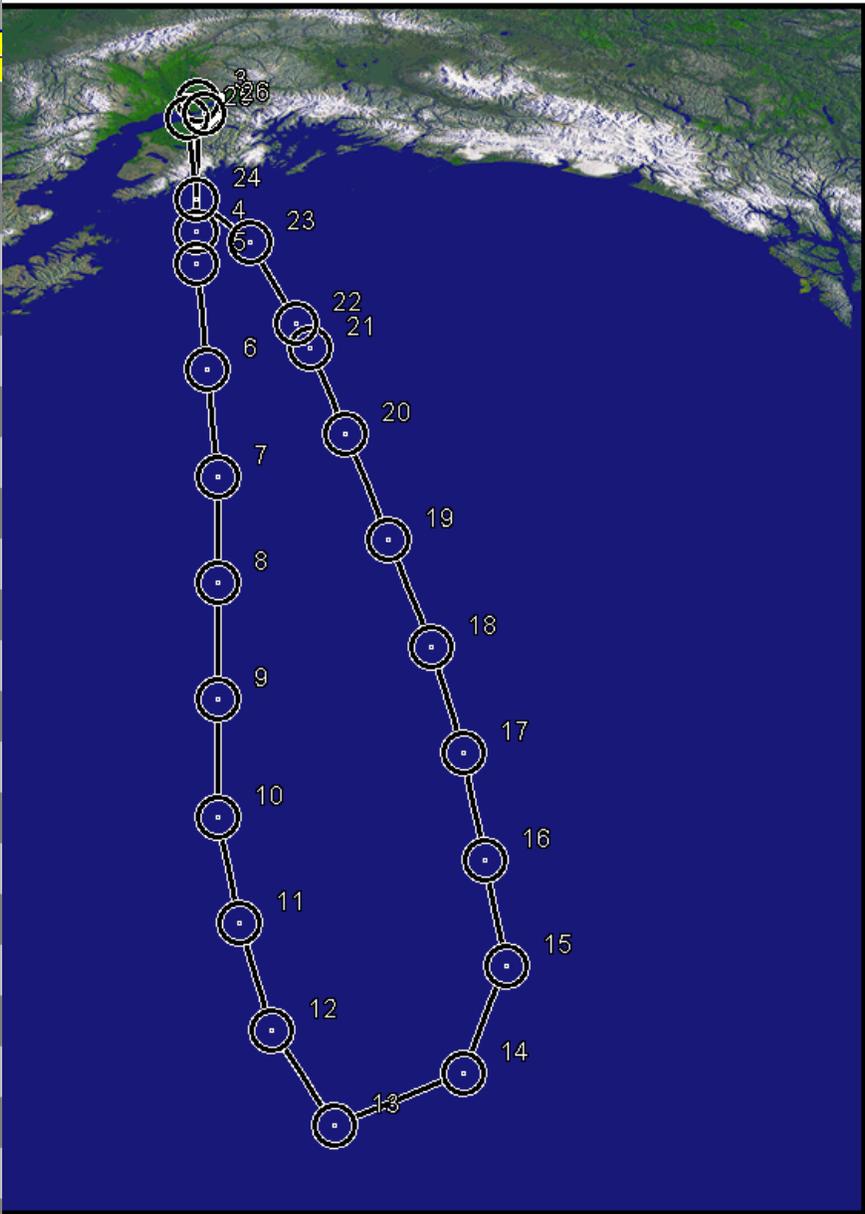


Figure G-30. Alaskan Flight Track WSRP-P29

APPENDIX H
HAWAIIAN FLIGHT TRACKS

This appendix contains the Hawaiian winter storm flight tracks.

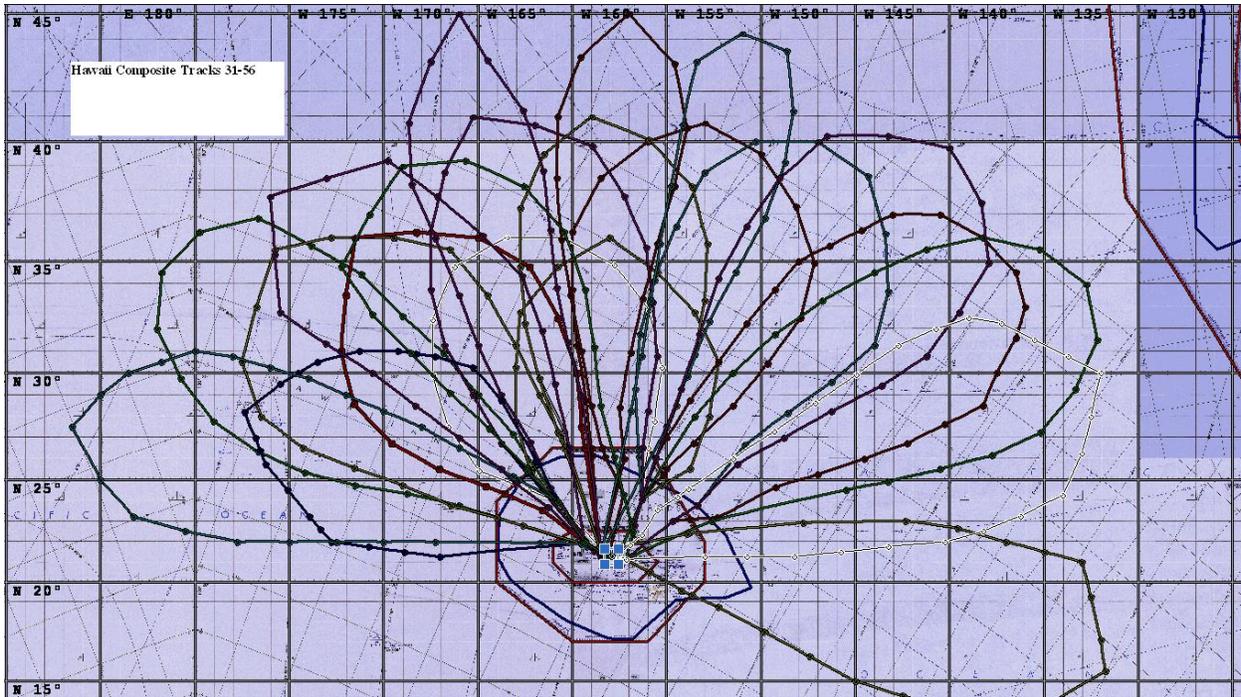


Figure H-1. Overview of all Hawaiian Flight Tracks

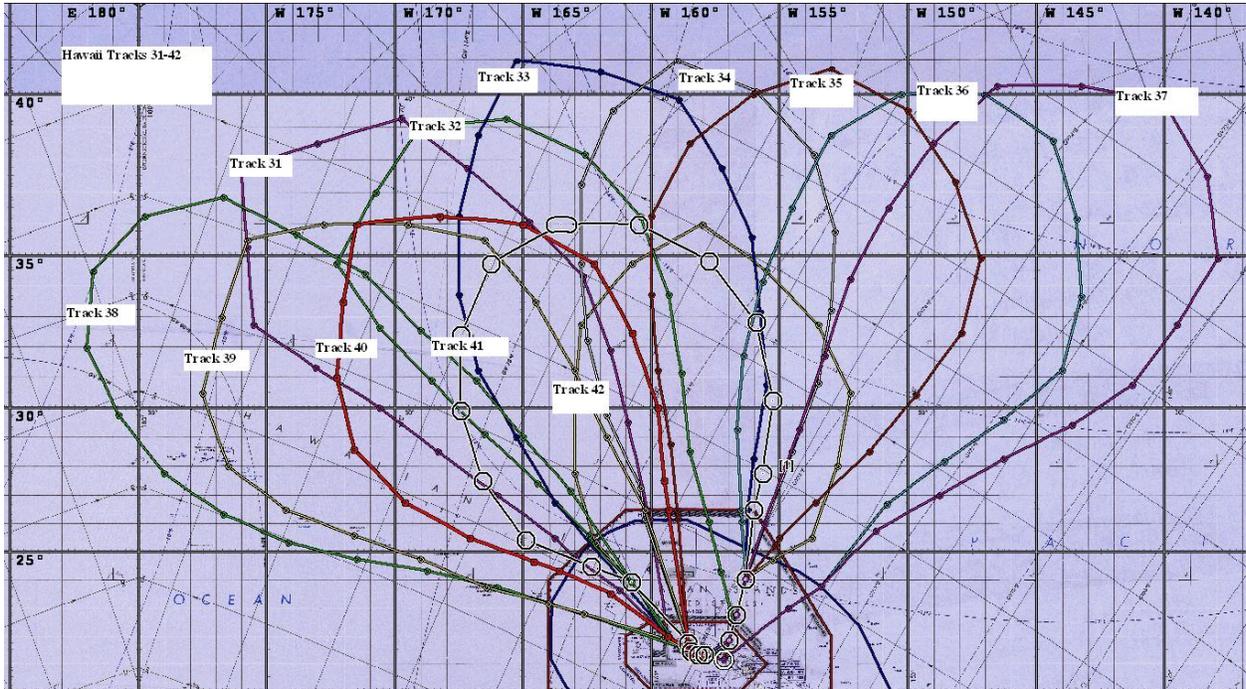


Figure H-2. Composite of Hawaiian Flight Tracks WSRP P31-42

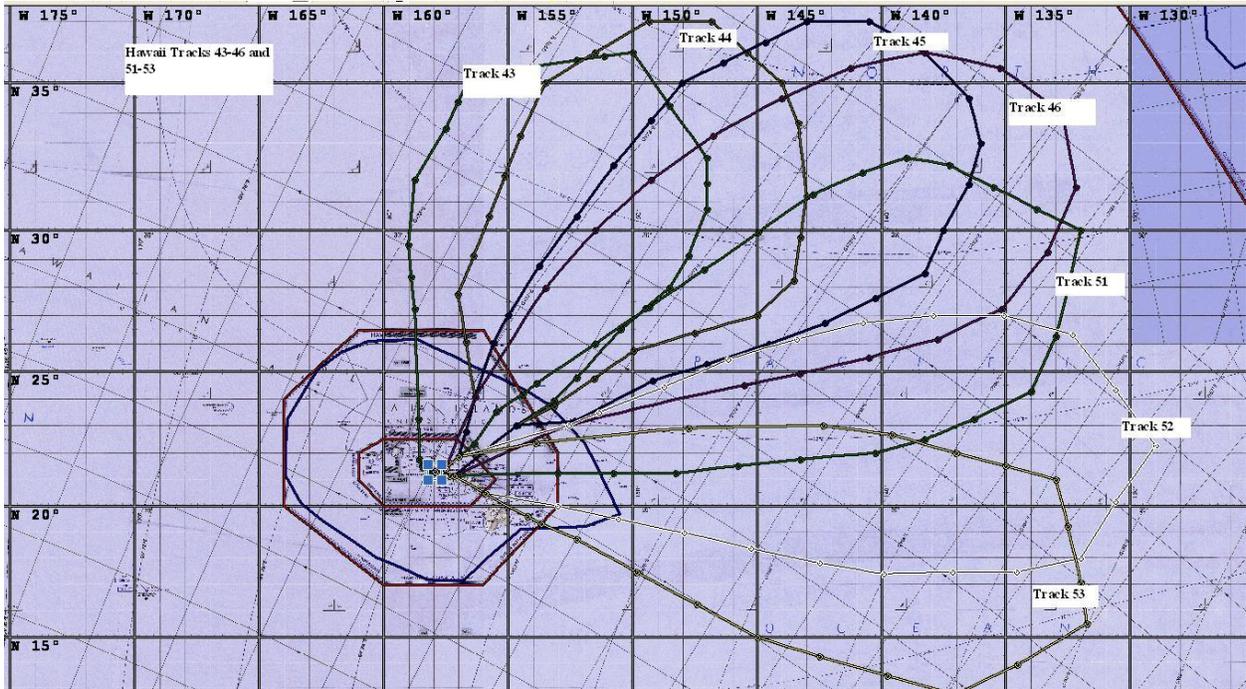


Figure H-3. Composite of Hawaiian Flight Tracks WSRP P43-46 and P51-53

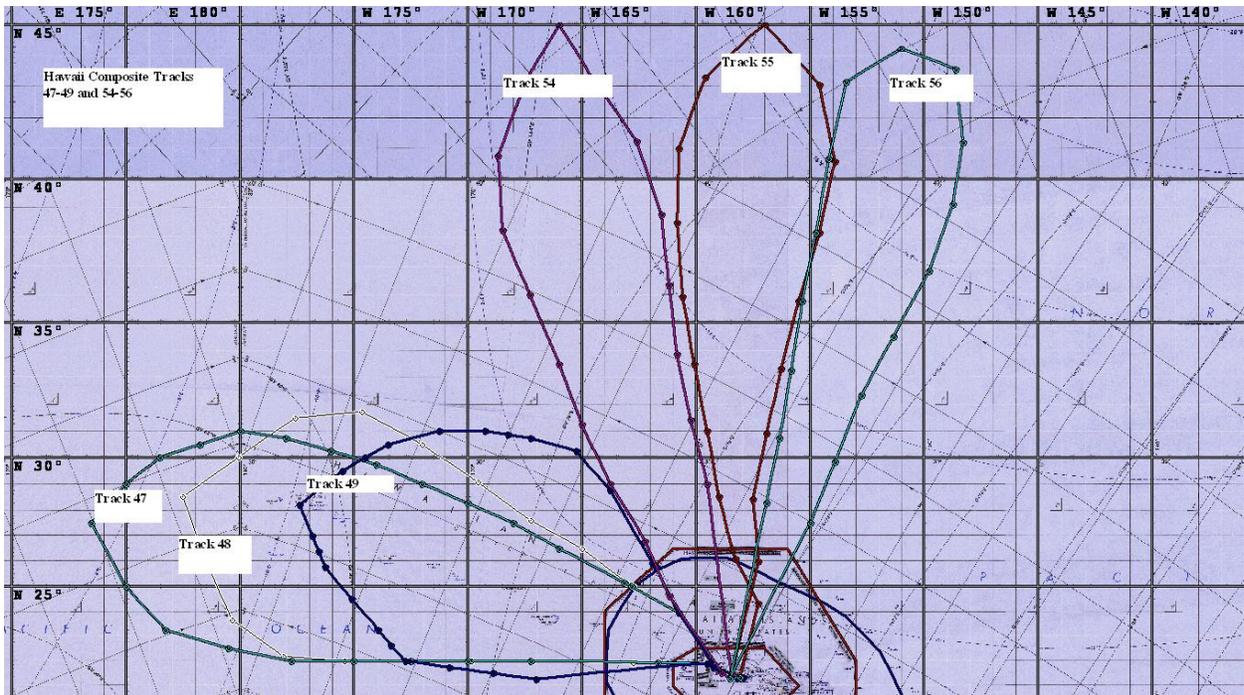


Figure H-4. Composite of Hawaiian Flight Tracks WSRP P47-49 and P54-56

Turn Pt	Type	Fix Point Description	Latitude Longitude
1	ST	PHIK/A	N 21 19.12
		HONOLULU INTL	W157 55.35
2		KEOLA W	N 21 17.89
		KEOLA	W158 29.43
3		GRAIL W	N 21 30.78
		GRAIL	W158 51.55
4		HAPUA W	N 21 44.18
		NAPUA	W159 14.64
5		LIH W	N 21 57.92
		LIHUE	W159 20.29
6		W188 OUT	H 26 00.00
			W160 00.00
7		.KZAK-PHZH	H 26 10.00
		FIR	W160 05.00
8		.ADIZ	H 26 30.00
			W160 10.00
9		.DROP #1	H 29 30.00
1			W160 55.00
10		.DROP #2	H 31 55.00
			W161 35.00
11		.DROP #3	H 34 20.00
			W162 40.00
12		.DROP #4	H 36 05.00
			W164 45.00
13		.DROP #5	H 37 45.00
			W167 10.00
14		.DROP #6	H 39 15.00
			W169 45.00
15		.DROP #7	H 38 30.00
			W173 00.00
16		.DROP #8	H 37 45.00
8		CP	W176 00.00
17		.DROP #9	H 35 15.00
			W175 45.00
18		.DROP #10	H 32 45.00
			W175 30.00
19		.DROP #11	H 31 20.00
			W173 05.00
20		.DROP #12	H 30 00.00
			W170 35.00
21		.DROP #13	H 28 30.00
			W168 20.00
22		.DROP #14	H 27 00.00
			W166 00.00
23		.DROP #15	H 25 30.00
15			W163 45.00
24		.ADIZ	H 24 50.00
			W163 00.00
25		W188	H 23 40.00
			W161 15.00
26		LIH W	N 21 57.92
		LIHUE	W159 20.29
27		BOOKE W	N 21 27.79
		BOOKE	W158 26.99
28		SHIGI W	N 21 18.25
		SHIGI	W158 10.29
29		HIIL R	N 21 18.50
		HONOLULU	W157 55.82
30	AP	PHIK/A	N 21 19.12
		HONOLULU INTL	W157 55.35



Figure H-5. Hawaiian Flight Track WSRP-P31

Turn Pt	Type	FixPoint Description	Latitude Longitude
1	ST	PHIK/A	N 21 19.12
		HONOLULU INTL	W157 55.35
2		MKKR	N 21 08.29
		MOLOKAI	W157 10.04
3		MAGGIW	N 21 50.43
		MAGGI	W156 57.94
4		SERYUW	N 22 27.30
		(SERYU)	W156 47.26
5		REXIEW	N 22 59.55
		REXIE	W156 54.77
6		ZIGIEW	N 24 18.82
		ZIGIE	W157 17.12
7		.KZAK-PHZH	II 26 05.00
		FIR	W157 45.00
8		.DROP #1	II 28 30.00
1		ADIZ	W158 30.00
9		.DROP #2	II 31 10.00
			W158 50.00
10		.DROP #3	II 33 45.00
			W159 20.00
11		.DROP #4	II 36 15.00
			W160 25.00
12		.DROP #5	II 38 10.00
			W162 35.00
13		.DROP #6	II 39 15.00
			W165 40.00
14		.DROP #7	II 39 00.00
7		CP	W169 00.00
15		.DROP #8	II 37 00.00
			W170 45.00
16		.DROP #9	II 34 45.00
			W172 15.00
17		.DROP #10	II 32 40.00
			W170 35.00
18		.DROP #11	II 30 55.00
			W168 35.00
19		.DROP #12	II 29 05.00
			W166 30.00
20		.DROP #13	II 27 25.00
			W164 25.00
21		.DROP #14	II 25 35.00
14			W162 25.00
22		ADIZ-FIR	II 25 25.00
			W162 15.00
23		THOMAW	N 23 56.61
		THOMA	W160 45.81
24		LIHW	N 21 57.92
		LIHUE	W159 20.29
25		BOOKEW	N 21 27.79
		BOOKE	W158 26.99
26		SHIGIW	N 21 18.25
	DCT	SHIGI	W158 10.29
27	AP	PHIK/A	N 21 19.12
		HONOLULU INTL	W157 55.35

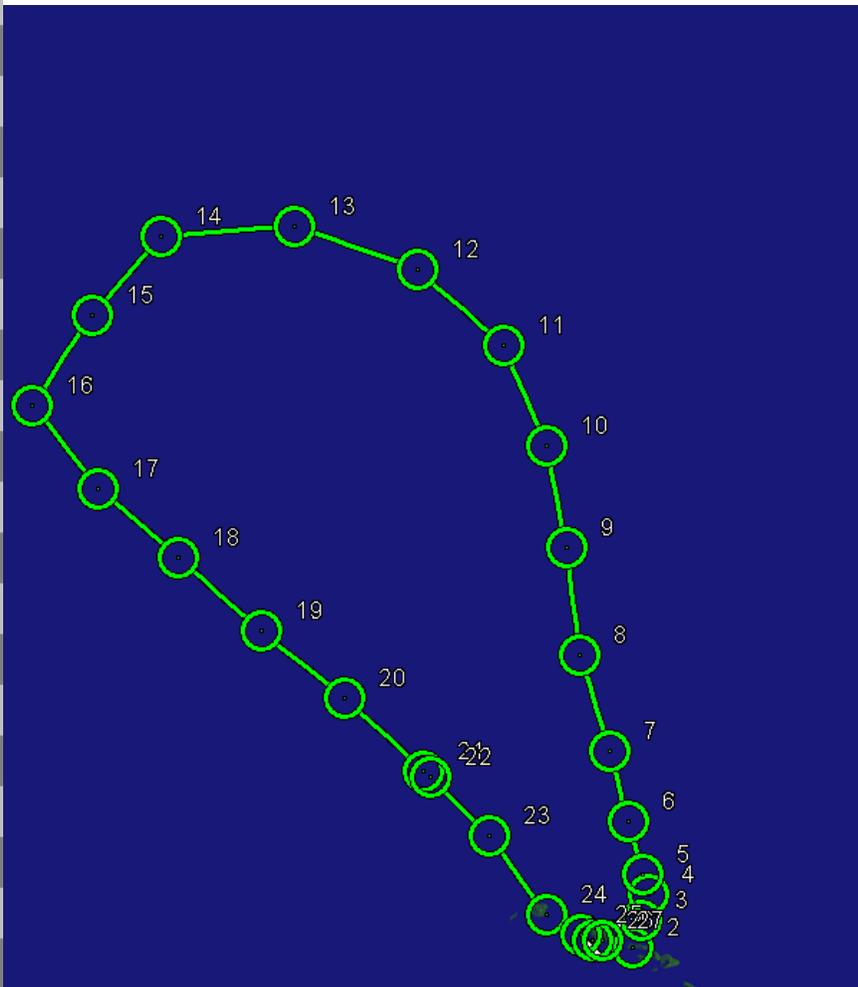


Figure H-6. Hawaiian Flight Track WSRP-P32

Turn Pt	Type	Fix/Point DTD Description	Latitude Longitude
1	ST	PHIK/A	N 21 19.12
		HONOLULU INTL	W157 55.35
2	MKK/W	MKK4 TP	N 21 08.29
		MOLOKAI	W157 10.04
3	MAGGI/W	MAGGI	N 21 50.43
			W156 57.94
4	MKK4 TP	MKK4.APACK	N 22 27.30
			W156 47.26
5	TOADS/W	TOADS	N 22 46.16
			W156 41.76
6	APACK/W	APACK	N 24 02.62
			W156 19.17
7	.ADIZ OUT		H 26 30.00
			W156 15.00
8	DROP #1		H 28 15.00
			W156 00.00
9	DROP #2		H 30 45.00
			W155 30.00
10	DROP #3		H 33 10.00
			W155 45.00
11	DROP #4		H 35 35.00
			W156 05.00
12	DROP #5		H 37 45.00
			W157 15.00
13	DROP #6		H 39 50.00
			W158 55.00
14	DROP #7		H 40 40.00
			W162 00.00
15	DROP #8		H 41 00.00
			W165 15.00
16	DROP #9		H 38 45.00
			W166 45.00
17	DROP #10		H 36 15.00
			W167 30.00
18	DROP #11		H 33 45.00
			W167 30.00
19	DROP #12		H 31 15.00
			W166 45.00
20	DROP #13		H 29 00.00
			W165 15.00
21	DROP #14		H 26 45.00
			W163 45.00
22	.ADIZ-FIR	KZAK-PHZH	H 25 25.00
			W162 20.00
23	THOMA/W	THOMA	N 23 56.61
			W160 45.81
24	LIH/W	LIHUE	N 21 57.92
			W159 20.29
25	BOOKE/W	BOOKE	N 21 27.79
			W158 26.99
26	SHIGI/W	SHIGI	N 21 18.25
			W158 10.29
27	AP	HIL/R	N 21 18.50
		HONOLULU	W157 55.82

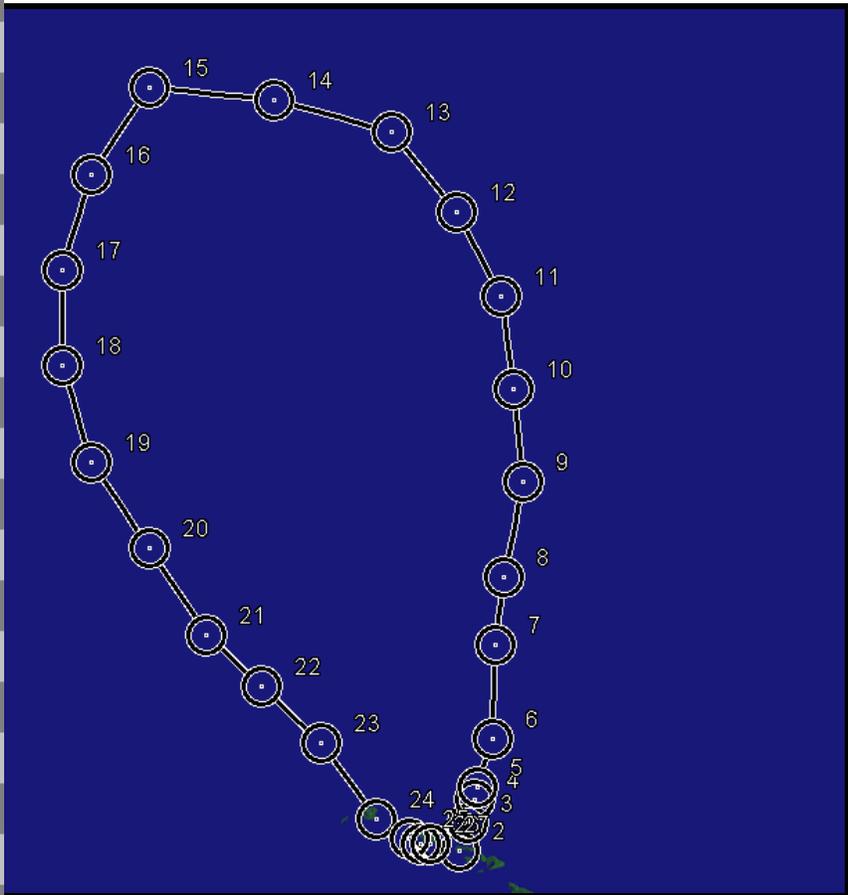


Figure H-7. Hawaiian Flight Track WSRP-P33

Turn Pt	Type	FixPoint Description	Latitude Longitude
1	ST	PHIK/A	N 21 19.12
		HONOLULU INTL	W157 55.35
2		MKKW	N 21 08.29
		MOLOKAI	W157 10.04
3		MAGGIW	N 21 50.43
		MAGGI	W156 57.94
4		TOADS/W	N 22 46.16
		TOADS	W156 41.76
5		APACK/W	N 24 02.62
		APACK	W156 19.17
6		ZOULU/W	N 25 11.75
		ZOULU	W156 25.27
7	1	DROP #1	H 28 30.00
			W154 30.00
8		DROP #2	H 30 50.00
			W153 30.00
9		DROP #3	H 33 15.00
			W153 00.00
10		DROP #4	H 35 45.00
			W152 50.00
11		DROP #5	H 38 10.00
			W153 40.00
12		DROP #6	H 40 05.00
			W155 55.00
13	7	DROP #7	H 41 00.00
		CP	W159 00.00
14		DROP #8	H 39 30.00
			W161 30.00
15		DROP #9	H 37 15.00
			W162 45.00
16		DROP #10	H 34 45.00
			W162 45.00
17		DROP #11	H 32 15.00
			W162 30.00
18		DROP #12	H 29 45.00
			W161 45.00
19	13	DROP #13	H 27 15.00
			W160 45.00
20		.ADIZ	H 26 30.00
			W160 25.00
21		PHZH-KZAK	H 26 10.00
		FIR	W160 15.00
22		WV-188	H 26 00.00
			W160 10.00
23		W188-W189	H 22 45.00
			W158 55.00
24		HAULI/W	N 21 45.34
		HAULI	W158 33.82
25		BOOKE/W	N 21 27.79
		BOOKE	W158 26.99
26		SHIGI/W	N 21 18.25
		SHIGI	W158 10.29
27		HNL/R	N 21 18.50
		HONOLULU	W157 55.82
28	AP	PHIK/A	N 21 19.12
		HONOLULU INTL	W157 55.35

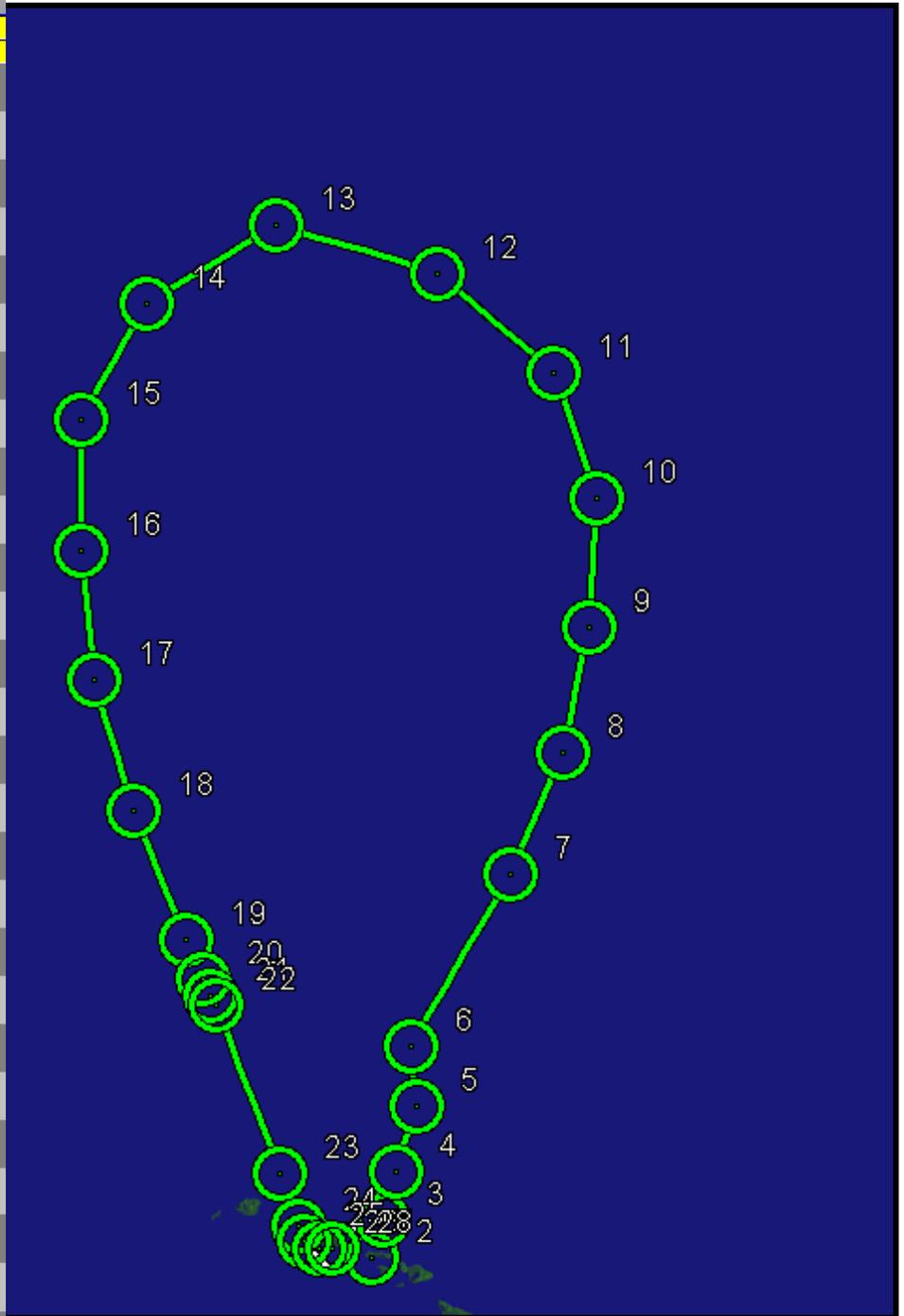


Figure H-8. Hawaiian Flight Track WSRP-P34

Turn Pt	Type	FixPoint Description	Latitude Longitude
1	ST	PHIK/A	N 21 19.12
		HONOLULU INTL	W157 55.35
2		MKK/W	N 21 08.29
		MOLOKAI	W157 10.04
3		MAGGI/W	N 21 50.43
		MAGGI	W156 57.94
4		TOADS/W	N 22 46.16
		TOADS	W156 41.76
5		APACK/W	N 24 02.62
		APACK	W156 19.17
6		.ADIZ	H 25 15.00
			W155 10.00
7		.FIR-KZOA	H 25 30.00
			W155 00.00
8		.DROP #1	H 26 45.00
1			W153 35.00
9		.DROP #2	H 28 30.00
			W151 30.00
10		.DROP #3	H 30 25.00
			W149 40.00
11		.DROP #4	H 32 30.00
			W147 55.00
12		.DROP #5	H 34 55.00
			W147 10.00
13		.DROP #6	H 37 20.00
			W148 10.00
14		.DROP #7	H 39 30.00
			W150 00.00
15		.DROP #8	H 40 45.00
8		CP	W153 00.00
16		.DROP #9	H 40 00.00
			W156 00.00
17		.DROP #10	H 38 30.00
			W158 30.00
18		.DROP #11	H 36 15.00
			W160 00.00
19		.DROP #12	H 33 45.00
			W160 00.00
20		.DROP #13	H 31 15.00
			W159 45.00
21		.DROP #14	H 28 45.00
14			W159 15.00
22		.ADIZ	H 26 30.00
			W159 00.00
23		.PHZH-KZAK FIR	H 26 10.00 W158 57.00
24		.WV-188	H 25 55.00
			W158 55.00
25		.W188-189	H 23 15.00
			W158 40.00
26		HAULI/W	N 21 45.34
		HAULI	W158 33.82
27		BOOKE/W	N 21 27.79
		BOOKE	W158 26.99
28		SHIGI/W	N 21 18.25
		SHIGI	W158 10.29
29	AP	PHIK/A	N 21 19.12
		HONOLULU INTL	W157 55.35

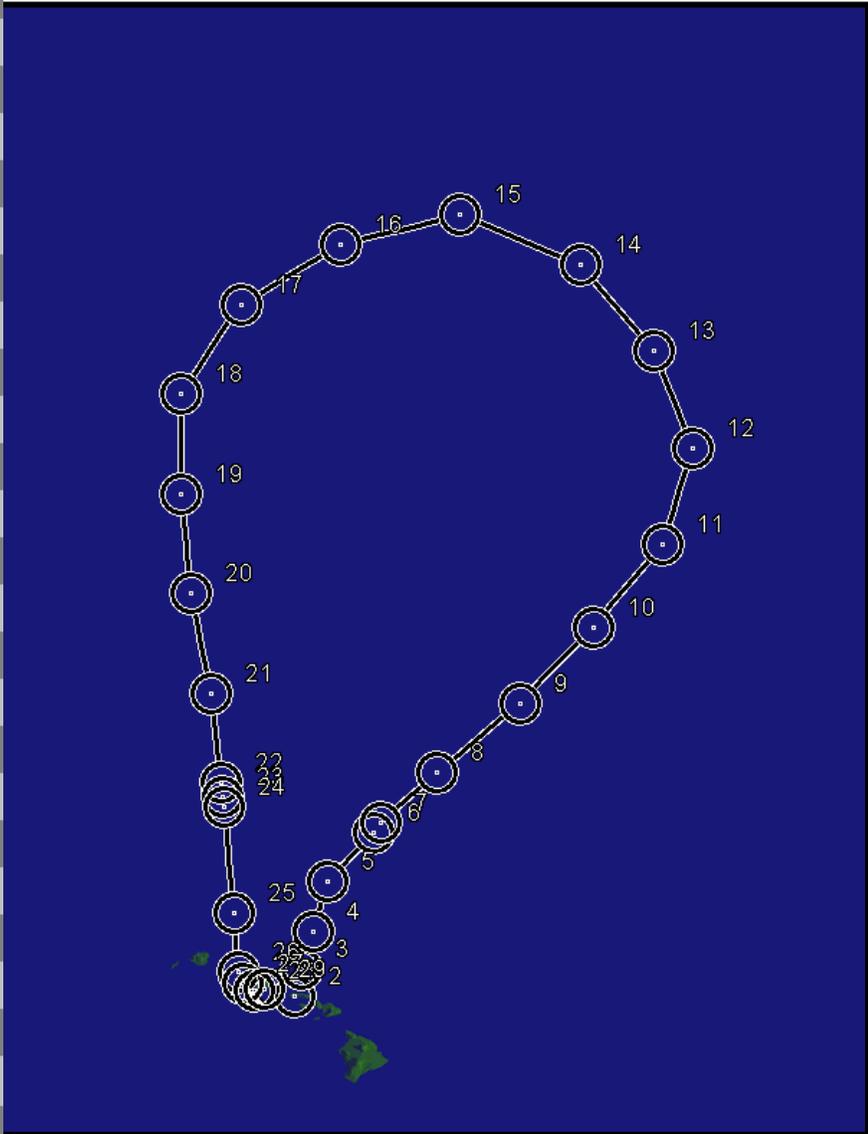


Figure H-9. Hawaiian Flight Track WSRP-P35

Turn Pt	Type	FixPoint Description	Latitude Longitude
1	ST	PHIK/A	N 21 19.12
		HONOLULU INTL	W157 55.35
2		MKK/W	N 21 08.29
		MOLOKAI	W157 10.04
3		CLUTS/W	N 23 00.20
		CLUTS	W154 39.29
4		CEBEN/W	N 23 46.83
		CEBEN	W153 21.97
5		.DROP #1	H 26 40.00
6	1		W150 50.00
		.DROP #2	H 28 10.00
7			W148 35.00
		.DROP #3	H 29 35.00
8			W146 15.00
		.DROP #4	H 31 15.00
9			W144 00.00
		.DROP #5	H 33 40.00
10			W143 15.00
		.DROP #6	H 36 10.00
11			W143 25.00
		.DROP #7	H 38 35.00
12	8		W144 20.00
		.DROP #8	H 40 00.00
13		CP	W147 00.00
		.DROP #9	H 40 00.00
14			W150 15.00
		.DROP #10	H 38 45.00
15			W153 00.00
		.DROP #11	H 36 30.00
16			W154 30.00
		.DROP #12	H 34 10.00
17			W155 40.00
		.DROP #13	H 31 45.00
18			W156 25.00
		.DROP #14	H 29 15.00
19	14		W156 40.00
		.ADIZ	H 26 30.00
20			W156 30.00
		.PHZH-KZAK	H 26 05.00
21		FIR	W156 28.00
		APACK/W	N 24 02.62
22		APACK	W156 19.17
		TOADS/W	N 22 46.16
23		TOADS	W156 41.76
		MAGGI/W	N 21 50.43
24		MAGGI	W156 57.94
		BAMBO/W	N 21 24.99
25		BAMBO	W157 30.60
		GRITL/W	N 21 19.66
26		GRITL	W157 37.40
		CKH/W	N 21 15.91
27	AP	KOKO HEAD	W157 42.18
		HIL/R	N 21 18.50
		HONOLULU	W157 55.82

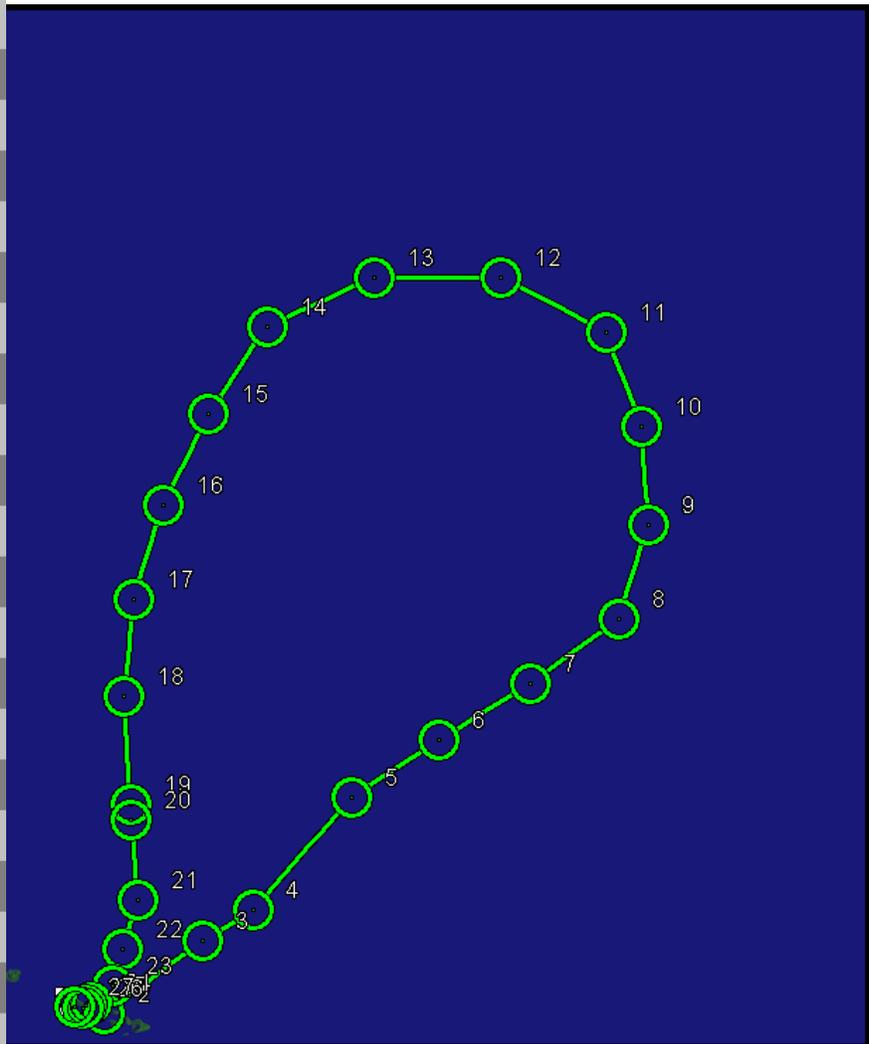


Figure H-10. Hawaiian Flight Track WSRP-P36

Turn Pt	Type	FixPoint Description	Latitude Longitude
1	ST	PHIK/A	N 21 19.12
		HONOLULU INTL	W157 55.35
2		MKK/W	N 21 08.29
		MOLOKAI	W157 10.04
3		CLUTS/W	N 23 00.20
		CLUTS	W154 39.29
4		CEBEN/W	N 23 46.83
		CEBEN	W153 21.97
5		.DROP #1	H 25 45.00
1			W151 15.00
6		.DROP #2	H 27 00.00
			W148 45.00
7		.DROP #3	H 28 15.00
			W146 15.00
8		.DROP #4	H 29 25.00
			W143 35.00
9		.DROP #5	H 30 45.00
			W141 15.00
10		.DROP #6	H 32 45.00
			W139 30.00
11		.DROP #7	H 34 55.00
			W137 55.00
12		.DROP #8	H 37 30.00
			W138 20.00
13		.DROP #9	H 39 45.00
9		CP	W140 00.00
14		.DROP #10	H 40 15.00
			W143 15.00
15		.DROP #11	H 40 15.00
			W146 30.00
16		.DROP #12	H 38 30.00
			W149 00.00
17		.DROP #13	H 36 30.00
			W150 45.00
18		.DROP #14	H 34 15.00
			W152 15.00
19		.DROP #15	H 31 45.00
			W153 15.00
20		.DROP #16	H 29 15.00
16			W154 15.00
21		.FIR-PHZH	H 26 00.00
			W155 35.00
22		.ADIZ	H 25 55.00
			W155 35.00
23		APACK/W	N 24 02.62
		APACK	W156 19.17
24		TOADS/W	N 22 46.16
		TOADS	W156 41.76
25		MAGGI/W	N 21 50.43
		MAGGI	W156 57.94
26		BAMBO/W	N 21 24.99
		BAMBO	W157 30.60
27		GRITL/W	N 21 19.66
		GRITL	W157 37.40
28		CKHW	N 21 15.91
		KOKO HEAD	W157 42.18
29	AP	HNL/R	N 21 18.50
		HONOLULU	W157 55.82

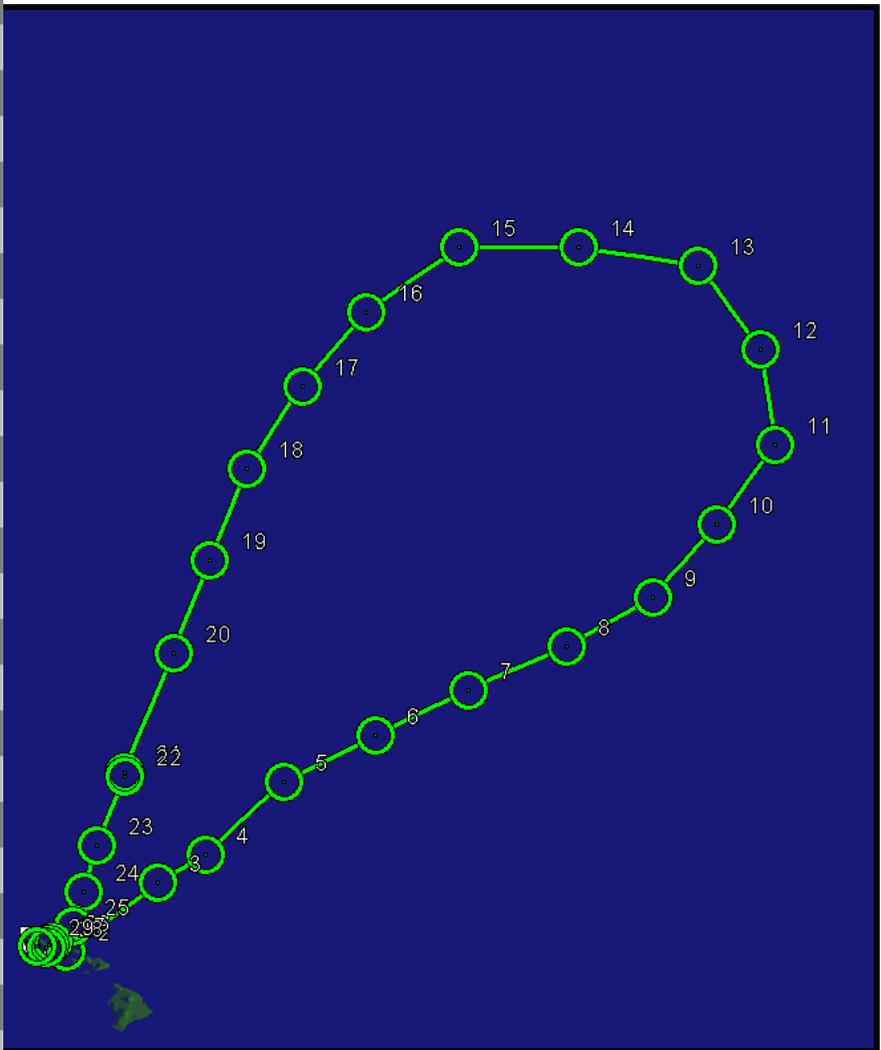


Figure H-11. Hawaiian Flight Track WSRP-37

Turn Pt	Type	FixPoint	Latitude
	DTD	Description	Longitude
1	ST	PHIK/A	N 21 19.12
		HONOLULU INTL	W157 55.35
2		KEOLA W	N 21 17.89
		KEOLA	W158 29.43
3		GRAIL W	N 21 30.78
		GRAIL	W158 51.55
4		HAPUA W	N 21 44.18
		NAPUA	W159 14.64
5		LIH W	N 21 57.92
		LIHUE	W159 20.29
6		THOMA W	N 23 56.61
		THOMA	W160 45.81
7		.ADIZ	H 25 40.00
8		.FIR-KZOA	W162 00.00
9	1	DROP #1	H 25 50.00
			W162 05.00
10	1	DROP #2	H 27 10.00
			W163 10.00
11	1	DROP #3	H 29 00.00
			W165 00.00
12	1	DROP #4	H 30 55.00
			W166 50.00
13	1	DROP #5	H 32 35.00
			W169 00.00
14	1	DROP #6	H 34 25.00
			W171 10.00
15	1	DROP #7	H 35 40.00
			W173 50.00
16	1	DROP #8	H 36 50.00
			W176 40.00
17	1	DROP #9	H 36 15.00
			W179 45.00
18	9	DROP #10	H 34 30.00
		CP	E178 15.00
19	9	DROP #11	H 32 00.00
			E178 00.00
20	9	DROP #12	H 29 45.00
			E179 15.00
21	9	DROP #13	H 27 45.00
			W179 00.00
22	9	DROP #14	H 26 20.00
			W176 40.00
23	9	DROP #15	H 25 20.00
			W174 10.00
24	9	DROP #16	H 24 45.00
			W171 30.00
25	17	DROP #17	H 24 20.00
			W168 45.00
26	17	.ADIZ-FIR	H 23 45.00
		PHZH-KZAK	W166 00.00
27	17	CANOH W	N 22 48.09
		CANON	W162 37.01
28	17	SOK W	N 21 54.02
		SOUTH KAUAI	W159 31.73
29	17	BOOKE W	N 21 27.79
		BOOKE	W158 26.99
30	17	SHIGI W	N 21 18.25
		SHIGI	W158 10.29
31	AP	HIL R	N 21 18.50
		HONOLULU	W157 55.82

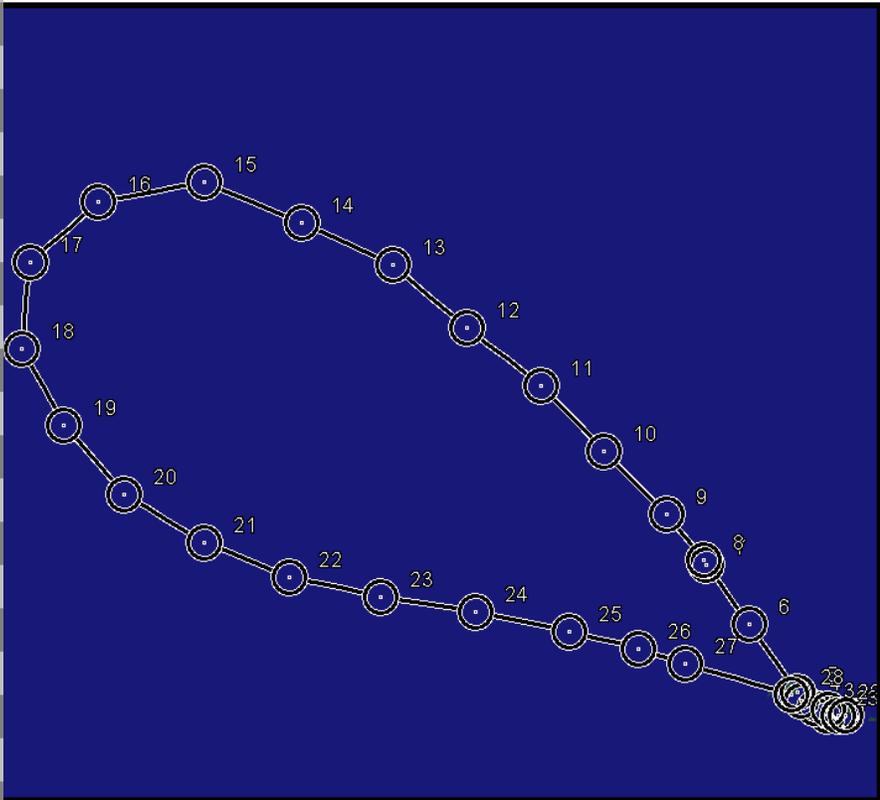


Figure H-12. Hawaiian Flight Track WSRP-P38

Turn Pt	Type	FixPoint Description	Latitude Longitude
1	ST	PHK/A	N 21 19.12
		HONOLULU INTL	W157 55.35
2		KEOLA W	N 21 17.89
		KEOLA	W158 29.43
3		HAULI W	N 21 45.34
		HAULI	W158 33.82
4		W-188/189	H 22 50.00
			W158 50.00
5		W-188 EXIT	H 26 00.00
			W160 00.00
6		.FIR-KZOA	H 26 30.00
		ADIZ	W160 15.00
7		.DROP #1	H 29 00.00
	1		W161 45.00
8		.DROP #2	H 31 15.00
			W163 00.00
9		.DROP #3	H 33 30.00
			W164 30.00
10		.DROP #4	H 35 30.00
			W166 30.00
11		.DROP #5	H 36 00.00
			W169 30.00
12		.DROP #6	H 36 00.00
			W172 45.00
13		.DROP #7	H 35 30.00
	7	CP	W175 45.00
14		.DROP #8	H 33 00.00
			W176 45.00
15		.DROP #9	H 30 30.00
			W177 30.00
16		.DROP #10	H 28 00.00
			W176 30.00
17		.DROP #11	H 26 30.00
			W174 15.00
18		.DROP #12	H 25 35.00
			W171 35.00
19		.DROP #13	H 24 45.00
			W169 00.00
20		.DROP #14	H 23 45.00
	14		W166 25.00
21		.ADIZ-FIR	H 23 10.00
		.PHZH-KZAK	W164 00.00
22		CANON W	N 22 48.09
		CANON	W162 37.01
23		SOK W	N 21 54.02
		SOUTH KAUAI	W159 31.73
24		BOOKE W	N 21 27.79
		BOOKE	W158 26.99
25		SHIGI W	N 21 18.25
		SHIGI	W158 10.29
26	AP	HIL R	N 21 18.50
		HONOLULU	W157 55.82

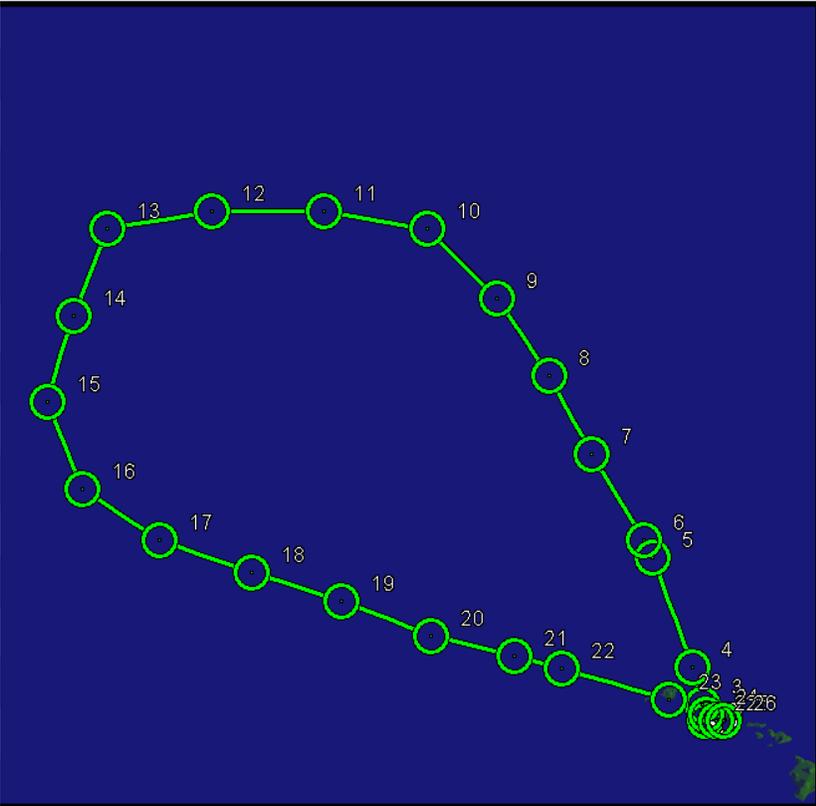


Figure H-13. Hawaiian Flight Track WSRP-P39

Turn Pt	Type	FixPoint Description	Latitude Longitude
1	ST	PHIK/A	N 21 19.12
		HONOLULU INTL	W157 55.35
2		KEOLA/W	N 21 17.89
		KEOLA	W158 29.43
3		HAULI/W	N 21 45.34
		HAULI	W158 33.82
4		WV-188/189	H 23 00.00
			W158 45.00
5		WV-188 EXIT	H 26 00.00
			W159 15.00
6		FIR-KZOA	H 26 30.00
		ADIZ	W159 20.00
7		DROP #1	H 27 30.00
	1		W159 30.00
8		DROP #2	H 30 00.00
			W159 45.00
9		DROP #3	H 32 30.00
			W160 45.00
10		DROP #4	H 34 45.00
			W162 15.00
11		DROP #5	H 36 00.00
			W165 00.00
12		DROP #6	H 36 15.00
			W168 15.00
13		DROP #7	H 36 00.00
	7	CP	W171 30.00
14		DROP #8	H 33 30.00
			W172 00.00
15		DROP #9	H 31 00.00
			W172 15.00
16		DROP #10	H 28 35.00
			W171 35.00
17		DROP #11	H 26 45.00
			W169 35.00
18		DROP #12	H 25 30.00
			W167 05.00
19		DROP #13	H 24 40.00
	13		W164 35.00
20		ADIZ-FIR	H 24 20.00
		PHZH-KZAK	W163 35.00
21		DAHIO/W	N 23 31.99
		DANNO	W161 34.91
22		LIH/W	N 21 57.92
		LIHUE	W159 20.29
23		BOOKE/W	N 21 27.79
		BOOKE	W158 26.99
24		SHIGI/W	N 21 18.25
		SHIGI	W158 10.29
25	AP	PHIK/A	N 21 19.12
		HONOLULU INTL	W157 55.35



Figure H-14. Hawaiian Flight Track WSRP-P40

Turn Pt	Type	Fix/Point Description	Latitude Longitude
1	ST	PHIK/A	N 21 19.12
		HONOLULU INTL	W157 55.35
2		MKKW	N 21 08.29
		MOLOKAI	W157 10.04
3		MAGGIW	N 21 50.43
		MAGGI	W156 57.94
4		TOADS/W	N 22 46.16
		TOADS	W156 41.76
5		APACK/W	N 24 02.62
		APACK	W156 19.17
6		.FIR-KZOA	II 26 30.00
		ADIZ	W156 00.00
7	1	.DROP #1	II 27 45.00
			W155 40.00
8		.DROP #2	II 30 15.00
			W155 15.00
9		.DROP #3	II 32 50.00
			W155 55.00
10		.DROP #4	II 34 50.00
			W157 45.00
11		.DROP #5	II 36 00.00
			W160 30.00
12	6	.DROP #6	II 36 00.00
		CP	W163 30.00
13		.DROP #7	II 34 45.00
			W166 15.00
14		.DROP #8	II 32 25.00
			W167 25.00
15		.DROP #9	II 29 55.00
			W167 25.00
16		.DROP #10	II 27 30.00
			W166 35.00
17		.DROP #11	II 25 25.00
			W164 55.00
18		.ADIZ-FIR	II 24 50.00
		PHZH-KZAK	W163 00.00
19	12	.DROP #12	II 24 30.00
			W162 20.00
20		THOMA/W	N 23 56.61
		THOMA	W160 45.81
21		.W-188/189	II 22 35.00
			W159 00.00
22		HAULIW	N 21 45.34
		HAULI	W158 33.82
23		BOOKEW	N 21 27.79
		BOOKE	W158 26.99
24		SHIGIW	N 21 18.25
		SHIGI	W158 10.29
25	AP	PHIK/A	N 21 19.12
		HONOLULU INTL	W157 55.35

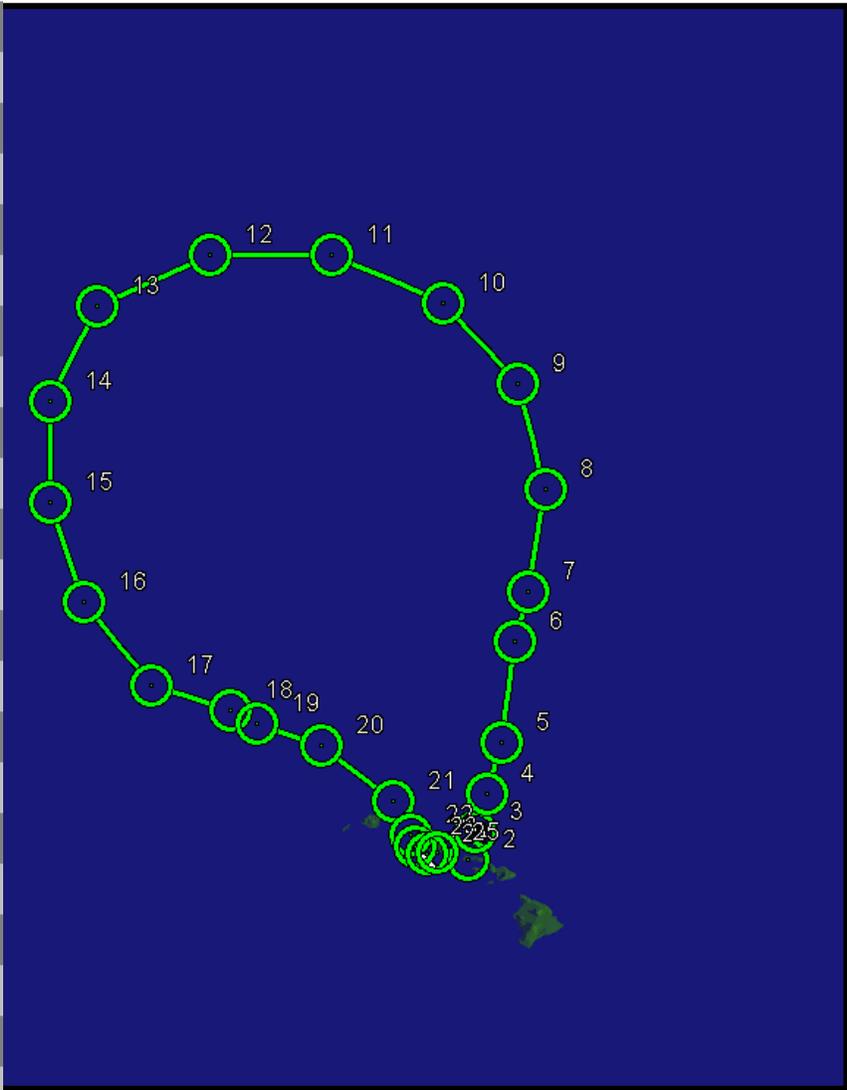


Figure H-15. Hawaiian Flight Track WSRP-P41

Turn Pt	Type	Fix/Point Description	Latitude Longitude
1	ST	PHIK/A	N 21 19.12
		HONOLULU INTL	W157 55.35
2		MKK/W	N 21 08.29
		MOLOKAI	W157 10.04
3		MAGGI/W	N 21 50.43
		MAGGI	W156 57.94
4		TOADS/W	N 22 46.16
		TOADS	W156 41.76
5		APACK/W	N 24 02.62
		APACK	W156 19.17
6		AUNTI/W	N 24 43.28
		AUNTI	W155 15.78
7		.DROP #1	H 25 30.00
	1		W153 45.00
8		.DROP #2	H 28 00.00
			W152 45.00
9		.DROP #3	H 30 30.00
			W152 15.00
10		.DROP #4	H 32 45.00
			W153 30.00
11		.DROP #5	H 34 30.00
			W155 30.00
12		.DROP #6	H 36 00.00
	6	CP	W158 00.00
13		.DROP #7	H 34 45.00
			W160 45.00
14		.DROP #8	H 32 45.00
			W162 45.00
15		.DROP #9	H 30 15.00
			W163 00.00
16		.DROP #10	H 27 45.00
			W163 00.00
17		.DROP #11	H 25 20.00
	11	PHZH-KZAK	W162 10.00
18		THOMA/W	N 23 56.61
		THOMA	W160 45.81
19		LIH/W	N 21 57.92
		LIHUE	W159 20.29
20		BOOKE/W	N 21 27.79
		BOOKE	W158 26.99
21		SHIGI/W	N 21 18.25
		SHIGI	W158 10.29
22	AP	PHIK/A	N 21 19.12
		HONOLULU INTL	W157 55.35

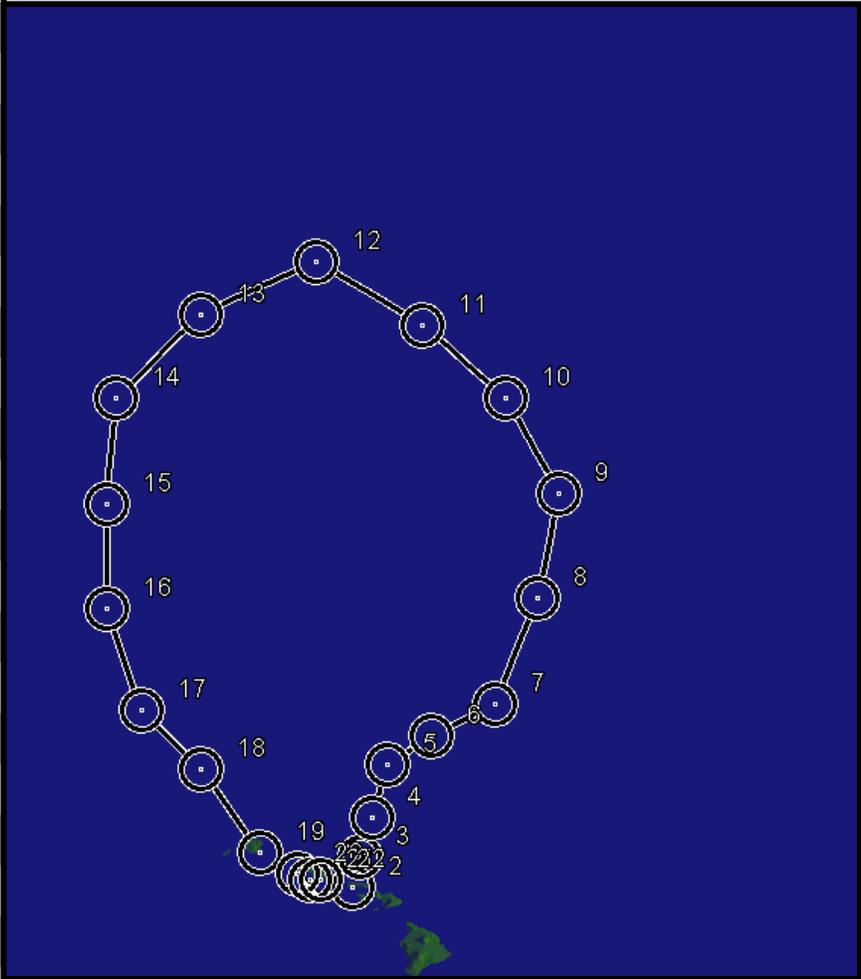


Figure H-16. Hawaiian Flight Track WSRP-P42

Turn Pt	Type	FixPoint	Latitude
	DTD	Description	Longitude
1	ST	PHIK/A	N 21 19.12
		HONOLULU INTL	W157 55.35
2		MKK/W	N 21 08.29
		MOLOKAI	W157 10.04
3		CLUTS/W	N 23 00.20
		CLUTS	W154 39.29
4		CEBEN/W	N 23 46.83
		CEBEN	W153 21.97
5	1	.DROP #1	II 25 05.00
			W151 50.00
6		.DROP #2	II 26 45.00
			W149 45.00
7		.DROP #3	II 28 40.00
			W147 55.00
8		.DROP #4	II 31 05.00
			W147 00.00
9		.DROP #5	II 33 30.00
			W148 00.00
10	6	.DROP #6	II 35 30.00
		CP	W150 00.00
11		.DROP #7	II 35 30.00
			W153 00.00
12		.DROP #8	II 35 15.00
			W156 00.00
13		.DROP #9	II 33 15.00
			W157 45.00
14		.DROP #10	II 31 00.00
			W158 55.00
15	11	.DROP #11	II 28 30.00
			W159 00.00
16		.ADIZ	II 26 30.00
			W158 50.00
17		.PHZH-KZAK	II 26 08.00
		FIR	W158 50.00
18		.W-188	II 25 55.00
			W158 48.00
19		.W-189	II 23 15.00
			W158 35.00
20		HAULIW	N 21 45.34
		HAULI	W158 33.82
21		BOOKEW	N 21 27.79
		BOOKE	W158 26.99
22		SHIGIW	N 21 18.25
		SHIGI	W158 10.29
23	AP	PHIK/A	N 21 19.12
		HONOLULU INTL	W157 55.35

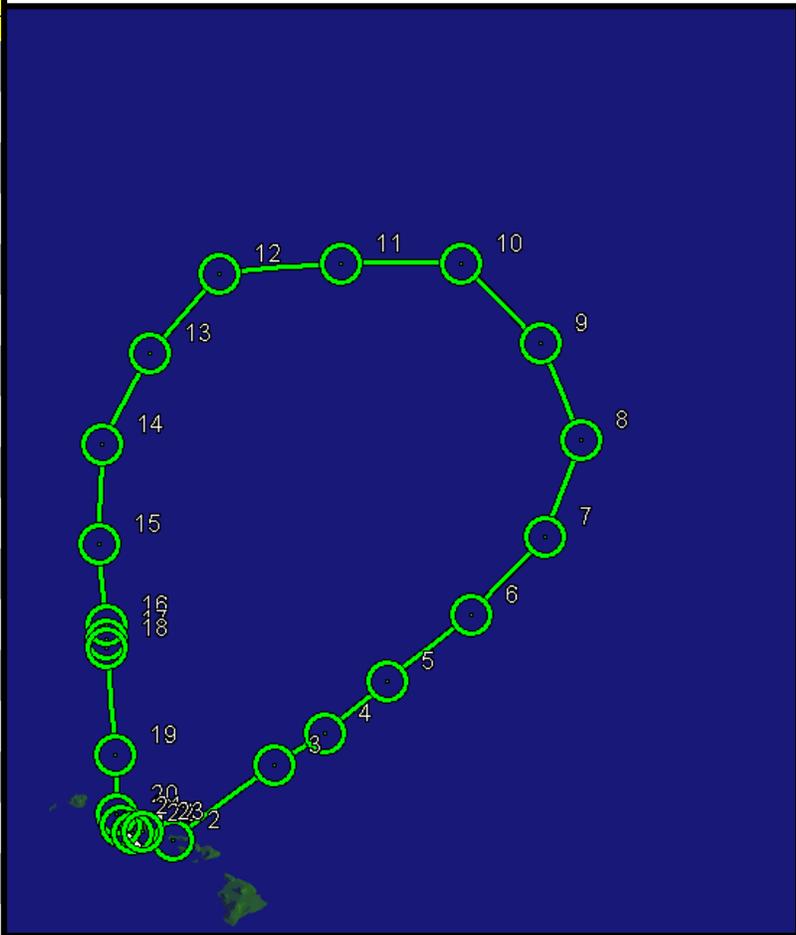


Figure H-17. Hawaiian Flight Track WSRP-P43

Turn Pt	Type	Fix Point Description	Latitude	Longitude
2		MKK/W MOLOKAI	N 21 08.29 W157 10.04	
3		CLUTS/W CLUTS	N 23 00.20 W154 39.29	
4	1	DROP #1	H 23 45.00 W153 30.00	
5		DROP #2	H 25 00.00 W151 00.00	
6		DROP #3	H 26 00.00 W148 30.00	
7		DROP #4	H 26 45.00 W145 45.00	
8		DROP #5	H 28 35.00 W143 45.00	
9		DROP #6	H 31 10.00 W143 00.00	
10		DROP #7	H 33 40.00 W143 20.00	
11	8	DROP #8 CP	H 36 00.00 W144 45.00	
12		DROP #9	H 37 00.00 W147 45.00	
13		DROP #10	H 36 15.00 W150 45.00	
14		DROP #11	H 34 45.00 W153 15.00	
15		DROP #12	H 32 35.00 W155 05.00	
16		DROP #13	H 30 15.00 W156 15.00	
17	14	DROP #14	H 27 45.00 W157 00.00	
18		.ADIZ	H 26 30.00 W156 45.00	
19		PHZH-KZAK FIR	H 26 03.00 W156 41.00	
20		APACK/W APACK	N 24 02.62 W156 19.17	
21		TOADS/W TOADS	N 22 46.16 W156 41.76	
22		MAGGI/W MAGGI	N 21 50.43 W156 57.94	
23		BAMBO/W BAMBO	N 21 24.99 W157 30.60	
24		GRITL/W GRITL	N 21 19.66 W157 37.40	
25		CKH/R KOKO HEAD	N 21 15.91 W157 42.18	
26	AP	PHIK/A HONOLULU INTL	N 21 19.12 W157 55.35	

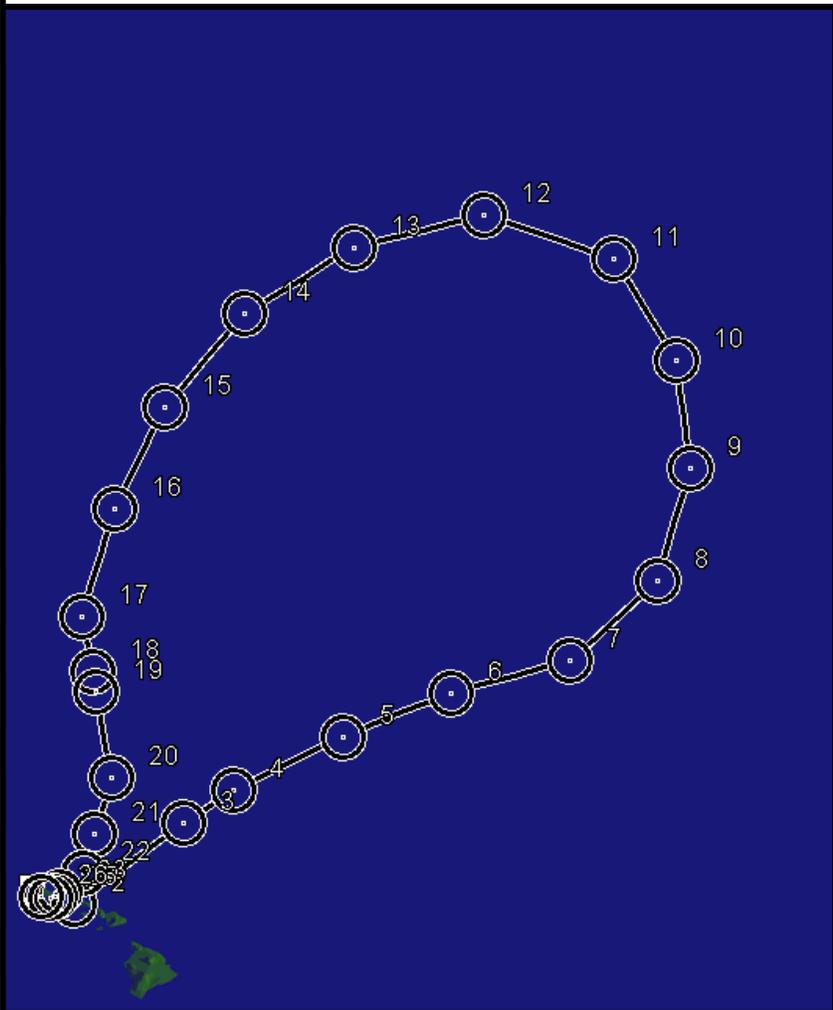


Figure H-18. Hawaiian Flight Track WSRP-P44

Turn Pt	Type	Fix Point Description	Latitude Longitude
1	ST	PHIK/A	N 21 19.12
		HONOLULU INTL	W157 55.35
2		MKK/W	N 21 08.29
		MOLOKAI	W157 10.04
3		CLUTS/W	N 23 00.20
		CLUTS	W154 39.29
4		.ADIZ	H 23 05.00
			W153 45.00
5		DRAYK/W	N 23 01.45
		DRAYK	W152 34.67
6		DUSAC/W	N 26 00.37
		DUSAC	W146 10.05
7		.DROP #1	H 25 15.00
	1		W147 00.00
8		.DROP #2	H 26 00.00
			W144 15.00
9		.DROP #3	H 26 45.00
			W141 30.00
10		.DROP #4	H 28 00.00
			W139 00.00
11		.DROP #5	H 29 45.00
			W136 45.00
12		.DROP #6	H 32 15.00
			W136 00.00
13		.DROP #7	H 34 45.00
	7	CP	W136 45.00
14		.DROP #8	H 36 30.00
			W139 00.00
15		.DROP #9	H 37 00.00
			W142 15.00
16		.DROP #10	H 36 15.00
			W145 15.00
17		.DROP #11	H 35 00.00
			W148 00.00
18		.DROP #12	H 33 00.00
			W150 00.00
19		.DROP #13	H 31 00.00
			W152 00.00
20		.DROP #14	H 29 00.00
			W153 45.00
21		.DROP #15	H 26 45.00
	15		W155 15.00
22		ZOULU/W	N 25 11.75
		ZOULU	W156 25.27
23		APACK/W	N 24 02.62
		APACK	W156 19.17
24		TOADS/W	N 22 46.16
		TOADS	W156 41.76
25		MAGGI/W	N 21 50.43
		MAGGI	W156 57.94
26		BAMBO/W	N 21 24.99
		BAMBO	W157 30.60
27		GRITL/W	N 21 19.66
		GRITL	W157 37.40
28		CKH/W	N 21 15.91
		KOKO HEAD	W157 42.18
29	AP	PHIK/A	N 21 19.12
		HONOLULU INTL	W157 55.35

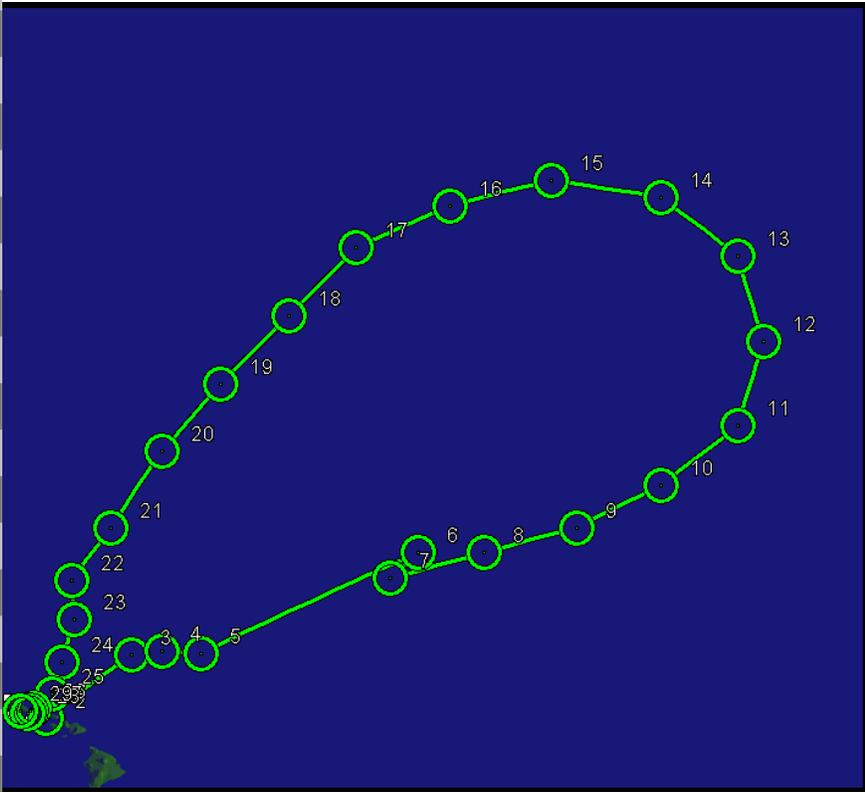


Figure H-19. Hawaiian Flight Track WSRP-P45

Turn Pt	Type	Fix/Point	Latitude
	DTD	Description	Longitude
1	ST	PHIK/A	N 21 19.12
		HONOLULU INTL	W157 55.35
2		MKK/W	N 21 08.29
		MOLOKAI	W157 10.04
3		CLUTS/W	N 23 00.20
		CLUTS	W154 39.29
4		DRAYK/W	N 23 01.45
		DRAYK	W152 34.67
5		DUSAC/W	N 26 00.37
		DUSAC	W146 10.05
6		.WAYPT A	H 24 30.00
			W145 30.00
7	1	.DROP #1	H 24 55.00
			W143 15.00
8		.DROP #2	H 25 30.00
			W140 30.00
9		.DROP #3	H 26 10.00
			W137 45.00
10		.DROP #4	H 27 15.00
			W135 10.00
11		.DROP #5	H 29 15.00
			W133 20.00
12		.DROP #6	H 31 30.00
			W132 10.00
13	7	.DROP #7	H 34 00.00
		CP	W132 45.00
14		.DROP #8	H 35 30.00
			W135 15.00
15		.DROP #9	H 36 00.00
			W138 15.00
16		.DROP #10	H 35 30.00
			W141 15.00
17		.DROP #11	H 34 30.00
			W144 00.00
18		.DROP #12	H 33 15.00
			W146 45.00
19		.DROP #13	H 31 45.00
			W149 15.00
20	14	.DROP #14	H 30 00.00
			W151 30.00
21		.WAYPT B	H 28 00.00
			W153 30.00
22		ZOULU/W	N 25 11.75
		ZOULU	W156 25.27
23		APACK/W	N 24 02.62
		APACK	W156 19.17
24		TOADS/W	N 22 46.16
		TOADS	W156 41.76
25		MAGGI/W	N 21 50.43
		MAGGI	W156 57.94
26		BAMBO/W	N 21 24.99
		BAMBO	W157 30.60
27		GRITL/W	N 21 19.66
		GRITL	W157 37.40
28		CKH/W	N 21 15.91
		KOKO HEAD	W157 42.18
29	AP	PHIK/A	N 21 19.12
		HONOLULU INTL	W157 55.35



Figure H-20. Hawaiian Flight Track WSRP-P46

Turn Pt	Type	Fix Point Description	Latitude Longitude
1	ST	PHI/A	N 21 19.12
		HONOLULU INTL	W157 55.35
2		KEOLA W	N 21 17.89
		KEOLA	W158 29.43
3		GRAIL W	N 21 30.78
		GRAIL	W158 51.55
4		IIAPUA W	N 21 44.18
		NAPUA	W159 14.64
5		LIHW	N 21 57.92
		LIHUE	W159 20.29
6		THOMA W	N 23 56.61
		THOMA	W160 45.81
7		ADIZ	H 25 00.00
			W162 50.00
8		FIR-KZAK	H 25 10.00
			W163 10.00
9		DROP #1	H 26 45.00
1			W166 25.00
10		DROP #2	H 27 40.00
			W169 05.00
11		DROP #3	H 28 40.00
			W171 50.00
12		DROP #4	H 29 40.00
			W174 35.00
13		DROP #5	H 30 30.00
			W177 20.00
14		DROP #6	H 30 55.00
			E179 45.00
15		DROP #7	H 30 40.00
			E176 55.00
16		DROP #8	H 29 00.00
			E174 45.00
17		DROP #9	H 27 00.00
9		CP	E173 00.00
18		DROP #10	H 24 55.00
			E174 40.00
19		DROP #11	H 23 15.00
			E176 45.00
20		DROP #12	H 22 25.00
			E179 20.00
21		DROP #13	H 21 50.00
			W178 00.00
22		DROP #14	H 21 45.00
			W175 10.00
23		DROP #15	H 21 45.00
			W172 25.00
24		DROP #16	H 21 55.00
			W169 40.00
25		DROP #17	H 22 00.00
17			W166 55.00
26		FIR-KOCA	H 22 00.00
			W165 00.00
27		ADIZ	H 22 00.00
			W164 00.00
28		SYVAD W	N 21 55.47
		SYVAD	W162 45.48
29		PUPPI W	N 21 55.28
		PUPPI	W161 40.78
30		SOK W	N 21 54.02
		SOUTH KAUAI	W159 31.73
31		BOOKE W	N 21 27.79
		BOOKE	W158 26.99
32		SHIGI W	N 21 18.25
		SHIGI	W158 10.29
33	AP	PHI/A	N 21 19.12
		HONOLULU INTL	W157 55.35

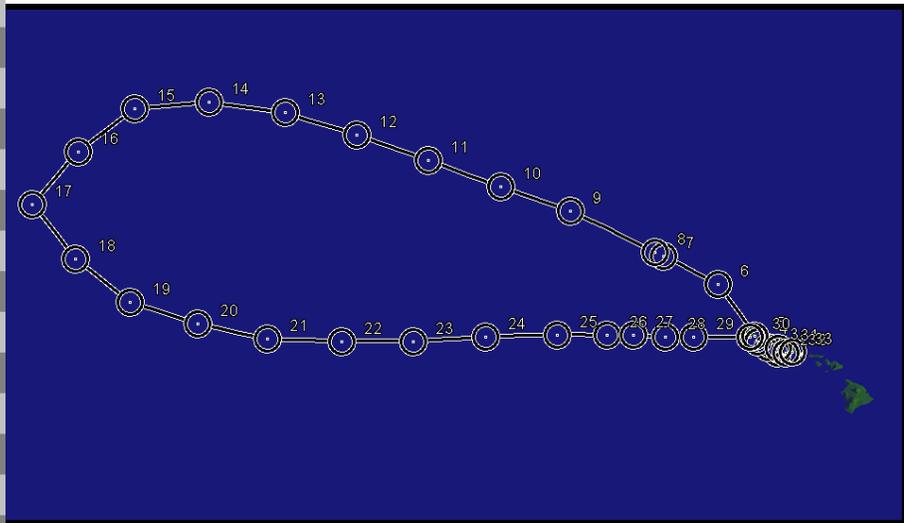


Figure H-21. Hawaiian Flight Track WSRP-P47

Turn Pt	Type	Fix Point	Latitude
	DTD	Description	Longitude
1	ST	PHIK/A	N 21 19.12
		HONOLULU INTL	W157 55.35
2		KEOLA W	N 21 17.89
		KEOLA	W158 29.43
3		GRAIL W	N 21 30.78
		GRAIL	W158 51.55
4		HAPUA W	N 21 44.18
		NAPUA	W159 14.64
5		LIH W	N 21 57.92
		LIHUE	W159 20.29
6		THOMA W	N 23 56.61
		THOMA	W160 45.81
7		ADIZ	H 25 00.00
			W162 45.00
8		FIR-KOCA	H 25 10.00
			W163 05.00
9		WAYPT A	H 26 30.00
			W165 00.00
10		DROP #1	H 27 35.00
	1		W167 15.00
11		DROP #2	H 29 05.00
			W169 35.00
12		DROP #3	H 30 30.00
			W172 00.00
13		DROP #4	H 31 45.00
			W174 40.00
14		DROP #5	H 31 30.00
			W177 35.00
15		DROP #6	H 30 00.00
			E179 55.00
16		DROP #7	H 28 30.00
	7	CP	E177 30.00
17		DROP #8	H 26 00.00
			E178 30.00
18		DROP #9	H 23 40.00
			E179 40.00
19		DROP #10	H 22 10.00
			W178 05.00
20		DROP #11	H 22 00.00
			W175 25.00
21		DROP #12	H 22 00.00
			W172 40.00
22		DROP #13	H 22 00.00
			W169 50.00
23		DROP #14	H 22 00.00
	14		W167 10.00
24		FIR-KOCA	H 22 00.00
			W165 00.00
25		ADIZ	H 22 00.00
			W164 00.00
26		SYVAD W	N 21 55.47
		SYVAD	W162 45.48
27		PUPPI W	N 21 55.28
		PUPPI	W161 40.78
28		SOK W	N 21 54.02
		SOUTH KAUAI	W159 31.73
29		BOOKE W	N 21 27.79
		BOOKE	W158 26.99
30		SHIGI W	N 21 18.25
		SHIGI	W158 10.29
31	AP	PHIK/A	N 21 19.12
		HONOLULU INTL	W157 55.35

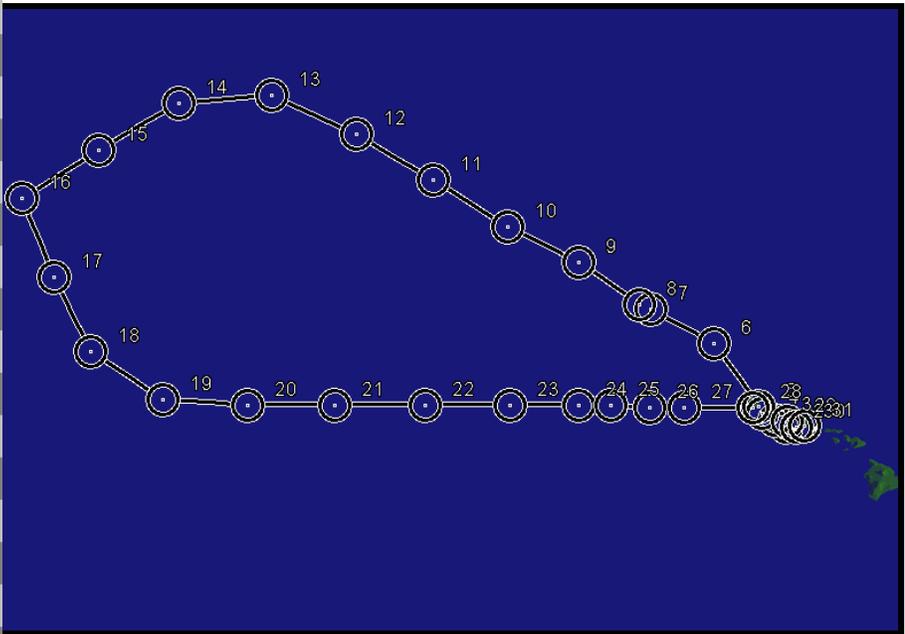


Figure H-22. Hawaiian Flight Track WSRP-P48

Turn Pt	Type	Fix/Point DTD Description	Latitude Longitude
1	ST	PHIK/A	N 21 19.12
		HONOLULU INTL	W157 55.35
2		KEOLA.W	N 21 17.89
		KEOLA	W158 29.43
3		GRAIL.W	N 21 30.78
		GRAIL	W158 51.55
4		HAPOA.W	N 21 44.18
		NAPUA	W159 14.64
5		LIH.W	N 21 57.92
		LIHUE	W159 20.29
6		THOMA.W	N 23 56.61
		THOMA	W160 45.81
7		.ADIZ	H 25 45.00
			W161 45.00
8		.FIR-KZOA	H 25 55.00
			W161 55.00
9	1	.DROP #1	H 29 00.00
			W164 00.00
10		.DROP #2	H 30 35.00
			W166 25.00
11		.DROP #3	H 31 00.00
			W169 20.00
12		.DROP #4	H 30 40.00
			W172 15.00
13	5	.DROP #5	H 29 45.00
		CP	W175 00.00
14		.NQMWV	H 28 12.21
		MIDWAY	W177 22.80
15		.DROP #6	H 25 45.00
			W176 15.00
16		.DROP #7	H 23 45.00
			W174 45.00
17		.DROP #8	H 22 00.00
			W172 45.00
18	9	.DROP #9	H 21 15.00
			W170 15.00
19		.DROP #10	H 21 15.00
			W167 30.00
20		.FIR-PHZH	H 21 30.00
			W165 00.00
21		.ADIZ	H 21 30.00
			W164 00.00
22		SOK.W	N 21 54.02
		SOUTH KAUAI	W159 31.73
23		BOOKE.W	N 21 27.79
		BOOKE	W158 26.99
24		SHIGI.W	N 21 18.25
		SHIGI	W158 10.29
25	AP	PHIK/A	N 21 19.12
		HONOLULU INTL	W157 55.35

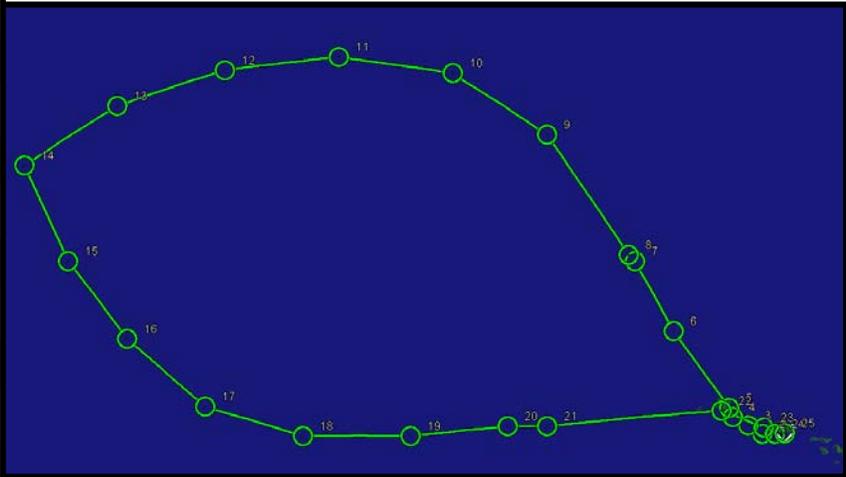


Figure H-23. Hawaiian Flight Track WSRP-P49

Note:

There is no Hawaiian Flight Track WSRP-P50

Figure H-24. Hawaiian Flight Track WSRP-P50

Turn Pt	Type	FixPoint	Latitude
	DTD	Description	Longitude
1	ST	PHIK'A	N 21 19.12
		HONOLULU INTL	W157 55.35
2		PALAY W	N 21 06.35
		PALAY	W157 34.22
3		LOKIE W	N 21 07.44
		LOKIE	W157 20.70
4		MKK W	N 21 08.29
		MOLOKAI	W157 10.04
5		.ADIZ	H 21 15.00
			W153 00.00
6		.DROP #1	H 21 15.00
1		FIR-KZOA	W150 45.00
7		.DROP #2	H 21 15.00
			W148 00.00
8		.DROP #3	H 21 30.00
			W145 15.00
9		.DROP #4	H 21 45.00
			W142 30.00
10		.DROP #5	H 22 15.00
			W139 45.00
11		.DROP #6	H 22 45.00
			W137 00.00
12		.DROP #7	H 24 00.00
			W134 30.00
13		.DROP #8	H 26 15.00
			W133 00.00
14		.DROP #09	H 28 45.00
9		CP	W132 15.00
15		.DROP #10	H 30 55.00
			W133 50.00
16		.DROP #11	H 32 00.00
			W136 30.00
17		.DROP #12	H 32 15.00
			W139 30.00
18		.DROP #13	H 31 45.00
			W142 30.00
19		.DROP #14	H 30 30.00
			W145 00.00
20		.DROP #15	H 29 00.00
			W147 15.00
21		.DROP #16	H 27 30.00
			W149 30.00
22		.DROP #17	H 26 00.00
17			W151 45.00
23		BOARD W	N 24 17.75
		BOARD	W154 15.00
24		.ADIZ	H 24 10.00
			W154 25.00
25		BITTA W	N 23 31.68
		BITTA	W155 28.73
26		CKH99 W	N 22 19.00
		(CKH 039/99)	W156 20.50
27		MAGGI W	N 21 50.43
		MAGGI	W156 57.94
28		BAMBO W	N 21 24.99
		BAMBO	W157 30.60
29		GRITL W	N 21 19.66
		GRITL	W157 37.40
30		CKH W	N 21 15.91
		KOKO HEAD	W157 42.18
31	AP	PHIK'A	N 21 19.12
		HONOLULU INTL	W157 55.35

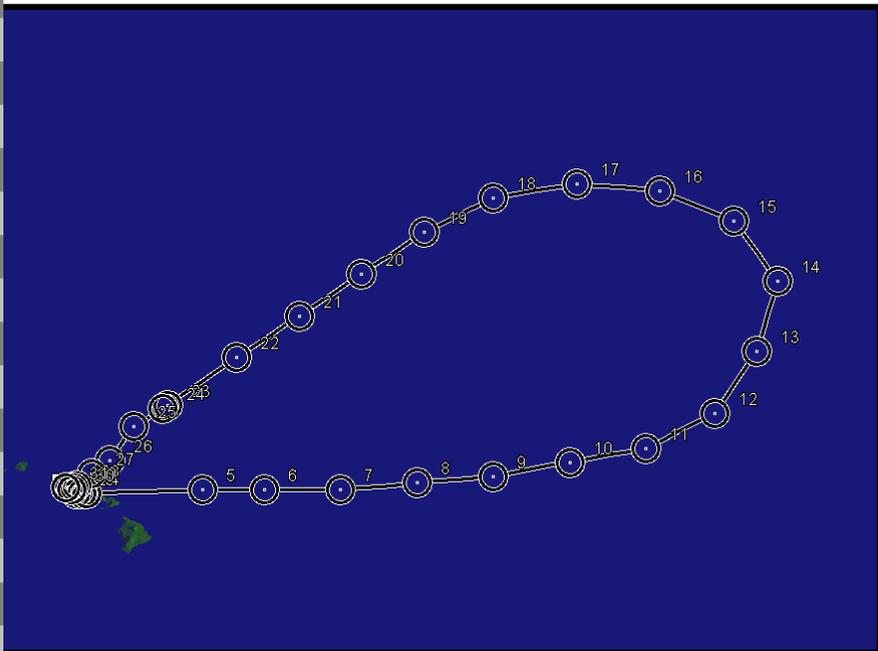


Figure H-25. Hawaiian Flight Track WSRP-P51

Turn Pt	Type	FixPoint Description	Latitude Longitude
1	ST	PHIK/A	N 21 19.12
		HONOLULU INTL	W157 55.35
2		PALAY/W	N 21 08.35
		PALAY	W157 34.22
3		LOKIE/W	N 21 07.44
		LOKIE	W157 20.70
4		MKK/R	N 21 08.29
		MOLOKAI	W157 10.04
5		PULPS/W	N 20 28.33
		PULPS	W155 53.96
6		.ADIZ	H 20 00.00
			W153 00.00
7		.DROP #1	H 19 30.00
1		FIR-KZOA	W150 35.00
8		.DROP #2	H 19 00.00
			W147 55.00
9		.DROP #3	H 18 25.00
			W145 15.00
10		.DROP #4	H 17 50.00
			W142 30.00
11		.DROP #5	H 17 25.00
			W139 55.00
12		.DROP #6	H 17 30.00
			W137 10.00
13		.DROP #7	H 17 30.00
			W134 35.00
14		.DROP #8	H 18 00.00
			W132 00.00
15		.DROP #9	H 20 10.00
			W130 35.00
16		.DROP #10	H 22 15.00
10		CP	W129 00.00
17		.DROP #11	H 24 20.00
			W130 35.00
18		.DROP #12	H 26 20.00
			W132 20.00
19		.DROP #13	H 27 00.00
			W135 05.00
20		.DROP #14	H 27 00.00
			W137 55.00
21		.DROP #15	H 26 45.00
			W140 45.00
22		.DROP #16	H 26 10.00
			W143 25.00
23		.DROP #17	H 25 25.00
			W146 10.00
24		.DROP #18	H 24 25.00
			W148 45.00
25		.DROP #19	H 23 30.00
19			W151 20.00
26		DRAYK/W	N 23 01.45
		DRAYK	W152 34.67
27		.ADIZ	H 22 35.00
			W153 25.00
28		DEHIS/W	N 22 21.80
		DENNS	W153 52.83
29		.STAR TP	H 22 23.90
		R039 INTRCPT	W156 14.56
30		MAGGI/W	N 21 50.43
		MAGGI	W156 57.94
31		BAMBO/W	N 21 24.99
		BAMBO	W157 30.60
32		GRITL/W	N 21 19.66
		GRITL	W157 37.40
33		CKH/W	N 21 15.91
		KOKO HEAD	W157 42.18
34	AP	PHIK/A	N 21 19.12
		HONOLULU INTL	W157 55.35

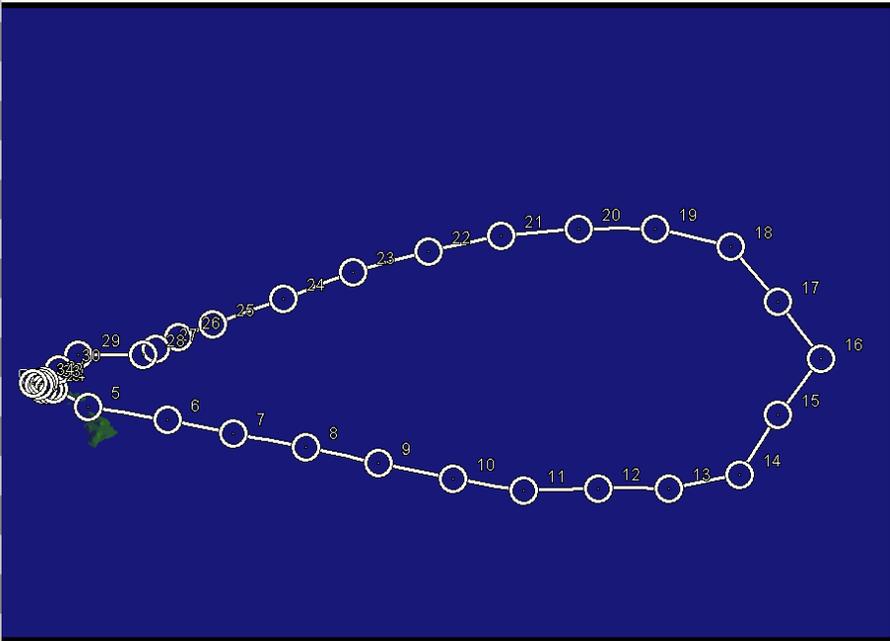


Figure H-26. Hawaiian Flight Track WSRP-P52

Turn Pt	Type	FixPoint	Latitude
DTD	Description	Longitude	
1	ST	PHIK/A	N 21 19.12
		HONOLULU INTL	W157 55.35
2		PALAY/W	N 21 06.35
		PALAY	W157 34.22
3		LOKIE/W	N 21 07.44
		LOKIE	W157 20.70
4		MKK/W	N 21 08.29
		MOLOKAI	W157 10.04
5		PULPS/W	N 20 28.33
		PULPS	W155 53.96
6		HODAY/W	N 19 36.14
		HODAY	W154 13.58
7		.ADIZ	H 19 20.00
			W153 40.00
8		DROP #1	H 18 45.00
1		FIR-KZOA	W152 15.00
9		DROP #2	H 17 25.00
			W150 00.00
10		DROP #3	H 16 10.00
			W147 45.00
11		DROP #4	H 15 05.00
			W145 20.00
12		DROP #5	H 14 20.00
			W142 50.00
13		DROP #6	H 13 40.00
			W140 25.00
14		DROP #7	H 12 45.00
			W137 00.00
15		DROP #8	H 13 54.97
			W134 32.97
16		DROP #10	H 15 30.00
10		CP	W131 45.00
17		DROP #10	H 17 05.00
10		CP	W132 00.00
18		DROP #12	H 19 15.00
			W132 30.00
19		DROP #13	H 21 00.00
			W133 00.00
20		DROP #14	H 21 30.00
			W135 00.00
21		DROP #13	H 22 00.00
			W137 00.00
22		DROP #14	H 22 40.00
			W139 35.00
23		DROP #15	H 23 00.00
			W142 20.00
24		DROP #16	H 23 00.00
			W145 00.00
25		DROP #17	H 22 55.00
			W147 45.00
26		DROP #18	H 22 40.00
18			W150 30.00
27		ELOYI/W	N 22 20.65
		ELOYI	W151 53.12
28		.ADIZ	H 22 30.00
			W153 20.00
29		DENNIS/W	N 22 21.80
		DENNIS	W153 52.83
30		.STAR TP	H 22 23.90
			W156 14.56
31		MAGGI/W	N 21 50.43
		MAGGI	W156 57.94
32		BAMBO/W	N 21 24.99
		BAMBO	W157 30.60
33		GRITL/W	N 21 19.66
		GRITL	W157 37.40
34		CKH/W	N 21 15.91
		KOKO HEAD	W157 42.18
35	AP	PHIK/A	N 21 19.12
		HONOLULU INTL	W157 55.35

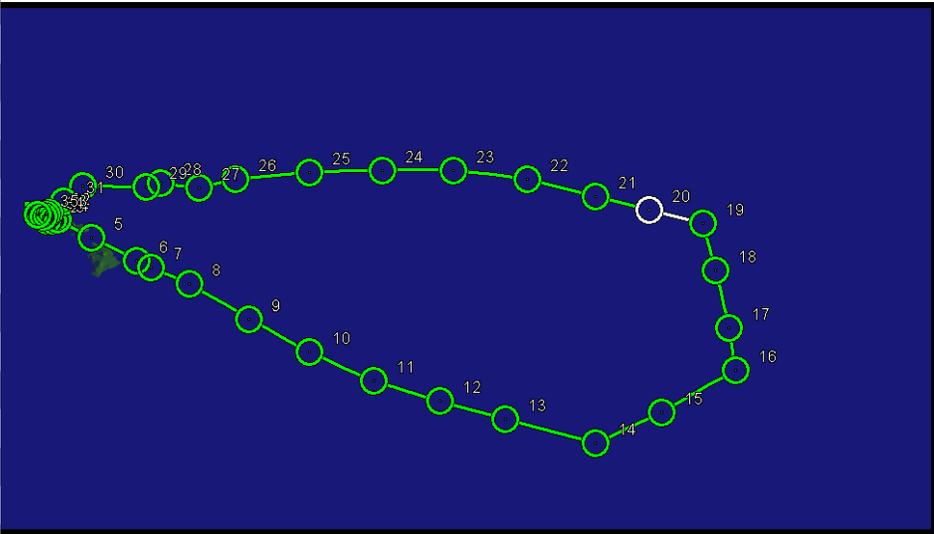


Figure H-27. Hawaiian Flight Track WSRP-P53

Turn Pt	Type	FixPoint Description	Latitude Longitude
1	ST	PHIK/A	N 21 19.12
		HONOLULU INTL	W157 55.35
2		MKK/W	N 21 08.29
		MOLOKAI	W157 10.04
3		MAGGI/W	N 21 50.43
		MAGGI	W156 57.94
4		SERYU/W	N 22 27.30
		(SERYU)	W156 47.26
5		REXIE/W	N 22 59.55
		REXIE	W156 54.77
6		ZIGIE/W	N 24 18.82
		ZIGIE	W157 17.12
7		.ADIZ	H 26 30.00
			W158 00.00
8	1	DROP #1	H 29 00.00
			W159 30.00
9		DROP #2	H 31 25.54
			W160 13.86
10		DROP #3	H 33 50.53
			W160 49.50
11		DROP #4	H 36 19.84
			W161 10.56
12		DROP #5	H 38 48.34
			W161 32.16
13		DROP #6	H 41 14.68
			W162 36.42
14		DROP #9	H 43 15.00
			W164 30.00
15	8	DROP #10	H 45 00.00
			W166 00.00
16		DROP #9	H 43 10.00
			W167 30.00
17		DROP #10	H 40 45.00
			W168 40.00
18		DROP #11	H 38 15.00
			W168 30.00
19		DROP #12	H 35 58.51
			W167 15.60
20		DROP #16	H 33 30.00
			W166 00.00
21		DROP #14	H 31 15.00
			W165 00.00
22		DROP #15	H 29 00.00
			W163 45.00
23		DROP #16	H 26 47.17
			W162 12.66
24	17	DROP #17	H 24 36.49
		.ADIZ-FIR	W161 10.02
25		THOMA/W	N 23 56.61
		THOMA	W160 45.81
26		LIH/W	N 21 57.92
		LIHUE	W159 20.29
27		BOOKE/W	N 21 27.79
		BOOKE	W158 26.99
28		SHIGI/W	N 21 18.25
		SHIGI	W158 10.29
29	AP	HIL/R	N 21 18.50
		HONOLULU	W157 55.82

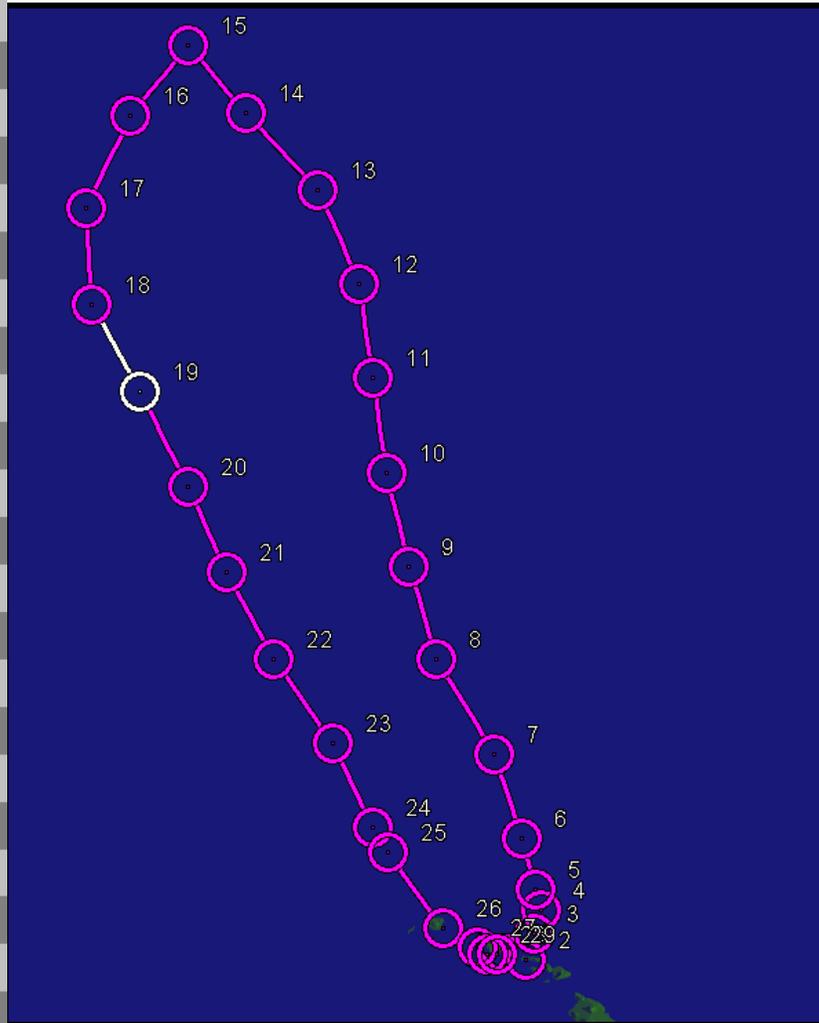


Figure H-28. Hawaiian Flight Track WSRP-P54

Turn Pt	Type	Fix/Point Description	Latitude Longitude
1	ST	PHIK/A	N 21 19.12
		HONOLULU INTL	W157 55.35
2		MKK/W MOLOKAI	N 21 08.29 W157 10.04
3		MAGGI/W MAGGI	N 21 50.43 W156 57.94
4		SERYU/W (SERYU)	N 22 27.30 W156 47.26
5		REXIE/W REXIE	N 22 59.55 W156 54.77
6		ZIGIE/W ZIGIE	N 24 18.82 W157 17.12
7	1	.DROP #1 .PHZH FIR	H 26 00.00 W157 15.00
8		.DROP #2	H 28 25.00 W157 30.00
9		.DROP #3	H 30 55.00 W156 55.00
10		.DROP #4	H 33 20.00 W156 15.00
11		.DROP #5	H 35 45.00 W155 30.00
12		.DROP #6	H 38 10.00 W154 35.00
13		.DROP #7	H 40 35.00 W153 55.00
14		.DROP #8	H 43 05.00 W154 35.00
15	9	.DROP #9 CP	H 45 00.00 W157 00.00
16		.DROP #10	H 43 20.00 W159 35.00
17		.DROP #11	H 41 00.00 W160 45.00
18		.DROP #12	H 38 30.00 W160 50.00
19		.DROP #13	H 35 55.00 W160 35.00
20		.DROP #14	H 33 30.00 W160 05.00
21		.DROP #15	H 31 00.00 W159 30.00
22		.DROP #16	H 28 30.00 W159 00.00
23		.ADIZ	H 26 30.00 W158 25.00
24	17	.DROP #17 .PHZH FIR	H 26 05.00 W158 15.00
25		ZIGIE/W ZIGIE	N 24 18.82 W157 17.12
26		SOPW/W (SOPW)	N 22 23.25 W156 48.44
27		MAGGI/W MAGGI	N 21 50.43 W156 57.94
28		BAMBO/W BAMBO	N 21 24.99 W157 30.60
29		CKH/R KOKO HEAD	N 21 15.91 W157 42.18
30	AP	PHIK/A HONOLULU INTL	N 21 19.12 W157 55.35



Figure H-29. Hawaiian Flight Track WSRP-P55

Turn Pt	Type	Fix Point Description	Latitude Longitude
1	ST	PHIKA	N 21 19.12
		HONOLULU INTL	W157 55.35
2		MKKW	N 21 08.29
		MOLOKAI	W157 10.04
3		MAGGIW	N 21 50.43
		MAGGI	W156 57.94
4		TOADSW	N 22 46.16
		TOADS	W156 41.76
5		APACKW	N 24 02.62
		APACK	W156 19.17
6		ZOULUW	N 25 11.75
		ZOULLU	W156 25.27
7	1	.DROP #1	II 27 30.00
			W155 00.00
8		.DROP #2	II 29 50.00
			W153 55.00
9		.DROP #3	II 32 19.71
			W152 45.54
10		.DROP #4	II 34 29.85
			W151 20.76
11		.DROP #5	II 36 50.25
			W149 47.34
12		.DROP #6	II 39 08.49
			W148 44.70
13		.DROP #7	II 41 12.69
			W148 17.70
14		.DROP #8	II 43 35.25
			W148 37.14
15		.DROP #11	II 44 15.00
	9		W151 00.00
16		.DROP #10	II 43 10.00
			W153 25.00
17		.DROP #11	II 40 40.00
			W154 10.00
18		.DROP #12	II 38 10.00
			W154 45.00
19		.DROP #13	II 35 45.00
			W155 20.00
20		.DROP #14	II 33 15.00
			W155 50.00
21		.DROP #15	II 30 45.00
			W156 20.00
22		.DROP #16	II 28 15.00
	16		W156 55.00
23		.ADIZ	II 26 30.00
			W157 00.00
24		.PHZH FIR	II 26 00.00
			W157 05.00
25		ZIGIEW	N 24 18.82
		ZIGIE	W157 17.12
26		SOPIW	N 22 23.25
		(SOPIW)	W156 48.44
27		MAGGIW	N 21 50.43
		MAGGI	W156 57.94
28		BAMBOW	N 21 24.99
		BAMBO	W157 30.60
29		CKHR	N 21 15.91
		KOKO HEAD	W157 42.18
30	AP	PHIK 04L RW	N 21 19.10
		HONOLULU INTL	W157 55.40

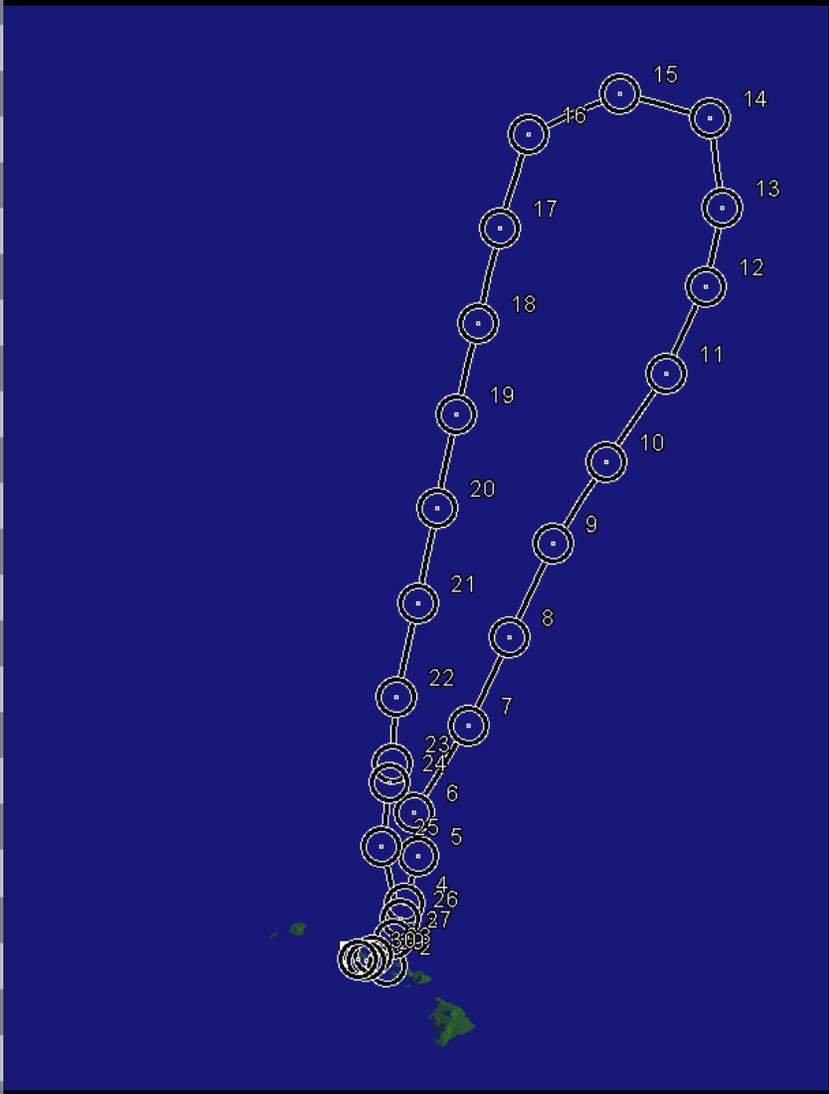


Figure H-30. Hawaiian Flight Track WSRP-P56

APPENDIX I
JAPANESE FLIGHT TRACKS

This appendix contains the Japanese winter storm flight tracks.

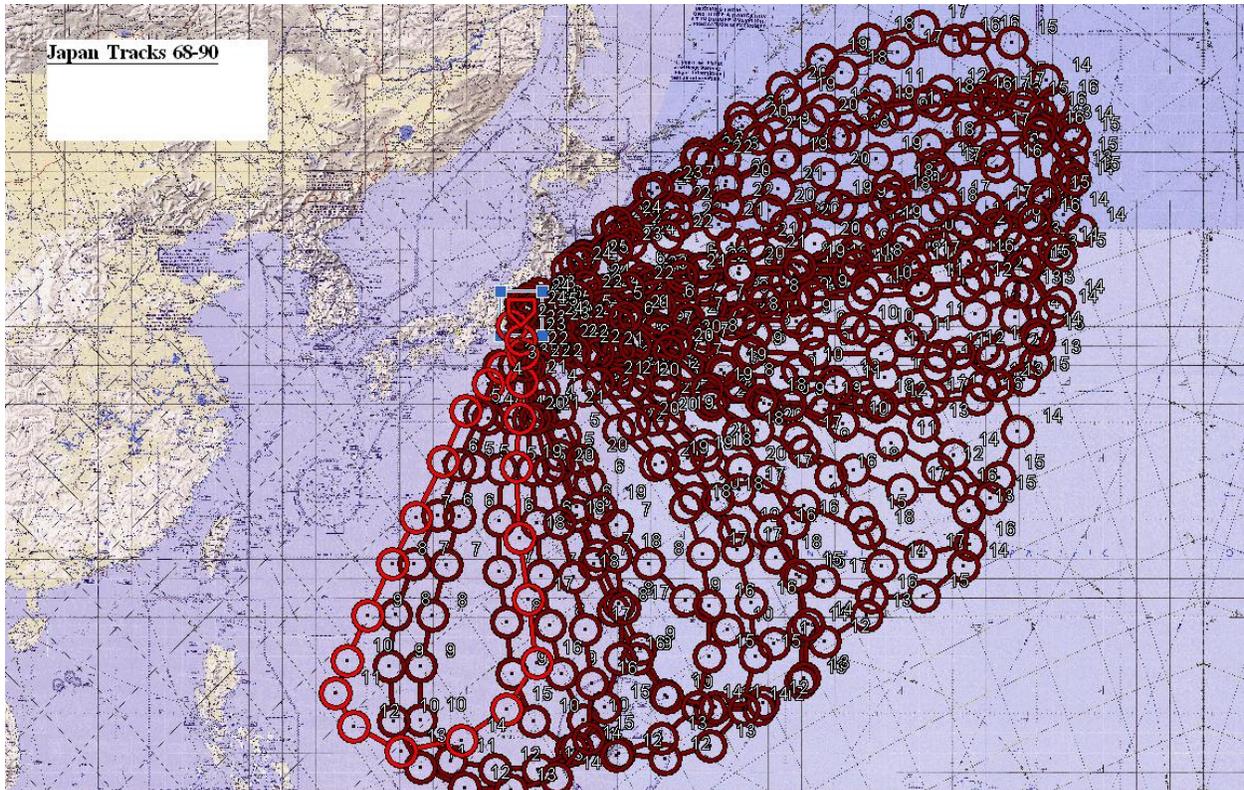


Figure I-1. Overview of all Japanese Flight Tracks

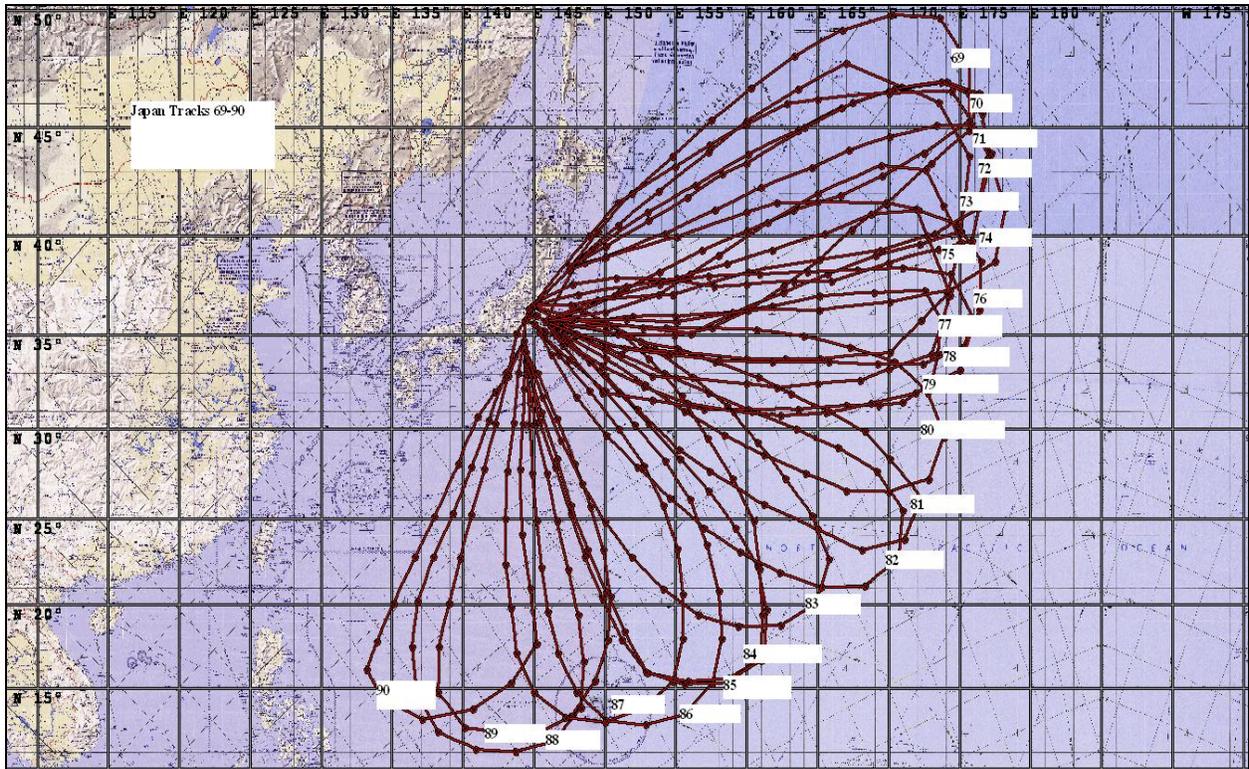


Figure I-2. Composite of Japanese Flight Tracks WSRP P69-90

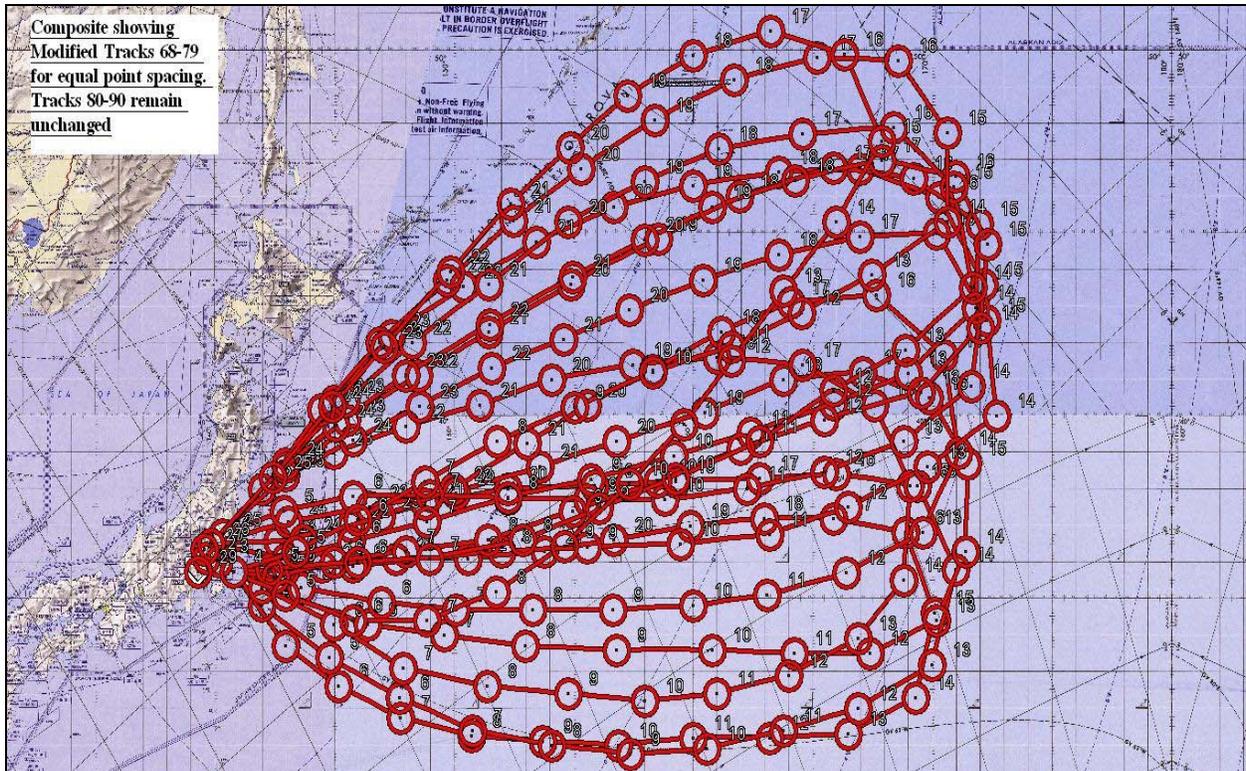


Figure I-3. Composite of Japanese Modified Flight Tracks WSRP P68-90

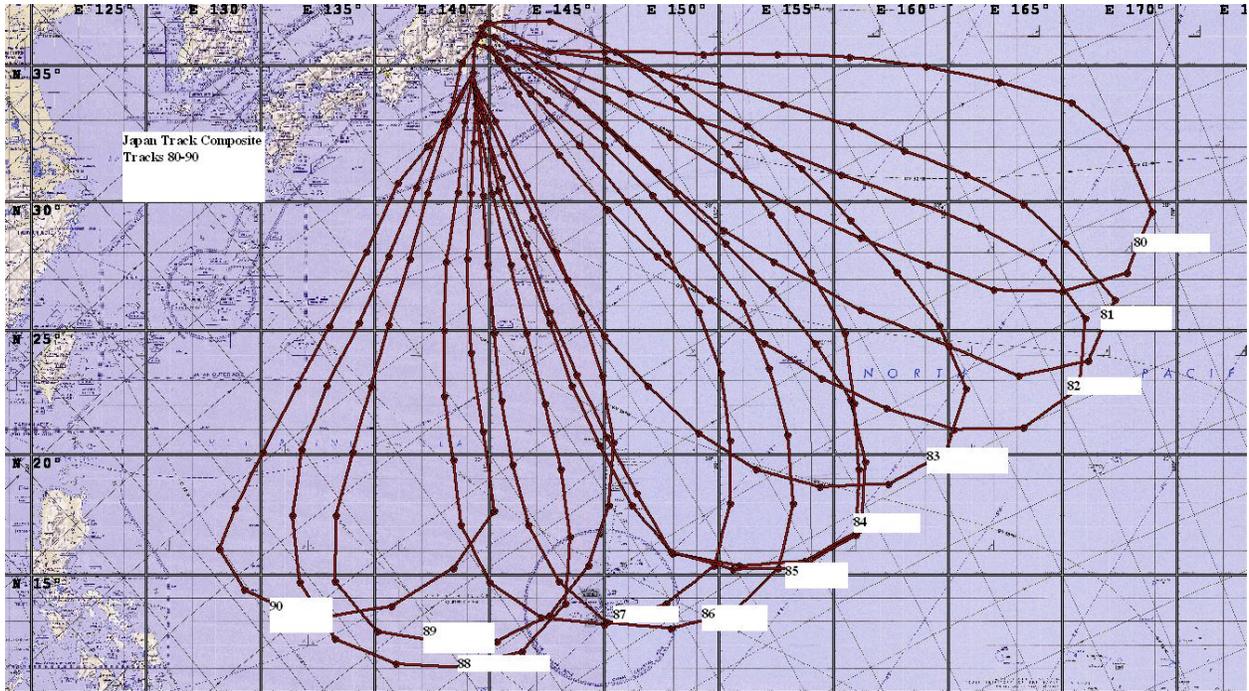


Figure I-4. Composite of Japanese Flight Tracks WSRP P80-90

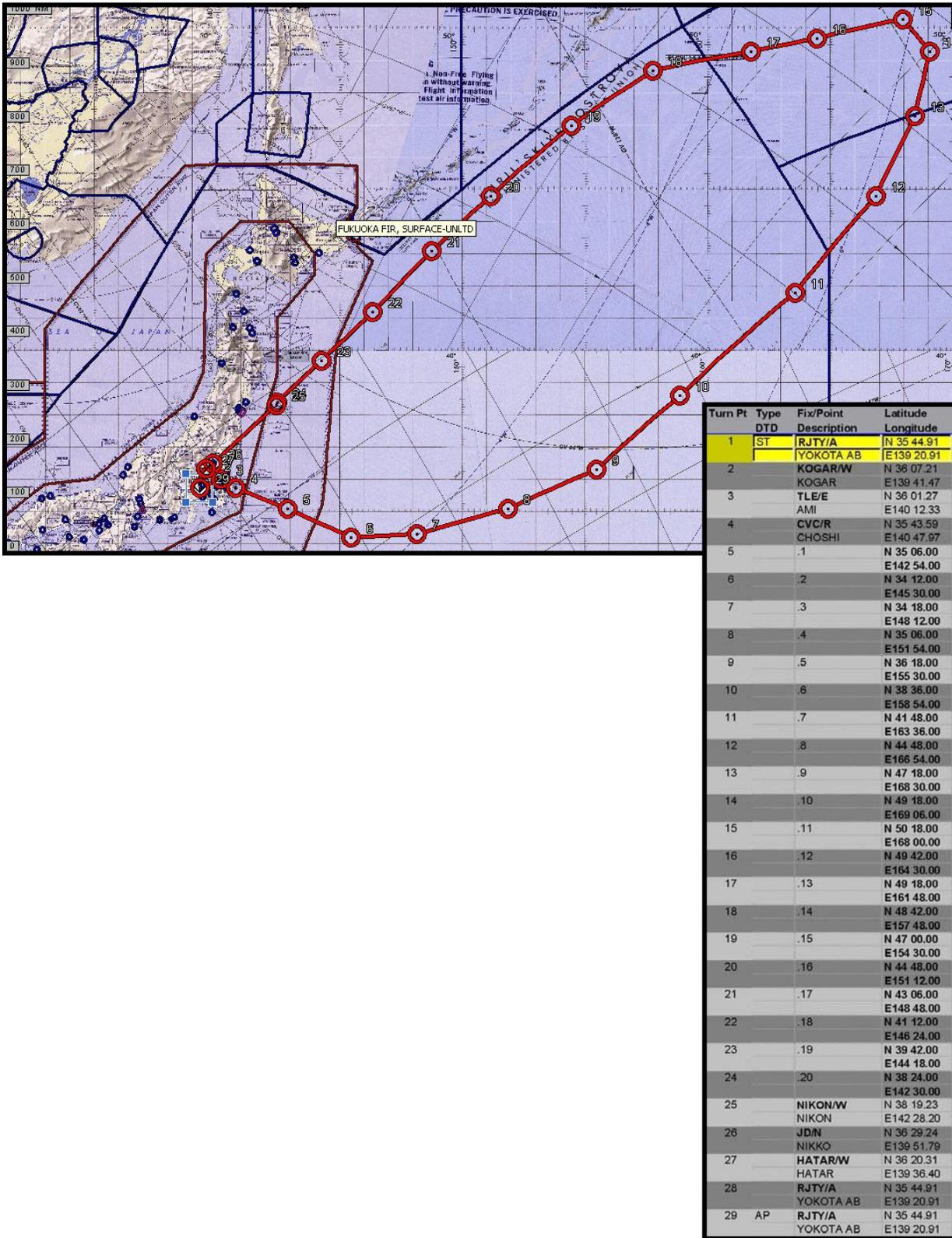


Figure I-5. Japanese Flight Track WSRP-68

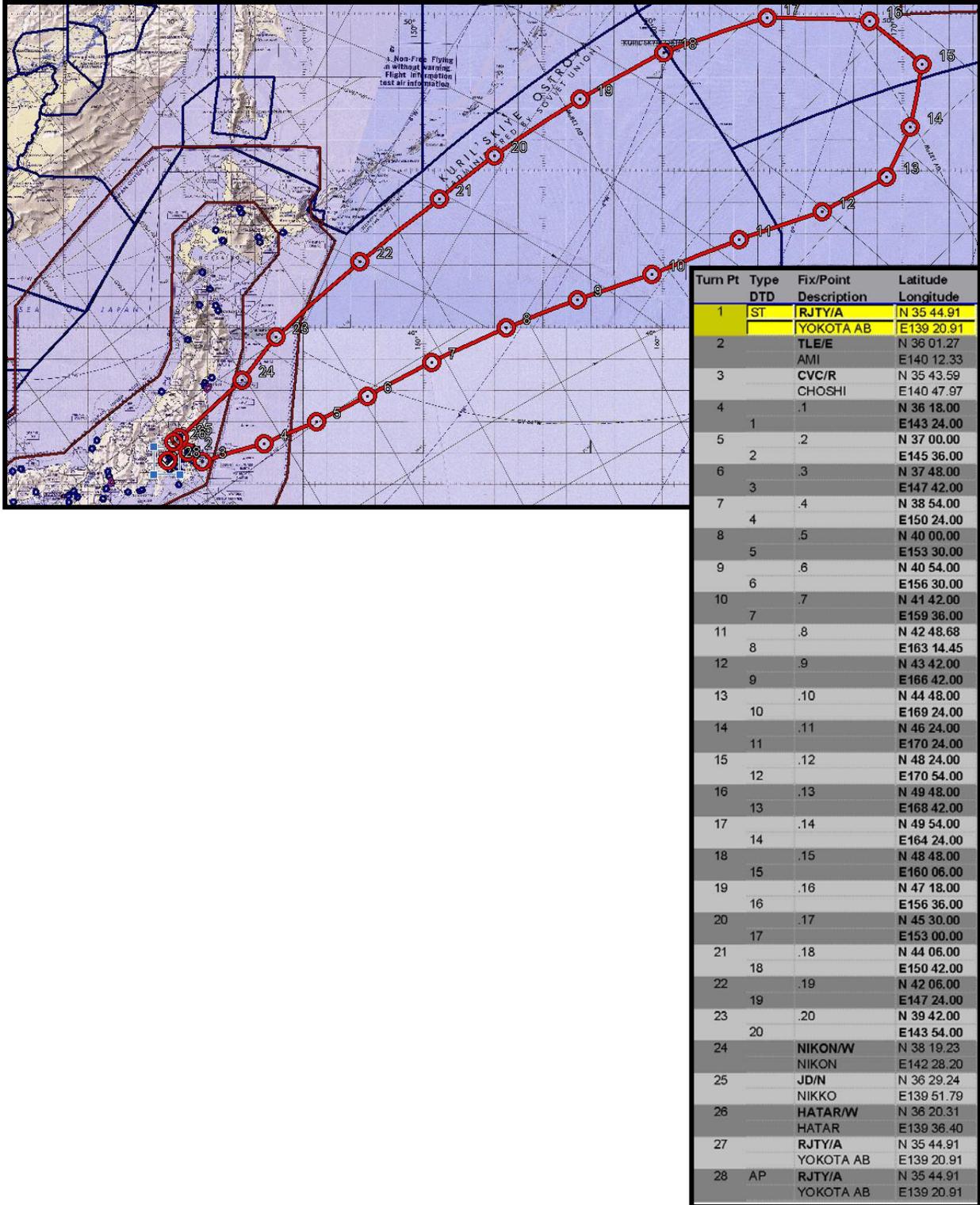


Figure I-6. Japanese Flight Track WSRP-69

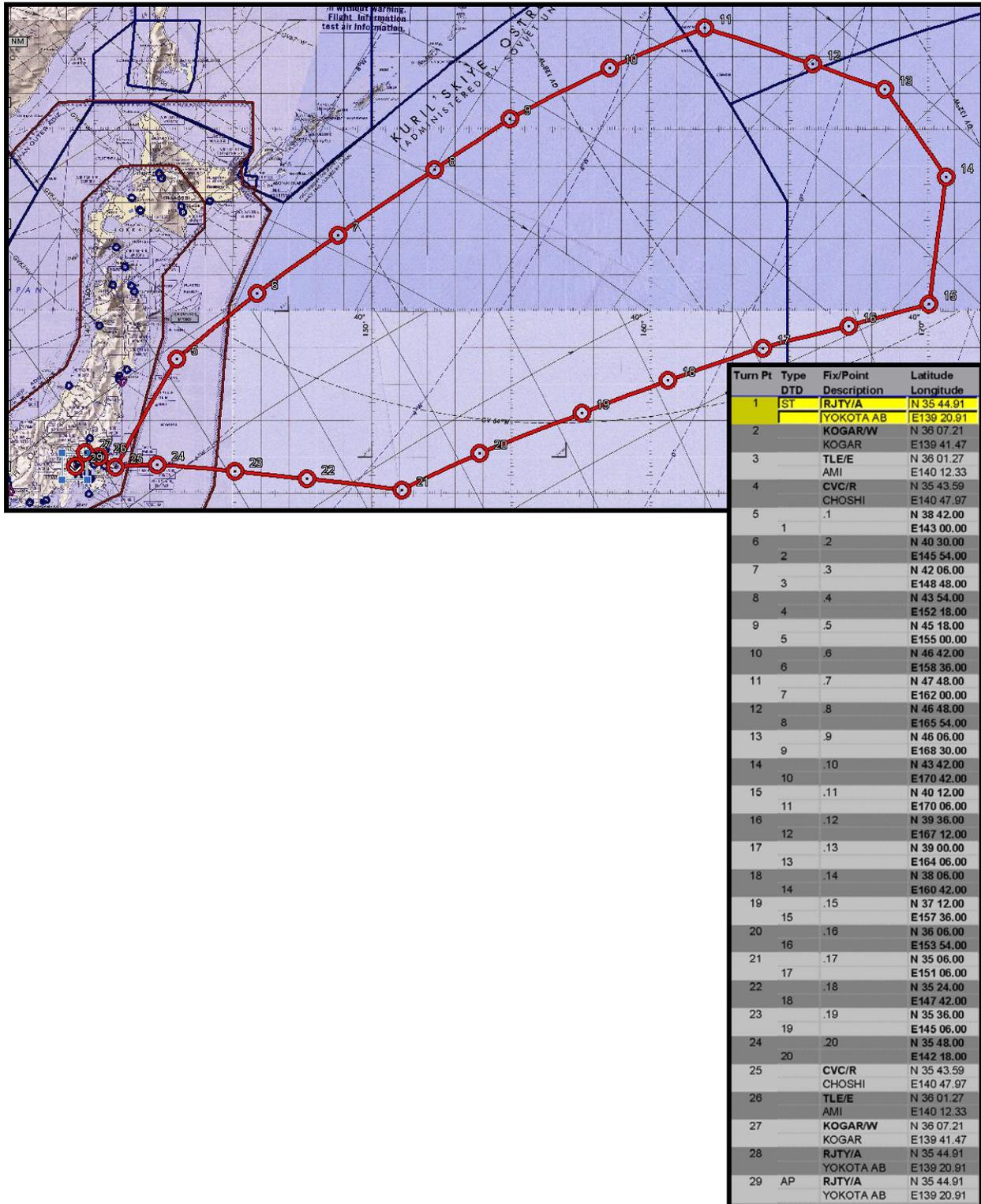


Figure I-7. Japanese Flight Track WSRP-70

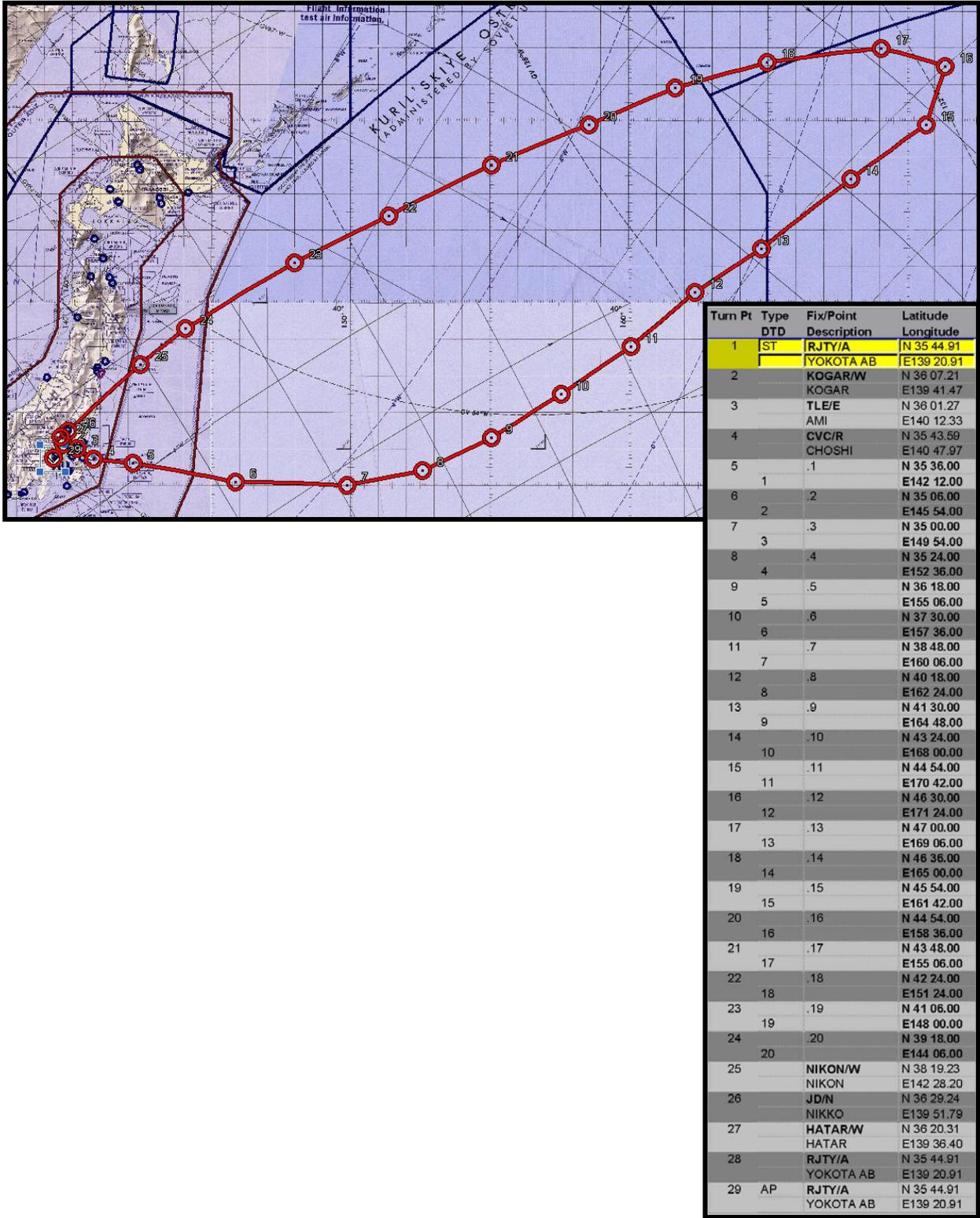


Figure I-8. Japanese Flight Track WSRP-71

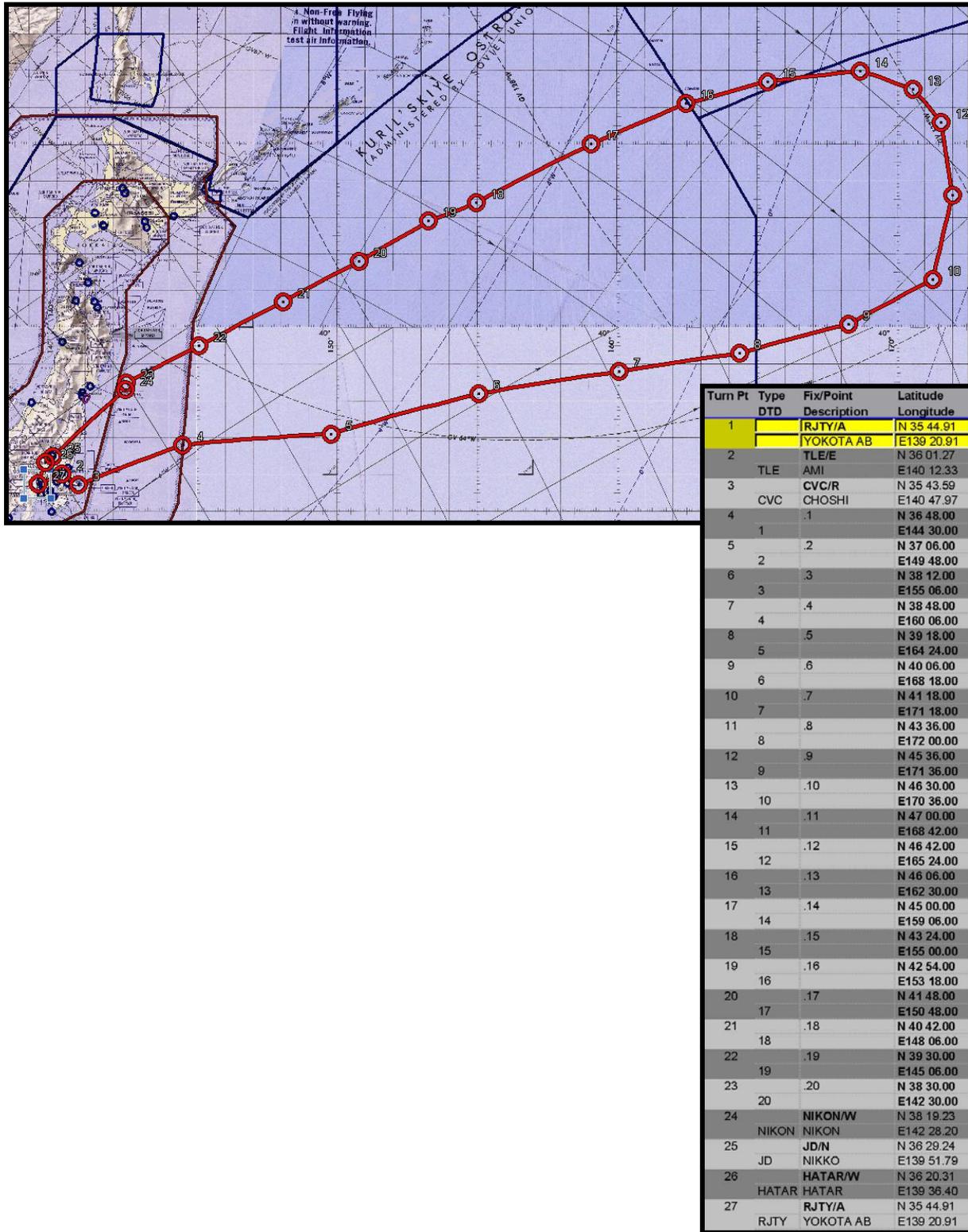


Figure I-9. Japanese Flight Track WSRP-72

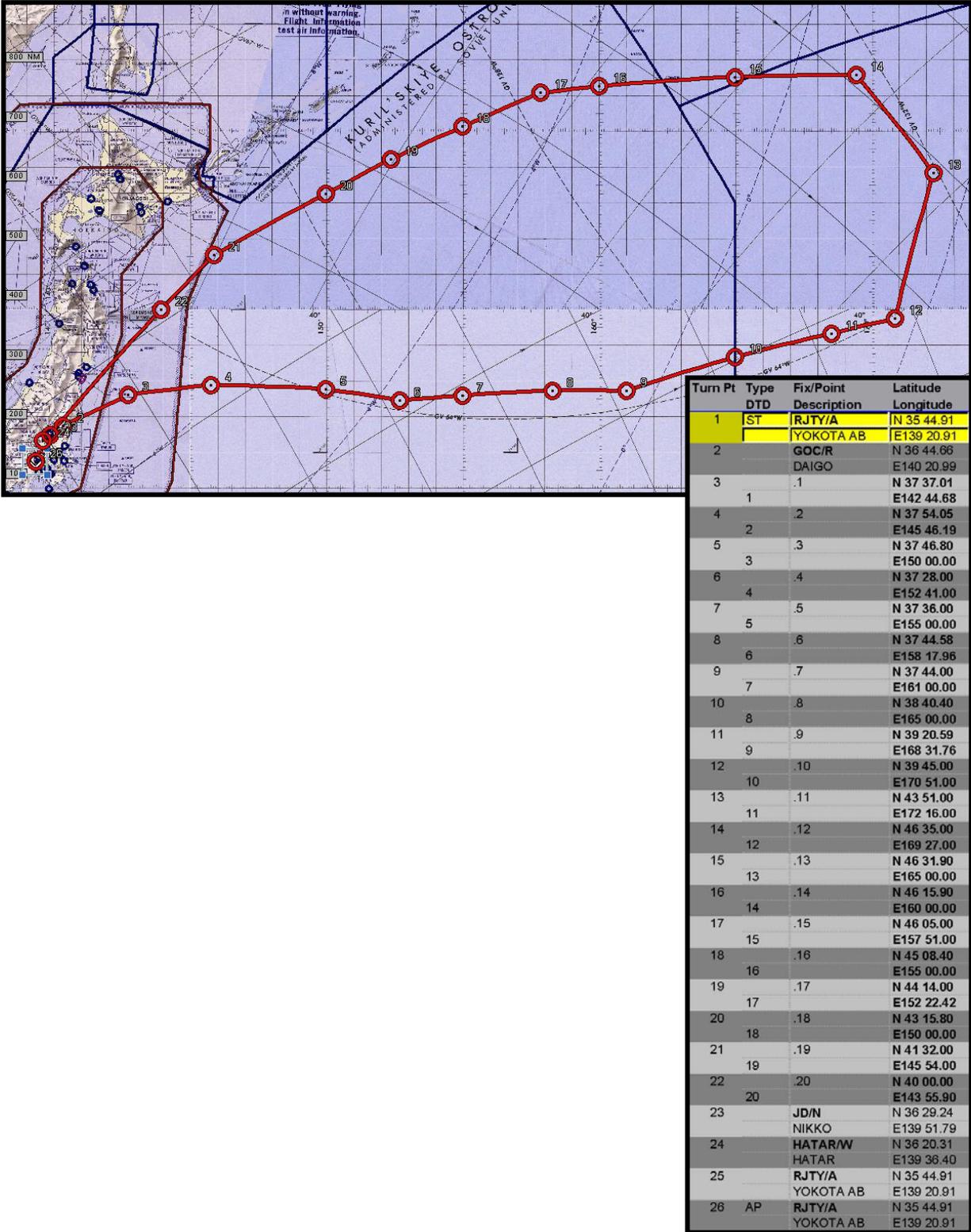


Figure I-10. Japanese Flight Track WSRP-73

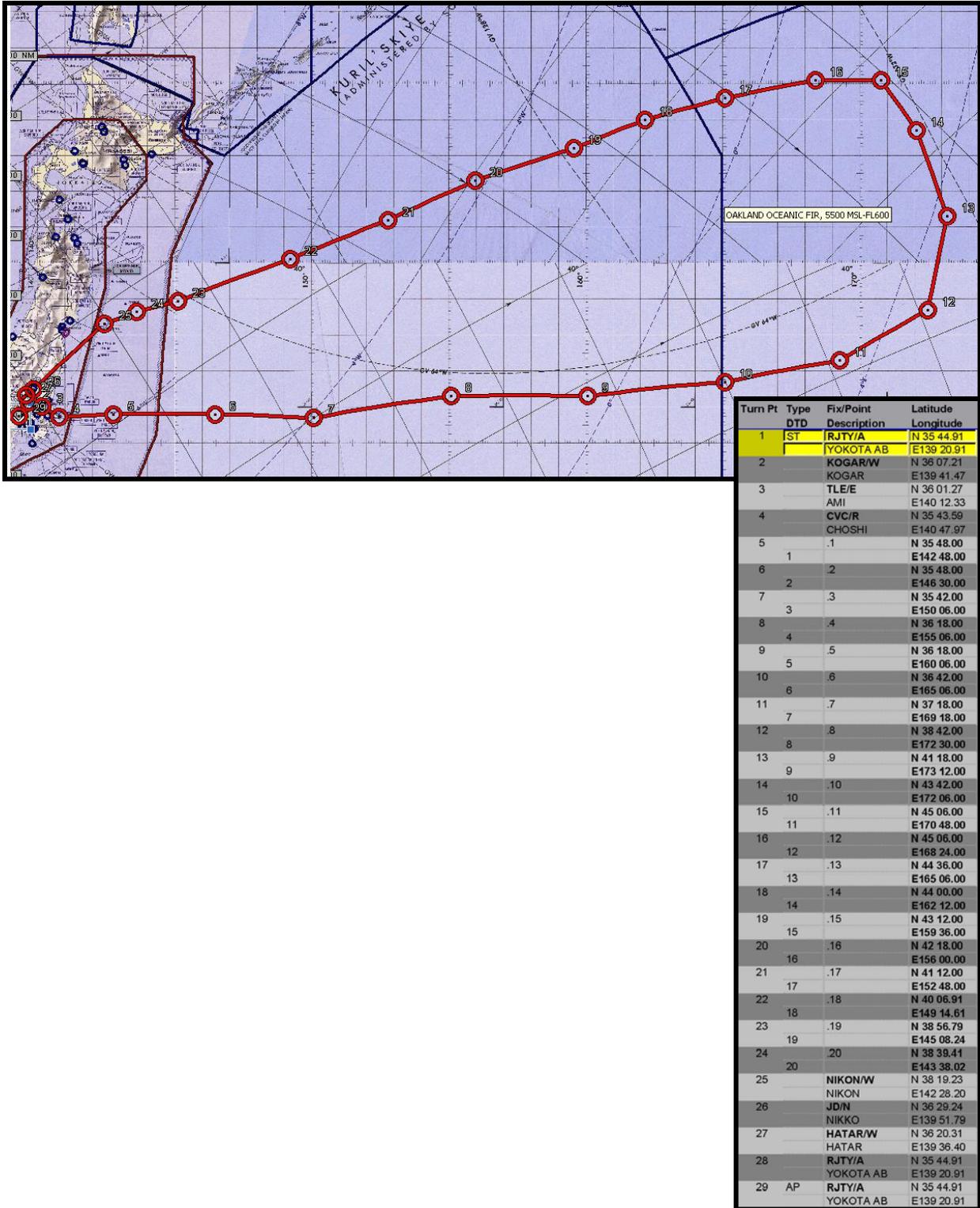


Figure I-11. Japanese Flight Track WSRP-74

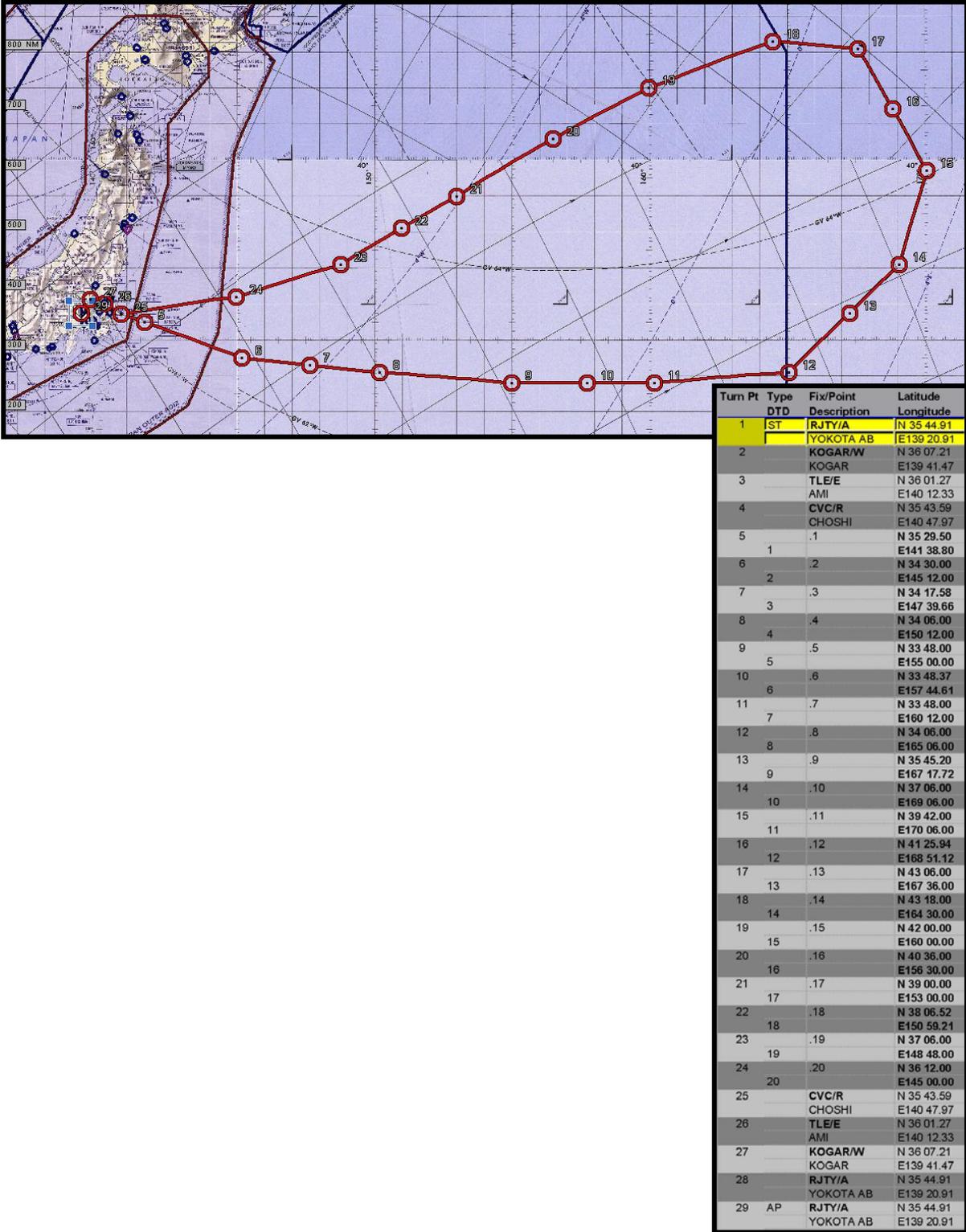


Figure I-12. Japanese Flight Track WSRP-75

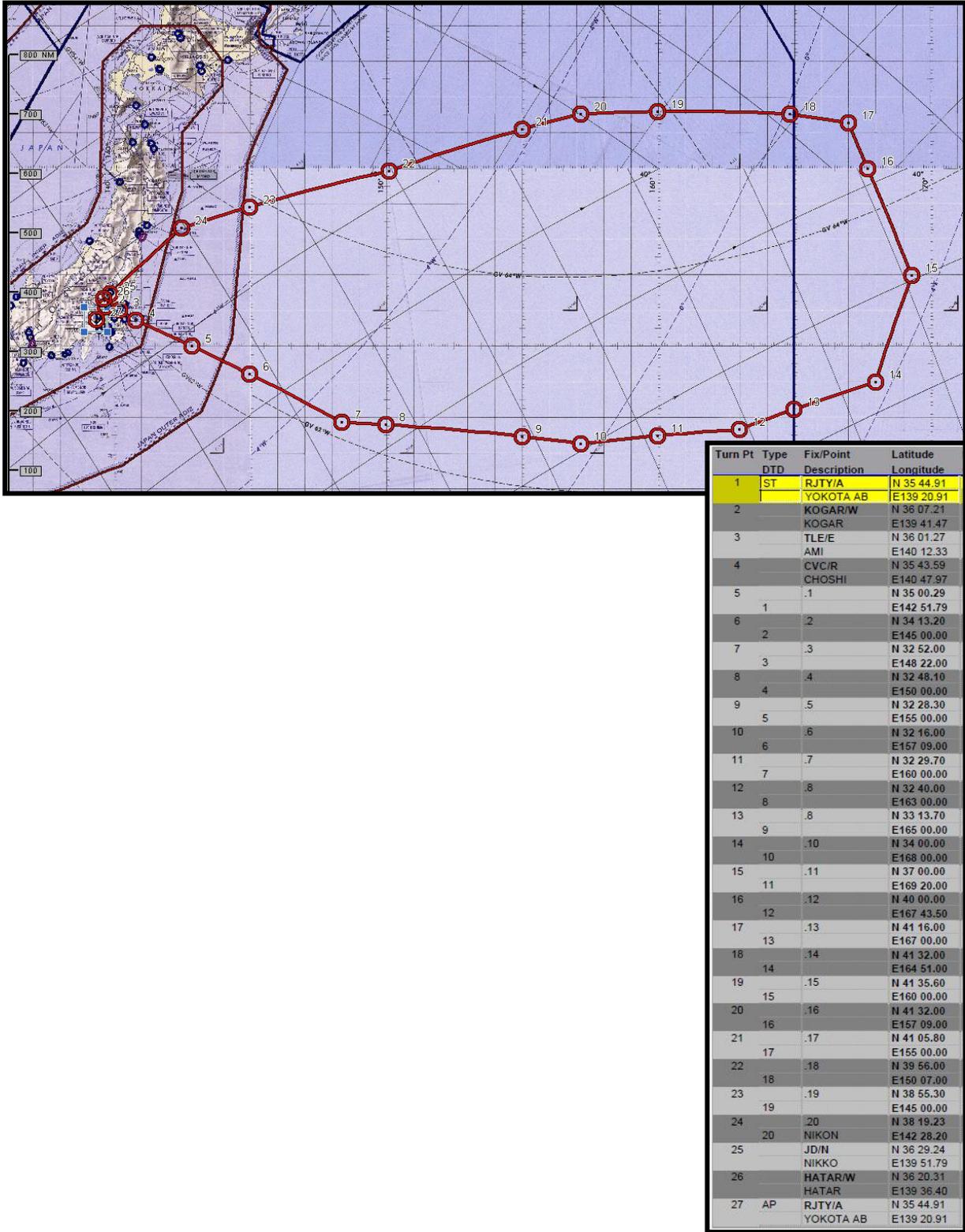


Figure I-13. Japanese Flight Track WSRP-76

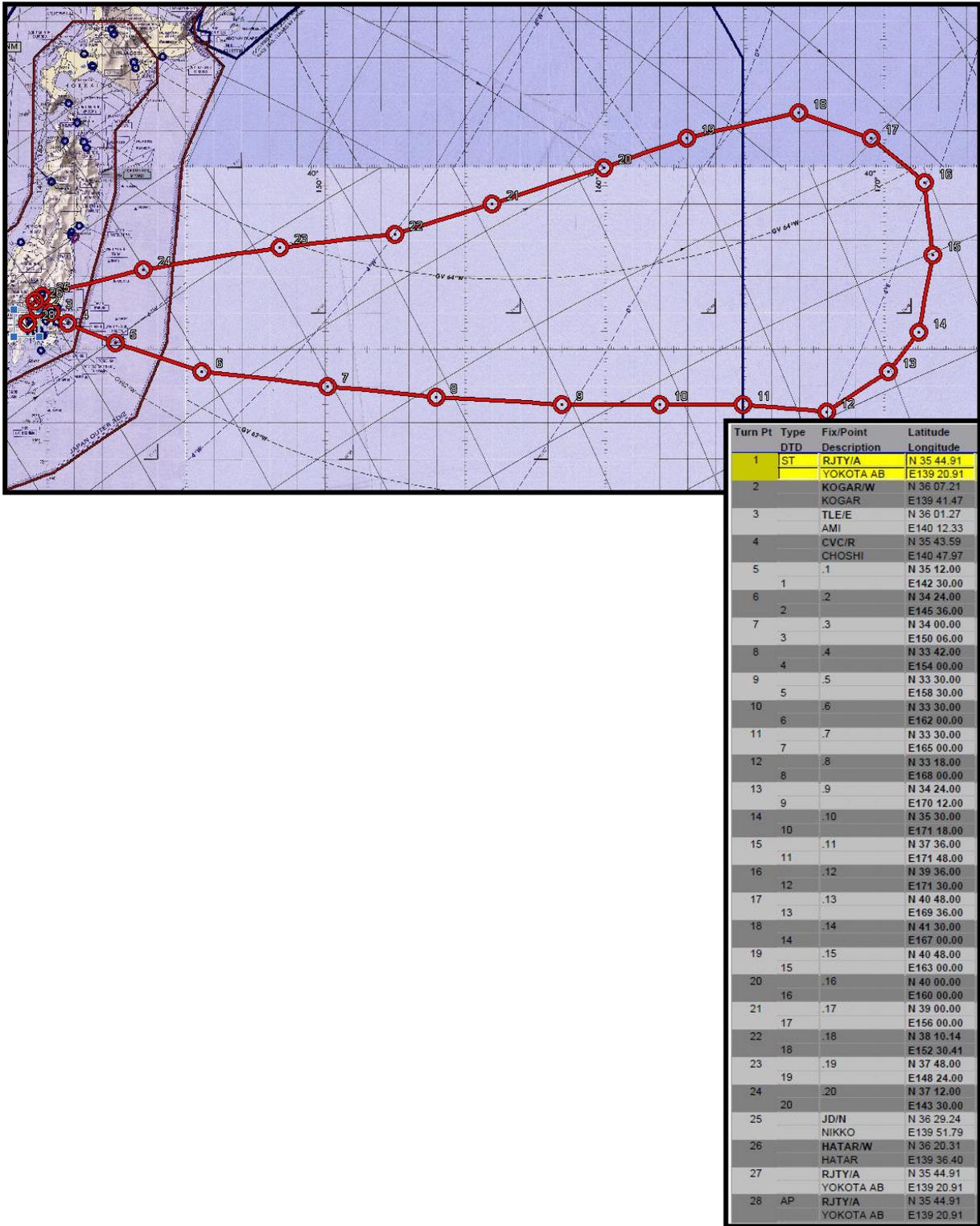


Figure I-14. Japanese Flight Track WSRP-77

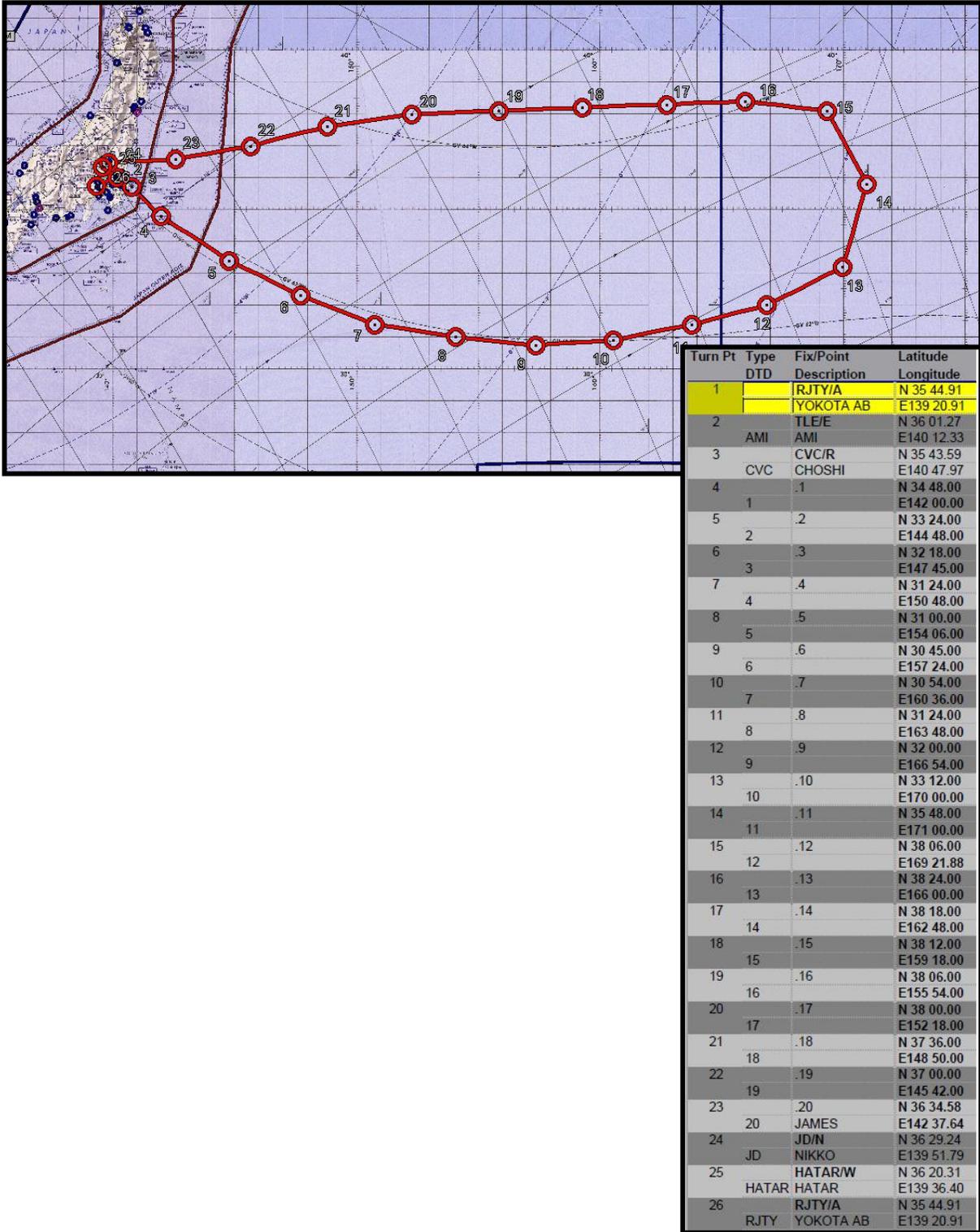


Figure I-15. Japanese Flight Track WSRP-78

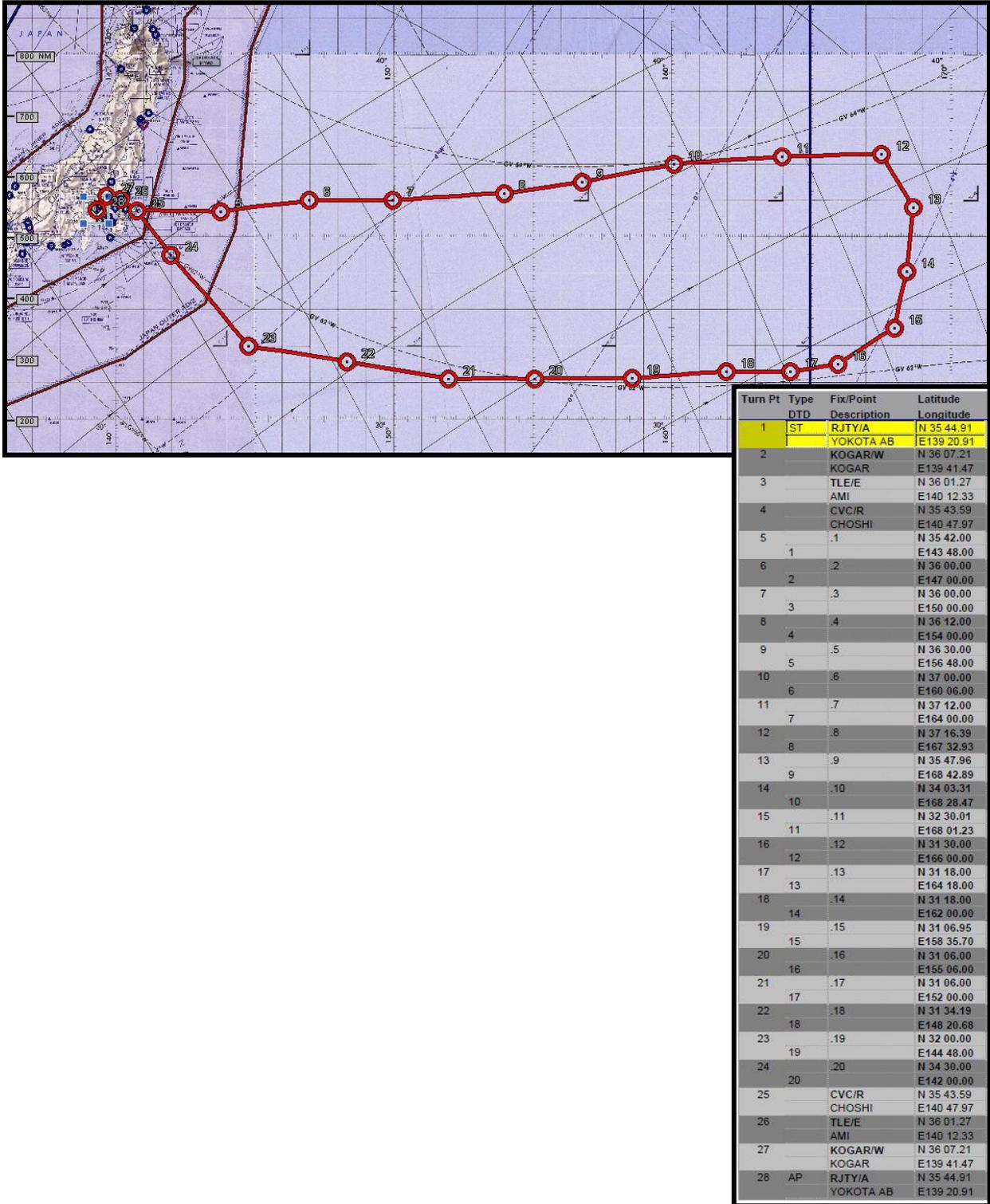


Figure I-16. Japanese Flight Track WSRP-79

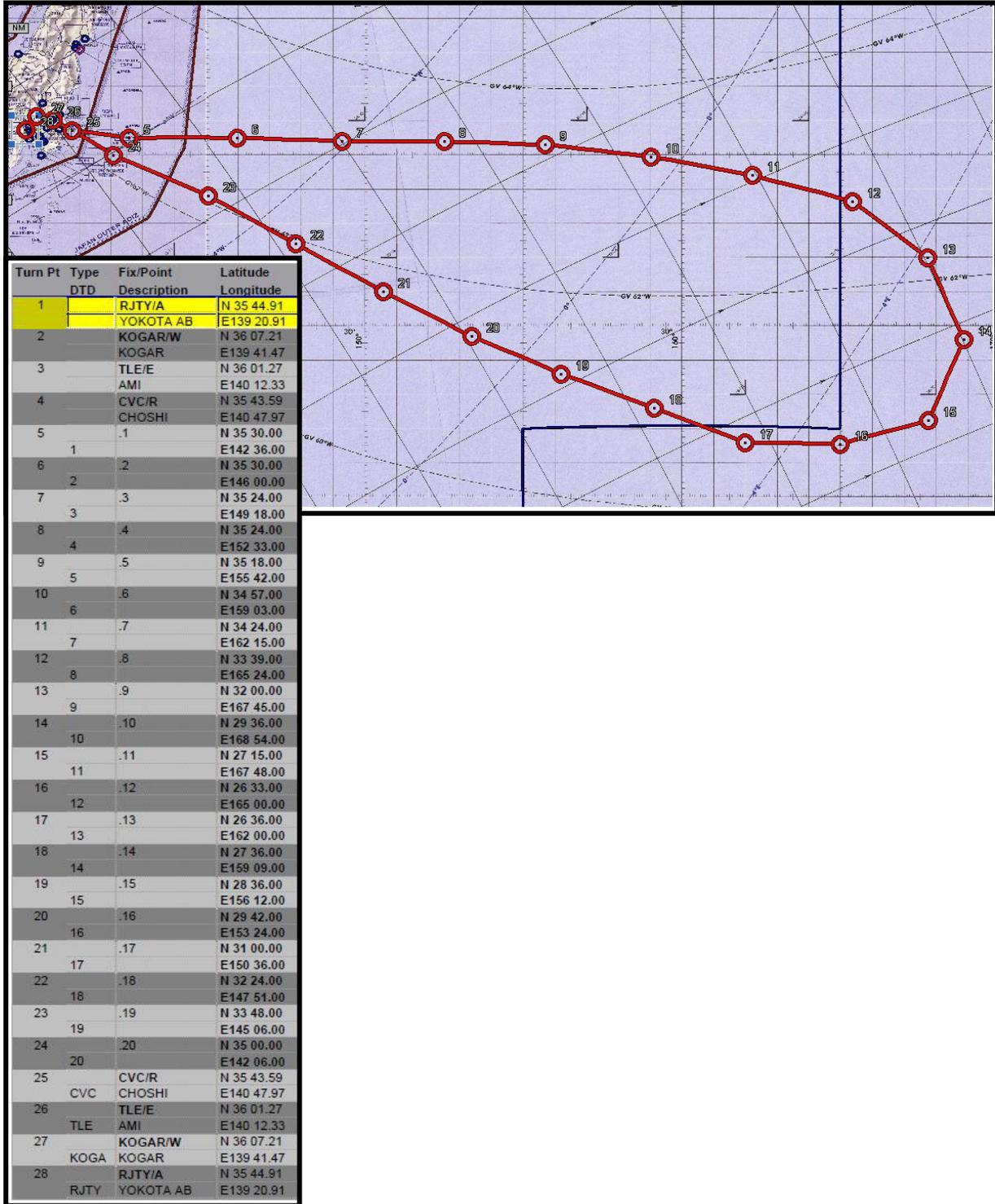


Figure I-17. Japanese Flight Track WSRP-80

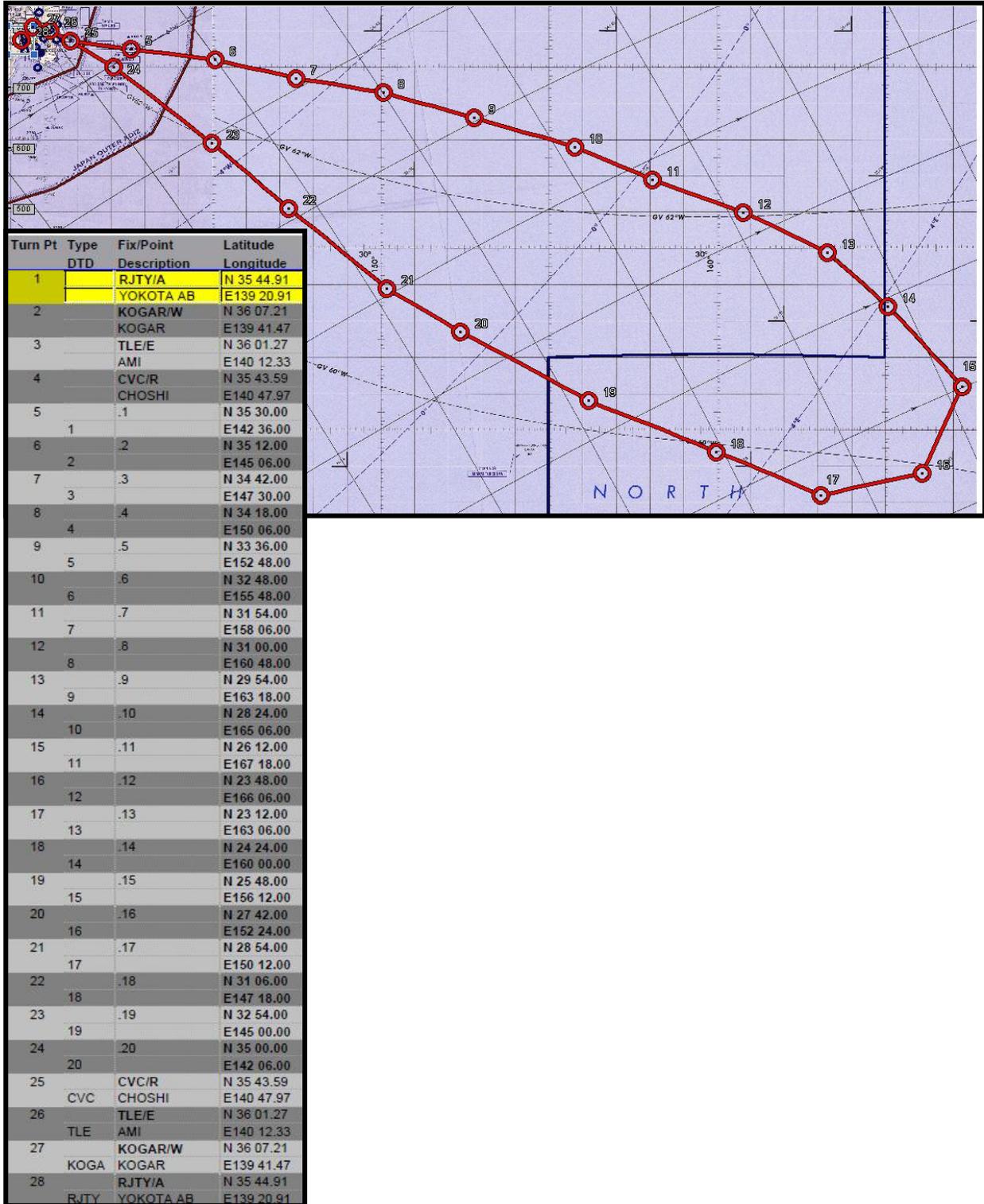


Figure I-18. Japanese Flight Track WSRP-81

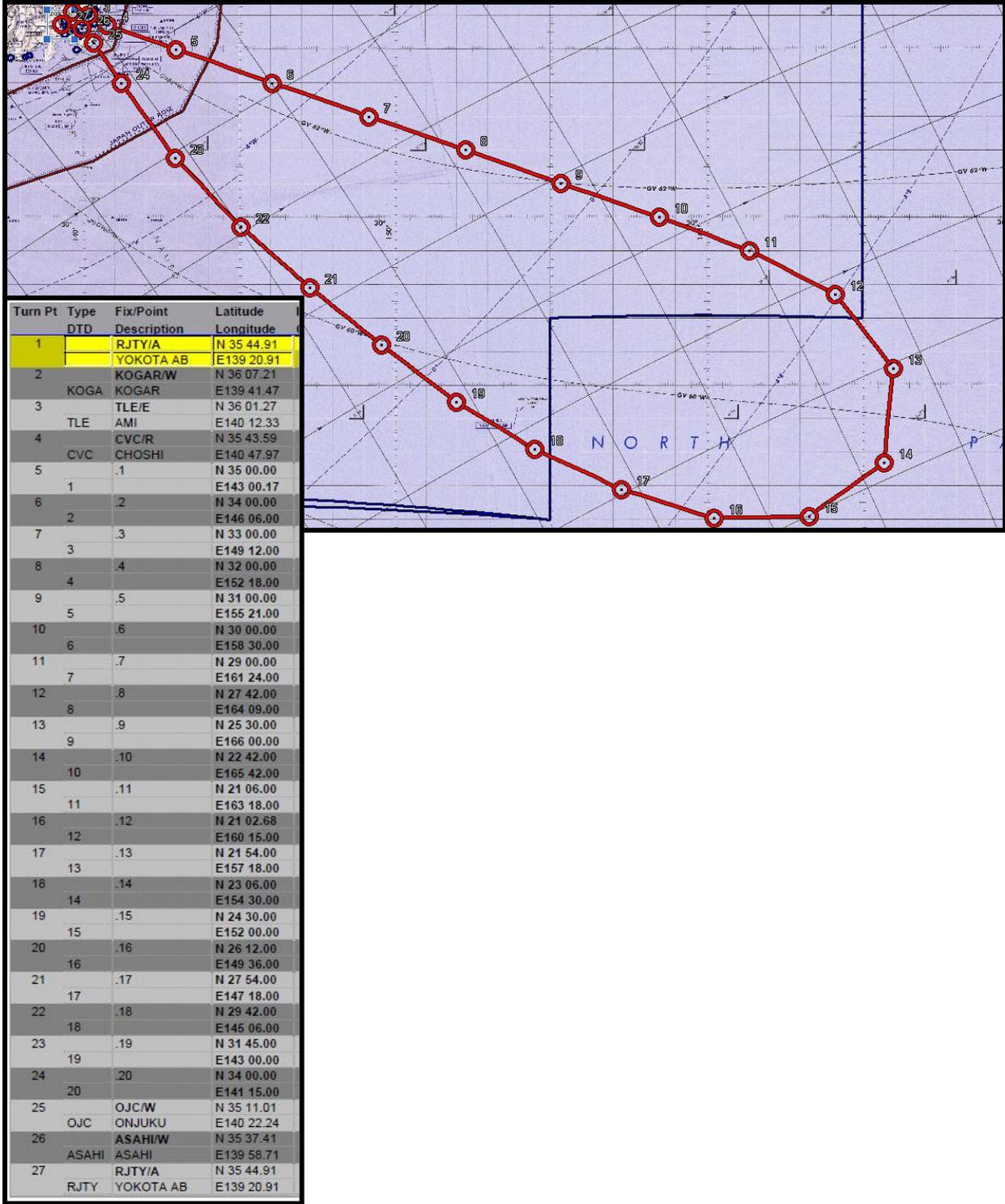


Figure I-19. Japanese Flight Track WSRP-82

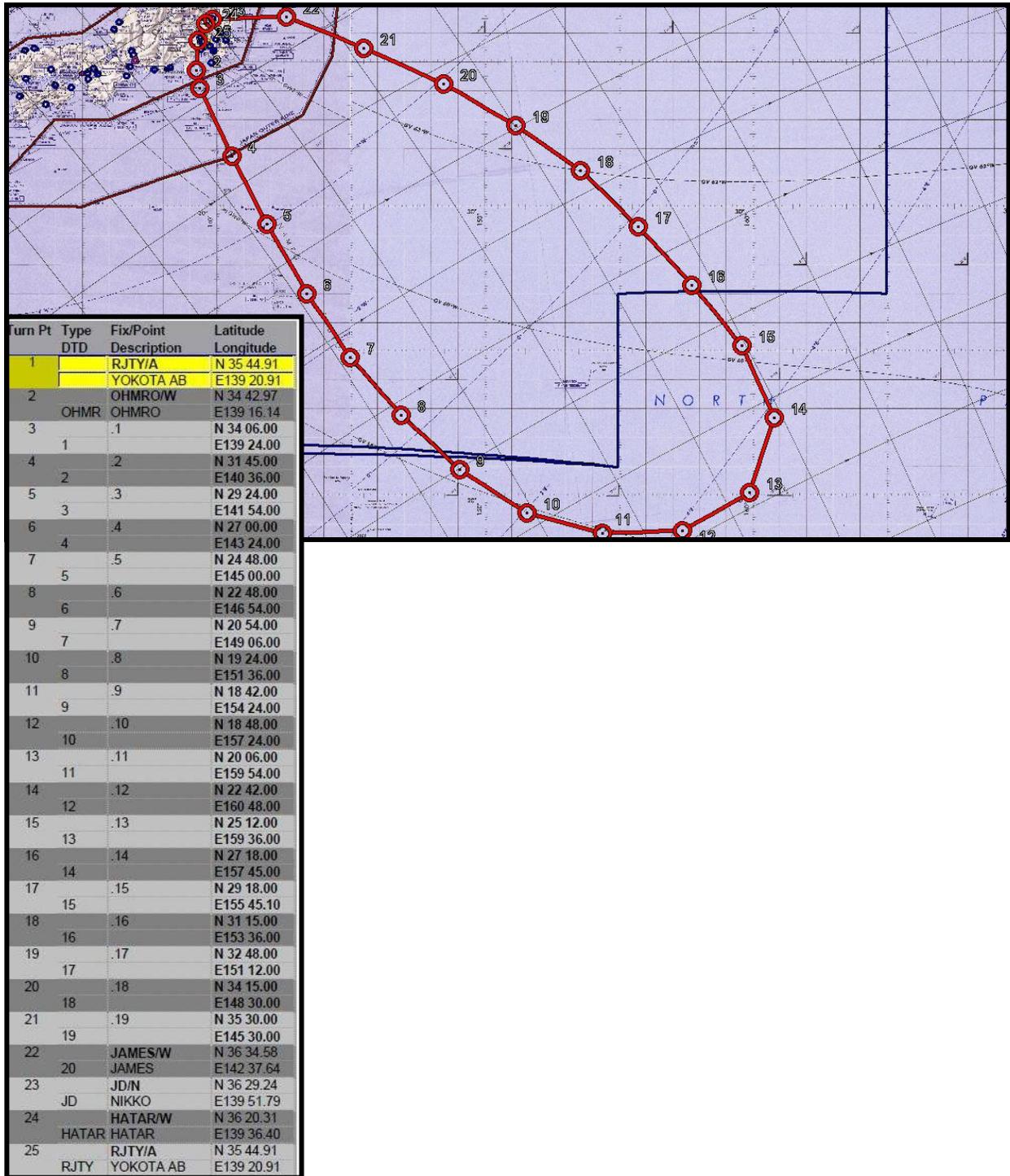


Figure I-20. Japanese Flight Track WSRP-83

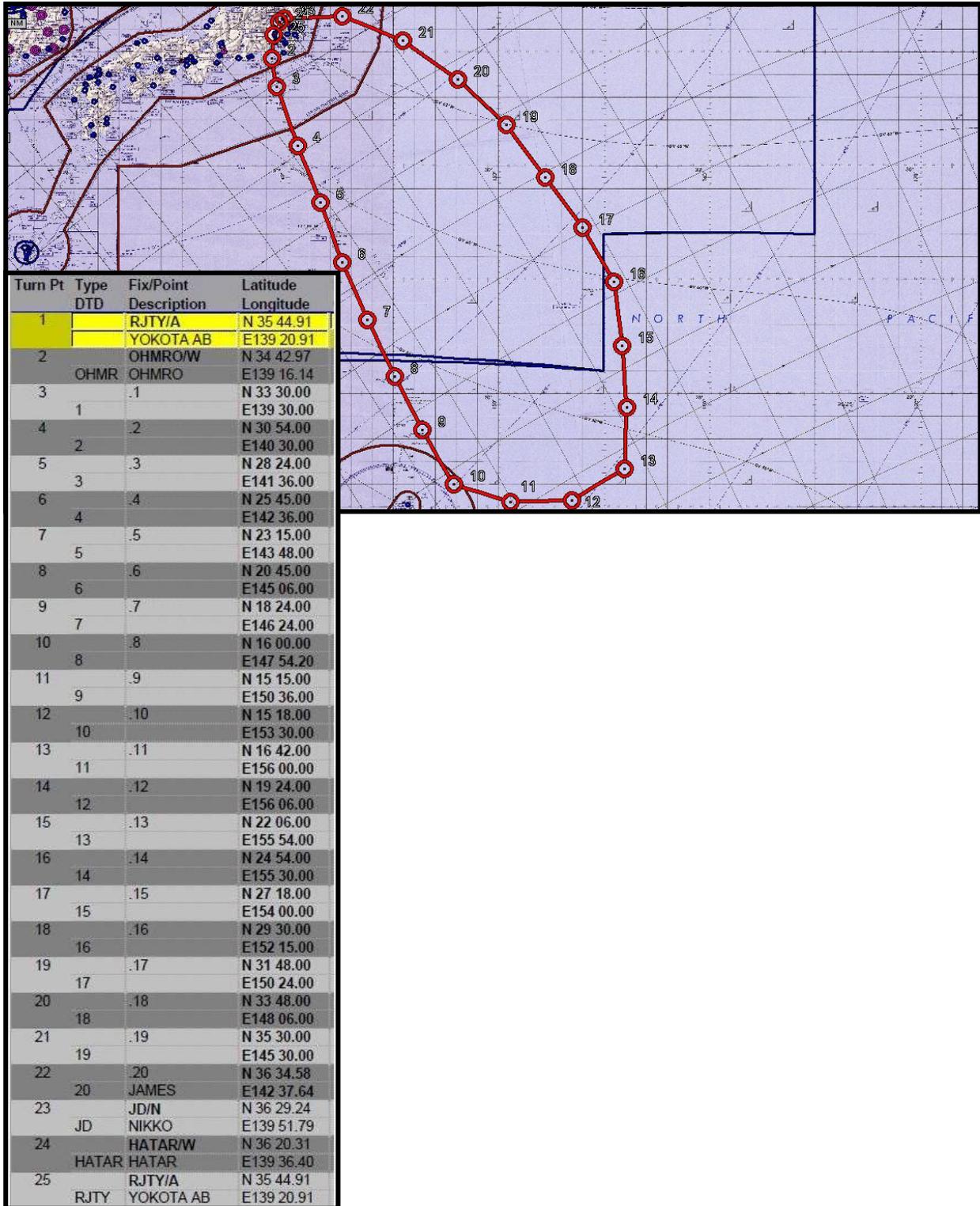


Figure I-21. Japanese Flight Track WSRP-84

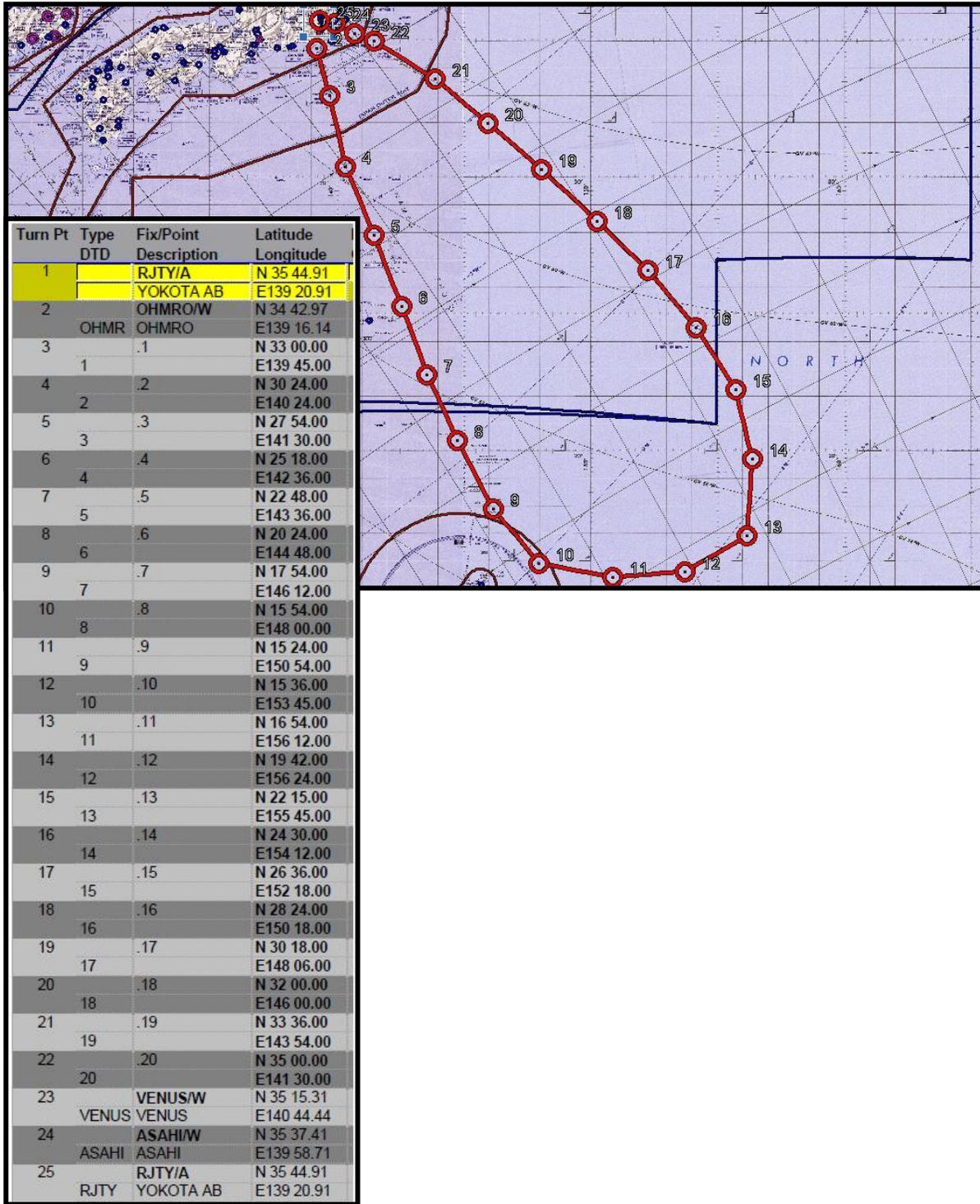


Figure I-22. Japanese Flight Track WSRP-85

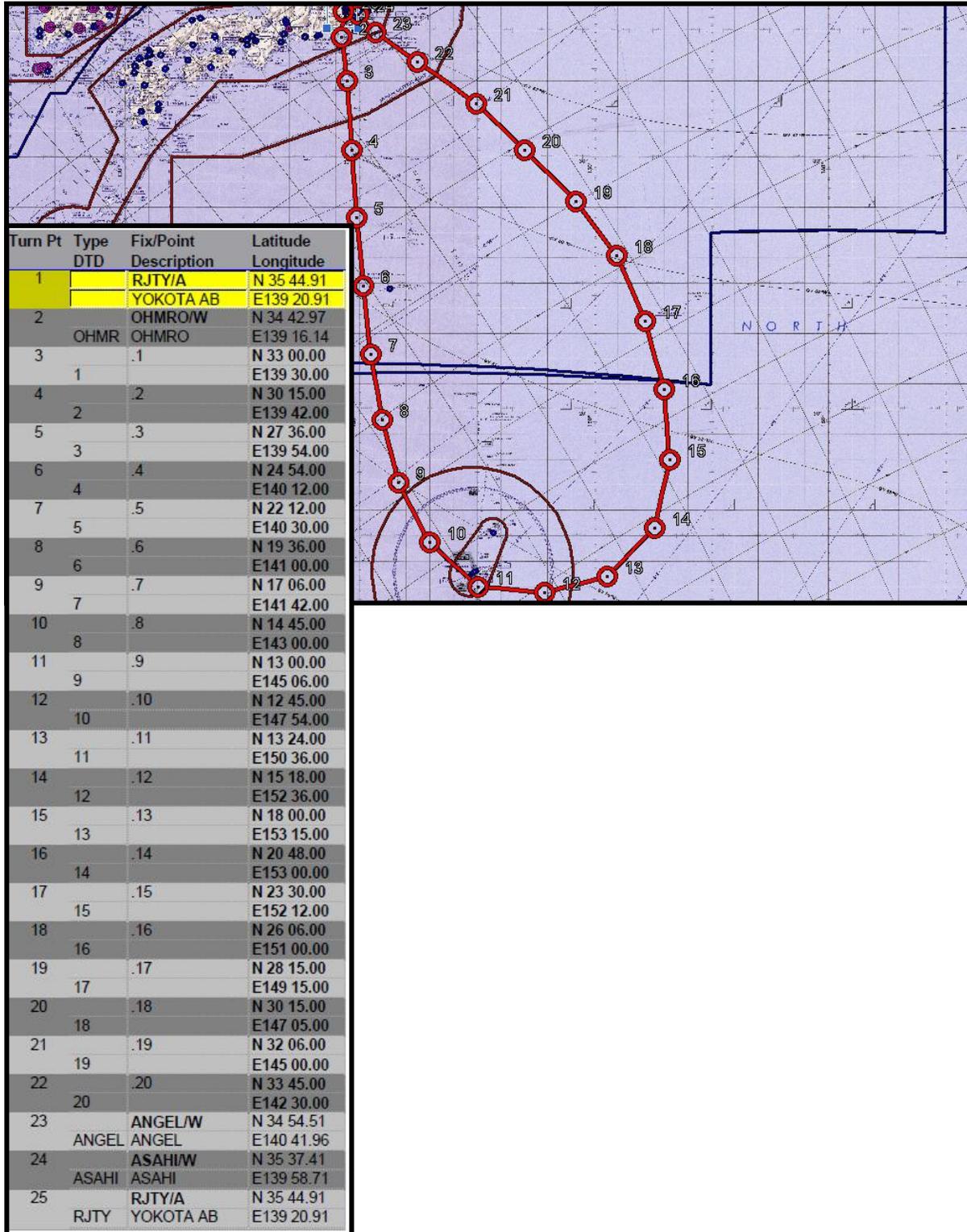


Figure I-23. Japanese Flight Track WSRP-86

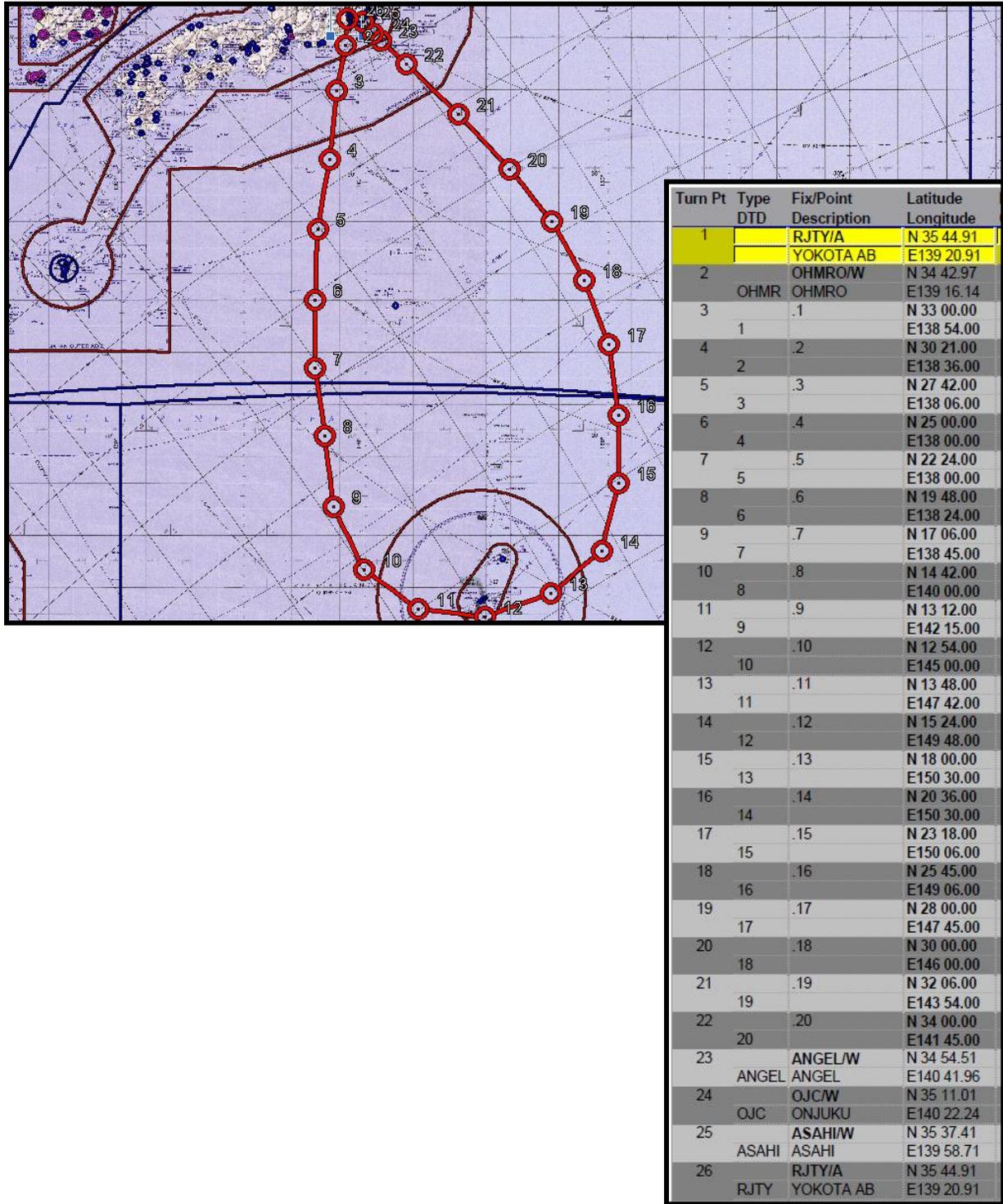


Figure I-24. Japanese Flight Track WSRP-87

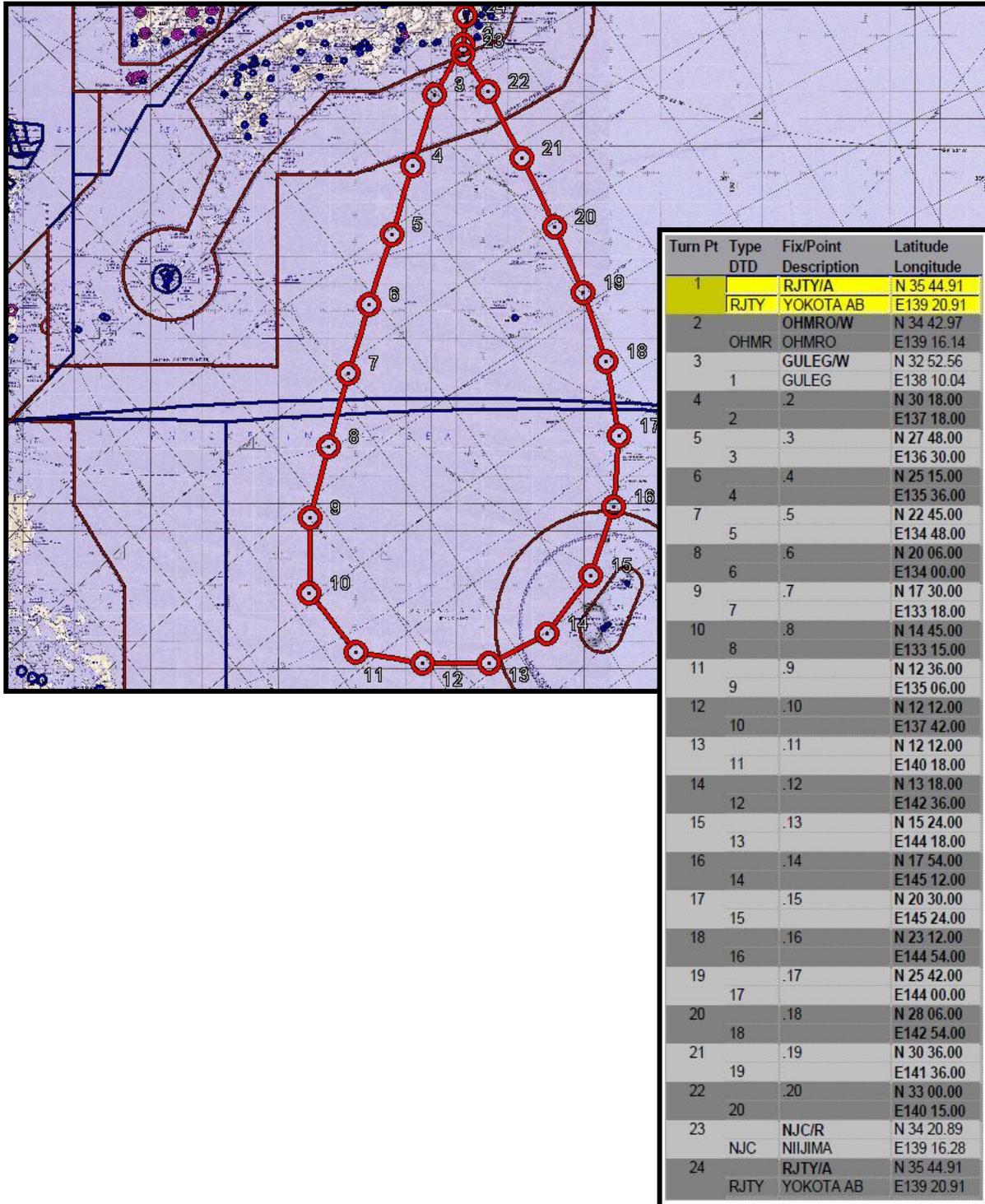


Figure I-25. Japanese Flight Track WSRP-88

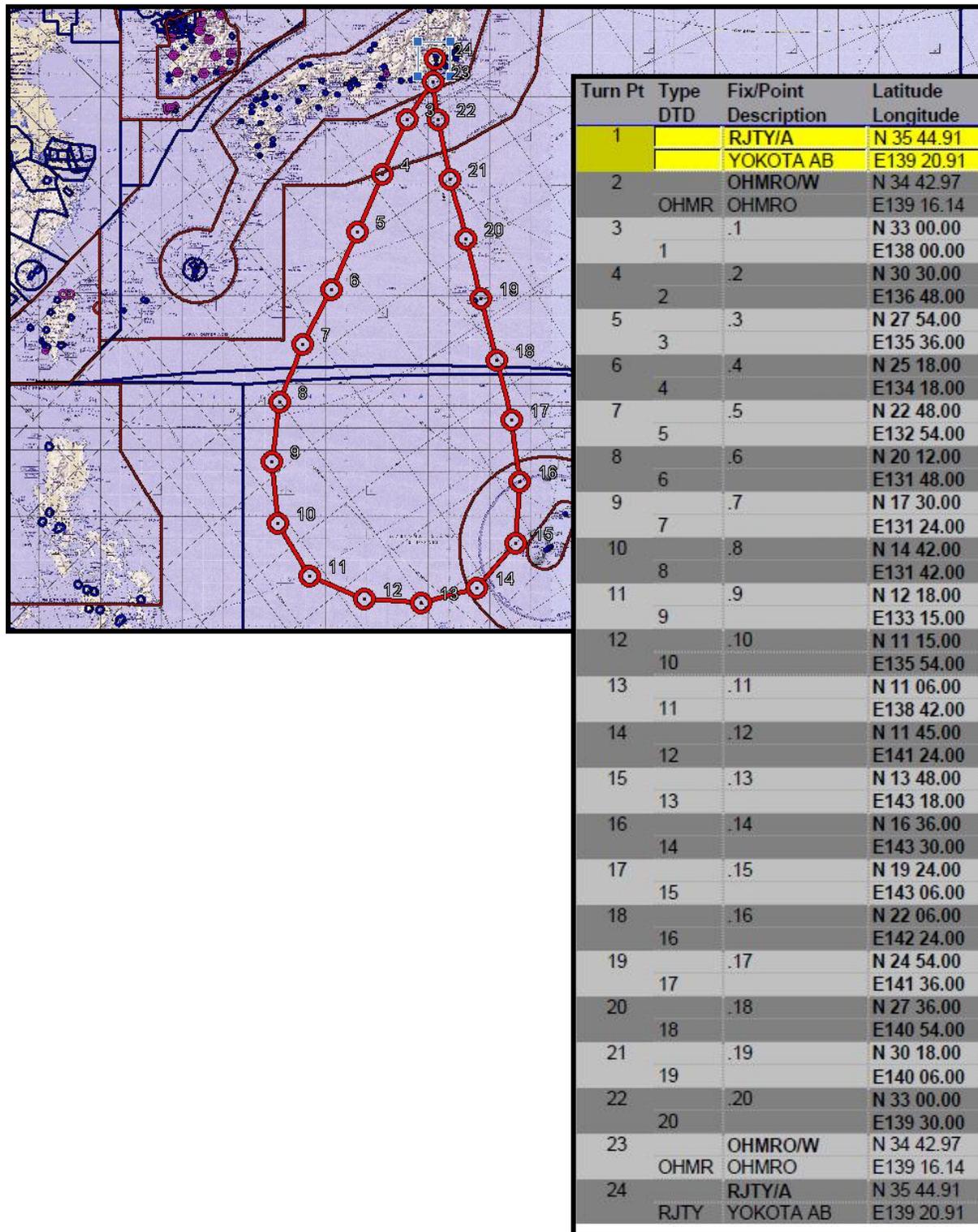


Figure I-26. Japanese Flight Track WSRP-89

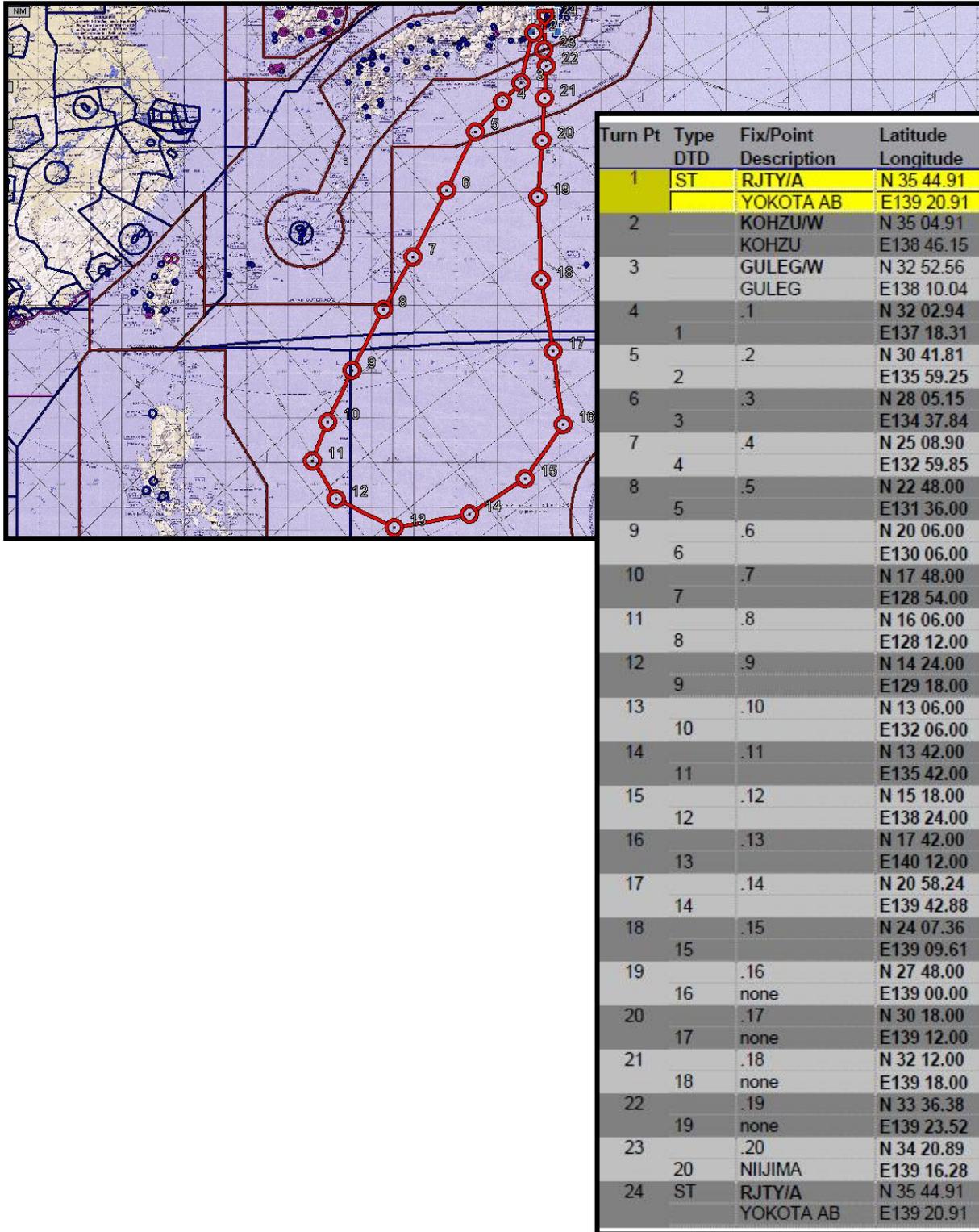


Figure I-27. Japanese Flight Track WSRP-90

APPENDIX J

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
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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: 2 Oct 2000

FOR THE NATIONAL OCEANIC AND
ATMOSPHERIC ADMINISTRATION

 Capt NOAA

Date: 10/12/2000

APPENDIX K
RECCO, HDOB, AND TEMP DROP
CODES, TABLES, AND REGULATIONS

Reconnaissance Code Recording Form

DATE		ORGANIZATION				MISSION IDENTIFIER										
OBSERVATION NUMBER	9	RECCO INDICATOR SPECIFYING TYPE OF OBSERVATION <i>Table 1</i>	g	TIME OF OBSERVATION <i>(Hours and Minutes)</i> <i>(GMT)</i>	Y	DAY OF WEEK <i>SUN-1</i>	L _o	LONGITUDE DEGREES AND TENTHS <i>(Note 4)</i>	h _a	PRESSURE ALTITUDE OF AIRCRAFT REPORTED TO THE NEAREST DECAMETER	d	WIND DIRECTION AT FLIGHT LEVEL <i>(Tens of deg. true.)</i>	T	TEMPERATURE WHOLE °C <i>(Note 6)</i>	/	INDICATOR
	X		Q		OCTANT <i>Table 3</i>	L _o		h _a		d		T		J	INDEX TO HHX <i>Table 9</i>	
	X		g		L _a	LATITUDE DEGREES AND TENTHS	L _o		h _a		f		T _d	DEW POINT WHOLE °C <i>(Note 6)</i>	H	GEOPOTENTIAL HEIGHT/ D-VALUE OR SLP PER INDEX J <i>(Note 8)</i>
	X		g		L _a		B	TURBULENCE <i>Table 4</i>	d _t	TYPE OF WIND <i>Table 6</i>	f	WIND SPEED AT FLIGHT LEVEL <i>(Knots)</i>	T _d		H	
	9		i		d	DEW POINT INDICATOR <i>Table 2</i>	L _a	TENTHS	f _c	FLIGHT COND <i>Table 3 (Note 5)</i>	d _a	METHOD OF OBTAINING WIND <i>Table 7</i>	f	w	PRESENT WEATHER <i>(Note 7 Table 8)</i>	H
1		2		3		4		5		6		7		8		
REMARKS																

TYPE AIRCRAFT				CALL SIGN				METEOROLOGIST							
1	INDICATOR	C	CLOUD TYPE <i>Table 11</i>	C	CLOUD TYPE <i>Table 11</i>	C	CLOUD TYPE <i>Table 11</i>	1	INDICATOR	C	CLOUD TYPE <i>Table 11</i>	C	CLOUD TYPE <i>Table 11</i>	C	CLOUD TYPE <i>Table 11</i>
k _n	NR OF CLOUD LAYERS <i>(Note 9)</i>	h _b	ALTITUDE OF BASE	h _b	ALTITUDE OF BASE	h _b	ALTITUDE OF BASE	k _n	NR OF CLOUD LAYERS <i>(Note 9)</i>	h _b	ALTITUDE OF BASE	h _b	ALTITUDE OF BASE	h _b	ALTITUDE OF BASE
N _a	AMOUNT OF CLOUDS <i>(Note 9) Table 10</i>	h _a	ALTITUDE OF TOP	h _a	ALTITUDE OF TOP	h _a	ALTITUDE OF TOP	N _a	AMOUNT OF CLOUDS <i>(Note 9) Table 10</i>	h _a	ALTITUDE OF TOP	h _a	ALTITUDE OF TOP	h _a	ALTITUDE OF TOP
N _t		H _t		H _t		H _t		N _t		H _t		H _t		H _t	
9		10		11		12		13		14		15		16	
REMARKS															

RECCO RECORDING WORKSHEET															
4	INDICATOR	6	INDICATOR <i>(Note 11)</i>	6	INDICATOR <i>(Note 11)</i>	7	INDICATOR	7	INDICATOR	8	INDICATOR	8	INDICATOR	9	INDICATOR
d	DIRECTION OF SFC WIND <i>(Tens of deg. true)</i>	W _s	SIGNIFICANT WEATHER CHANGES <i>Table 14</i>	W _s	SIGNIFICANT WEATHER CHANGES <i>Table 14</i>	i _r	RATE OF ICING <i>Table 17</i>	h _i	ALT OF BASE OF ICING STRATUM <i>(Note 12) Table 12</i>	d _r	BEARING OF ECHO CENTER <i>(Tens of Deg. True)</i>	E _w	ECHO WIDTH OR DIAMETER <i>Table 19</i>	V _i	INFLIGHT VISIBILITY <i>Table 23</i>
d		S _s	DISTANCE OF OCCURRENCE OF W _s <i>Table 15</i>	S _s	DISTANCE OF OCCURRENCE OF W _s <i>Table 15</i>	i _t	TYPE OF ICING <i>Table 18</i>	h _i		d _r		E _i	LENGTH OF MAJ AXIS <i>Table 19</i>	T _w	SEA SURFACE TEMPERATURE DEGREES AND TENTHS
f	SURFACE WIND SPEED <i>(Note 10)</i>	w _d	DISTANT WEATHER <i>Table 16</i>	w _d	DISTANT WEATHER <i>Table 16</i>	S _b	DISTANCE TO BEGINNING OF ICING <i>Table 15</i>	H _i	ALTITUDE OF TOP OF ICING STRATUM <i>(Note 12) Table 12</i>	S _r	DISTANCE TO ECHO CENTER <i>Table 19</i>	C _e	CHARACTER OF ECHO <i>Table 21</i>	T _w	
f		d _w	BEARING OF W _d <i>Table 13</i>	d _w	BEARING OF W _d <i>Table 13</i>	S _e	DISTANCE TO ENDING OF ICING <i>Table 15</i>	H _i		O _e	ORIENTATION OF ELLIPSE <i>Table 20</i>	I _e	INTENSITY OF ECHO <i>Table 22</i>	T _w	
17		18		19		20		21		22		23		24	
REMARKS															

Figure K-1. Reconnaissance Code Recording Form

Table K-1. Reconnaissance Code Tables

<p><u>TABLE 1</u> XXX</p> <p>222 Sec One Observation without radar capability</p> <p>555 Sec Three (intermediate) observation with or without radar capability</p> <p>777 Sec One Observation with radar capability</p>	<p><u>TABLE 6</u> d_t</p> <p>0 Spot of Wind</p> <p>1 Average wind</p> <p>/ No wind reported</p>	<p><u>TABLE 11</u> C</p> <p>0 Cirrus (Ci)</p> <p>1 Cirrocumulus (Cc)</p> <p>2 Cirrostratus (Cs)</p> <p>3 Altostratus (As)</p> <p>4 Altostratus (As)</p> <p>5 Nimbostratus (Ns)</p> <p>6 Stratocumulus (Sc)</p> <p>7 Stratus (St)</p> <p>8 Cumulus (Cu)</p> <p>9 Cumulonimbus (Cb)</p> <p>/ Cloud type unknown due to darkness or other analogous phenomena</p>
<p><u>TABLE 2</u> i_d</p> <p>0 No dew point capability/acft below 10,000 meters</p> <p>1 No dew point capability/acft at or above 10,000 meters</p> <p>2 No dew point capability/acft below 10,000 meters and flight lvl tem -50EC or colder</p> <p>3 No dew point capability/acft at or above 10,000 meters and flight lvl temp -50EC or colder</p> <p>4 Dew point capability/acft below 10,000 meters</p> <p>5 Dew point capability/acft at or above 10,000 meters</p> <p>6 Dew point capability/acft below 10,000 meters and flight lvl temp -50EC or colder</p> <p>7 Dew point capability/acft at or above 10,000 meters and flight lvl temp -50EC or colder</p>	<p><u>TABLE 7</u> d_a</p> <p>0 Winds obtained using doppler radar or inertial systems</p> <p>1 Winds obtained using other navigation equipment and/or techniques</p> <p>/ Navigator unable to determine or wind not compatible</p>	<p><u>TABLE 12</u> h_sh_sH_tH_th_ih_iH_iH_i</p> <p>00 Less than 100</p> <p>01 100 ft</p> <p>02 200 ft</p> <p>03 300 ft</p> <p>etc, etc</p> <p>49 4,900 ft</p> <p>50 5,000 ft</p> <p>51-55 Not used</p> <p>56 6,000 ft</p> <p>57 7,000 ft</p> <p>etc, etc</p> <p>79 29,000 ft</p> <p>80 30,000 ft</p> <p>81 35,000 ft</p> <p>82 40,000 ft</p> <p>etc, etc</p> <p>89 Greater than 70,000 ft</p> <p>// Unknown</p>
<p><u>TABLE 3</u> Q</p> <p>0 0E -90E W Northern</p> <p>1 90E W - 180E Northern</p> <p>2 180E - 90E E Northern</p> <p>3 90E - 0E E Northern</p> <p>4 Not Used</p> <p>5 0E - 90E W Southern</p> <p>6 90E W - 180E Southern</p> <p>7 180E - 90E E Southern</p> <p>8 90E - 0E E Southern</p>	<p><u>TABLE 8</u> w</p> <p>0 Clear</p> <p>1 Scattered (trace to 4/8 cloud coverage)</p> <p>2 Broken (5/8 to 7/8 cloud coverage)</p> <p>3 Overcast/undercast</p> <p>4 Fog, thick dust or haze</p> <p>5 Drizzle</p> <p>6 Rain (continuous or intermittent precip - from stratiform clouds)</p> <p>7 Snow or rain and snow mixed</p> <p>8 Shower(s) (continuous or intermittent precip - from cumuliform clouds)</p> <p>9 Thunderstorm(s)</p> <p>/ Unknown for any cause, including darkness</p>	<p><u>TABLE 13</u> d_w</p> <p>0 No report 5 SW</p> <p>1 NE 6 W</p> <p>2 E 7 NW</p> <p>3 SE 8 N</p> <p>4 S 9 all directions</p>
<p><u>TABLE 4</u> B</p> <p>0 None</p> <p>1 Light turbulence</p> <p>2 Moderate turbulence in clear air, infrequent</p> <p>3 Moderate turbulence in clear air, frequent</p> <p>4 Moderate turbulence in cloud, infrequent</p> <p>5 Moderate turbulence in cloud, frequent</p> <p>6 Severe Turbulence in clear air, infrequent</p> <p>7 Severe Turbulence in clear air, frequent</p> <p>8 Severe Turbulence in cloud, infrequent</p> <p>9 Severe Turbulence in cloud, frequent</p>	<p><u>TABLE 9</u> j</p> <p>0 Sea level pressure in whole millibars (thousands fig if any omitted)</p> <p>1 Altitude 200 mb surface in geopotential decameters (thousands fig if any omitted)</p> <p>2 Altitude 850 mb surface in geopotential meters (thousands fig omitted)</p> <p>3 Altitude 700 mb surface in geopotential meters (thousands fig omitted)</p> <p>4 Altitude 500 mb surface in geopotential decameters</p> <p>5 Altitude 400 mb surface in geopotential decameters</p> <p>6 Altitude 300 mb surface in geopotential decameters</p> <p>7 Altitude 250 mb surface in geopotential decameters (thousands fig if any omitted)</p> <p>8 D - Value in geopotential decameters; if negative 500 is added to HHH</p> <p>9 Altitude 925 mb surface in geopotential meters</p> <p>/ No absolute altitude available or geopotential data not within ∇ 30 meters/4 mb accuracy requirements</p>	<p><u>TABLE 14</u> W_s</p> <p>0 No change</p> <p>1 Marked wind shift</p> <p>2 Beginning or ending or marked turbulence</p> <p>3 Marked temperature change (not with altitude)</p> <p>4 Precipitation begins or ends</p> <p>5 Change in cloud forms</p> <p>6 Fog or ice fog bank begins or ends</p> <p>7 Warm front</p> <p>8 Cold Front</p> <p>9 Front, type not specified</p>
<p><u>TABLE 5</u> f_c</p> <p>0 In the clear</p> <p>8 In and out of clouds</p> <p>9 In clouds all the time (continuous IMC)</p> <p>/ Impossible to determine due to darkness or other cause</p>	<p><u>TABLE 10</u> N_s</p> <p>0 No additional cloud layers (place holder)</p> <p>1 1 okta or less, but not zero (1/8 or less sky covered)</p> <p>2 2 oktas (or 2/8 of sky covered)</p> <p>3 3 oktas (or 3/8 of sky covered)</p> <p>4 4 oktas (or 4/8 of sky covered)</p> <p>5 5 oktas (or 5/8 of sky covered)</p> <p>6 6 oktas (or 6/8 of sky covered)</p> <p>7 7 oktas or more but not 8 oktas</p> <p>8 8 oktas or sky completely covered</p> <p>9 Sky obscured (place holder)</p>	<p><u>TABLE 15</u> S_bS_eS_s</p> <p>0 No report</p> <p>1 Previous position</p> <p>2 Present position</p> <p>3 30 nautical miles</p> <p>4 60 nautical miles</p> <p>5 90 nautical miles</p> <p>6 120 nautical miles</p> <p>7 150 nautical miles</p> <p>8 180 nautical miles</p> <p>9 More than 180 nautical miles</p> <p>/ Unknown (not used for S_s)</p>

Table K-1. Reconnaissance Code Tables (continued)

<p><u>TABLE 16</u> w_d</p> <ol style="list-style-type: none"> 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 <p><u>TABLE 17</u> I_T</p> <ol style="list-style-type: none"> 7 Light 8 Moderate 9 Severe / Unknown or contrails <p><u>TABLE 18</u> I_t</p> <ol style="list-style-type: none"> 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 <p><u>TABLE 19</u> S_r, E_w, E_l</p> <table style="border: none;"> <tr> <td>0 0NM</td> <td>5 50NM</td> </tr> <tr> <td>1 10NM</td> <td>6 60-80NM</td> </tr> <tr> <td>2 20NM</td> <td>7 80-100NM</td> </tr> <tr> <td>3 30NM</td> <td>8 100-150NM</td> </tr> <tr> <td>4 40NM</td> <td>9 Greater than 150NM</td> </tr> <tr> <td colspan="2">/ Unknown</td> </tr> </table> <p><u>TABLE 20</u> O_e</p> <ol style="list-style-type: none"> 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 <p><u>TABLE 21</u> c_e</p> <ol style="list-style-type: none"> 1 Scattered Area 2 Solid Area 3 Scattered Line 4 Solid Line 5 Scattered, all quadrants 6 Solid, all quadrants / Unknown <p><u>TABLE 22</u> i_e</p> <ol style="list-style-type: none"> 2 Weak 5 Moderate 8 Strong / Unknown 	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		<p><u>TABLE 23</u> V_i</p> <ol style="list-style-type: none"> 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 <p style="text-align: center;">RECCO SYMBOLIC FORM</p> <p>SECTION ONE (MANDATORY)</p> <p>9XXX9 GGggi_d YQL_aL_aL_a L_oL_oL_oBf_c h_ah_ah_ad_td_a</p> <p>ddfff TTT_dT_dw /jHHH</p> <p>SECTION TWO (ADDITIONAL)</p> <p>1k_nN_sN_sN_s Ch_sh_sH_tH_t 4ddff</p> <p>6W_sS_sW_dd_w 7I_rI_tS_bS_e 7h_ih_iH_iH_i 8d_rd_rS_rO_e</p> <p>8E_wE_lc_ei_e 9V_iT_wT_wT_w</p> <p>SECTION THREE (INTERMEDIATE)</p> <p>9XXX9 GGggi_d YQL_aL_aL_a L_oL_oL_oBf_c h_ah_ah_ad_td_a</p> <p>ddfff TTT_dT_dw /jHHH</p>
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 K-2. Reconnaissance Code Regulations

<p>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.</p> <p>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.</p> <p>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."</p> <p>4. The hundreds digit of longitude is omitted for longitudes from 100E to 180E.</p> <p>5. Describe conditions along the route of flight actually experienced at flight level by aircraft.</p> <p>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 -52EC is encoded as 02, the distinction between -52EC and 2EC being made from i_d. Missing or unknown temperatures are reported as //. When the dew point is colder than -49.4EC, Code T_dT_d as // and report the actual value as a plain language remark - e.g. "DEW POINT NEG 52EC".</p> <p>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.</p>	<p>8. When j is reported as a /, HHH is encoded as ///.</p> <p>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.</p> <p>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."</p> <p>11. Significant weather changes which have occurred since the last observation along the track are reported for W_s.</p> <p>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 //.</p>
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The HDOB message is used to transmit High-Density/High-Accuracy (HD/HA) meteorological data from winter storm reconnaissance aircraft. These are created automatically by the system software. Each message consists of a communications header line (Table J-3), a mission/ob identifier line (Table J-4), and 20 lines of HD/HA data (Table J-5).

Within an HDOB message, the time interval (resolution) between individual HD/HA observations can be set by the operator to be 30, 60, or 120 seconds. However, regardless of the time resolution of the HD/HA data, the meteorological parameters in the HDOB message always represent 30-second averages along the flight track (except for certain peak values as noted in Table J-5).

The nominal time of each HD/HA record is the midpoint of the 30-second averaging interval. This means that an HD/HA record at time t will include data measured at time $t+15$ seconds. For purposes of determining peak flight-level and SFMR winds, the encoding interval begins 15 seconds after the nominal time of the last HD/HA record and ends 15 seconds after the nominal time of the record being encoded.

A sample HDOB message is given below (message begins with URPN15...):

```

0           1           2           3           4           5           6           7
01234567890123456789012345678901234567890123456789012345678901234567890
-----
URPN15 KNHC 040849
AF301 15WSC TRACK 21          HDOB 12 20100204
083930 5414N 14710W 3002 08759 4603 -540 +///// 231026 027 /// /// 05
084000 5411N 14709W 3003 08758 4603 -540 +///// 232026 026 004 002 05
084030 5409N 14708W 3003 08759 4604 -540 +///// 233027 027 001 003 05
084100 5406N 14708W 3003 08760 4605 -540 +///// 234026 027 005 003 05
.
.
.
084630 5338N 14659W 3003 08766 4611 -545 +///// 236027 027 /// /// 05
084700 5336N 14658W 3003 08767 4611 -545 +///// 237028 028 005 002 05
084730 5333N 14657W 3003 08766 4611 -545 +///// 236026 027 004 002 05
084800 5331N 14657W 3003 08767 4611 -542 +///// 234025 026 000 004 05
084830 5328N 14656W 2975 08825 4607 -544 +///// 232024 025 001 003 05
084900 5326N 14655W 2933 08919 4605 -548 +///// 232025 025 003 003 05
$$

```

Figure K-2. HDOB Description and Sample Message

Table K-5. HD/HA Data Line Format for HDOB Messages

0	1	2	3	4	5	6	7
01234567890123456789012345678901234567890123456789012345678901234567890							

hhmmss LLLH NNNNW PPPP GGGG XXXX sTTT sddd wwwSSS MMM KKK ppp FF							
084030 5409N 14708W 3003 08759 4604 -540 +//// 233027 027 001 003 05							
hhmmss:	Observation time, in hours, minutes and seconds (UTC). The observation time is the midpoint of the 30-s averaging interval used for the record's meteorological data.						
LLLH:	The latitude of the aircraft at the observation time in degrees (LL) and minutes (LL). The hemisphere (H) is given as either N or S.						
NNNNH:	The longitude of the aircraft at the observation time, in degrees (NNN) and minutes (NN). The hemisphere (H) is given as either E or W.						
PPPP:	Aircraft static air pressure, in tenths of mb with decimal omitted, at the observation time. If pressure is equal to or greater than 1000 mb the leading 1 is dropped.						
GGGG:	Aircraft geopotential height, in meters, at the observation time.						
XXXX:	Extrapolated surface pressure or D-value (30-s average). Encoded as extrapolated surface pressure if aircraft static pressure is 550.0 mb or greater (i.e., flight altitudes at or below 550 mb). Format for extrapolated surface pressure is the same as for static pressure. For flight altitudes higher than 550 mb, XXXX is encoded as the D-value, in meters. Negative D-values are encoded by adding 5000 to the D-value. <i>///</i> indicates missing value.						
s:	Sign of the temperature or dew point (+ or -). <i>/</i> indicates missing value						
sTTT:	The air temperature in degrees and tenths Celsius, decimal omitted (30-s average). <i>///</i> indicates missing value.						
sddd:	The dew point temperature, in degrees and tenths Celsius, decimal omitted (30-s average). <i>///</i> indicates missing value.						

Table K-5. HD/HA Data Line Format for HDOB Messages (continued)

www:	Wind direction in degrees (30-s average). North winds are coded as 000. /// indicates missing value.
SSS:	Wind speed, in kt (30-s average). /// indicates missing value.
MMM:	Peak 10-second average wind speed occurring within the encoding interval, in kt. /// indicates missing value.
KKK:	Peak 10-second average surface wind speed occurring within the encoding interval from the Stepped Frequency Microwave Radiometer (SFMR), in kt. /// indicates missing value.
ppp:	SFMR-derived rain rate, in mm hr ⁻¹ , evaluated over the 10-s interval chosen for KKK. /// indicates missing value.
FF:	Quality control flags. First column indicates status of positional variables as follows: 0 All parameters of nominal accuracy 1 Lat/lon questionable 2 Geopotential altitude or static pressure questionable 3 Both lat/lon and GA/PS questionable Second column indicates status of meteorological variables as follows: 0 All parameters of nominal accuracy 1 T or TD questionable 2 Flight-level winds questionable 3 SFMR parameter(s) questionable 4 T/TD and FL winds questionable 5 T/TD and SFMR questionable 6 FL winds and SFMR questionable 9 T/TD, FL winds, and SFMR questionable

Table K-6. TEMP DROP CODE

EXTRACT FROM: WMO-No. 306 MANUAL ON CODES

FM 37-X Ext. TEMP DROP: Upper-level pressure, temperature, humidity and wind report from a sonde released by aircraft. See Figure J-3 for an example TEMP DROP message for winter storm operations.

CODE FORM:

PART A

SECTION 1 $M_i M_i M_j M_j$ $YYGGI_d$ $99L_a L_a L_a$ $Q_c L_o L_o L_o$ $MMMU_{L_a} U_{L_o}$

SECTION 2 $99P_o P_o P_o$ $T_o T_o T_{ao} D_o D_o$ $d_o d_o f_o f_o f_o$
 $P_1 P_1 h_1 h_1 h_1$ $T_1 T_1 T_{a1} D_1 D_1$ $d_1 d_1 f_1 f_1 f_1$
 $P_n P_n h_n h_n h_n$ $T_n T_n T_{an} D_n D_n$ $d_n d_n f_n f_n f_n$

SECTION 3 $88P_t P_t P_t$ $T_t T_t T_{at} D_t D_t$ $d_t d_t f_t f_t f_t$
 or
 88999

SECTION 4 $77P_m P_m P_m$ $d_m d_m f_m f_m f_m$ $(4v_b v_b v_a v_a)$
 or
 $66P_m P_m P_m$ $d_m d_m f_m f_m f_m$ $(4v_b v_b v_a v_a)$
 or
 77999

SECTION 10 31313
 51515 $101A_{df} A_{df}$ $0P_n P_n P'_n P'_n$
 or
 $101A_{df} A_{df}$ $P_n P_n h_n h_n h_n$
 61616
 62626

PART B

SECTION 1 $M_i M_i M_j M_j$ $YYGG8$ $99L_a L_a L_a$ $Q_c L_o L_o L_o$ $MMMU_{L_a} U_{L_o}$

SECTION 5 $n_o n_o P_o P_o P_o$ $T_o T_o T_{ao} D_o D_o$
 $n_1 n_1 P_1 P_1 P_1$ $T_1 T_1 T_{a1} D_1 D_1$
 $n_n n_n P_n P_n P_n$ $T_n T_n T_{an} D_n D_n$

SECTION 6 21212 $n_o n_o P_o P_o P_o$ $d_o d_o f_o f_o f_o$
 $n_1 n_1 P_1 P_1 P_1$ $d_1 d_1 f_1 f_1 f_1$
 $n_n n_n P_n P_n P_n$ $d_n d_n f_n f_n f_n$

SECTION 7 31313 $s_r r_a r_a s_a s_a$ 8GGgg

SECTION 9 51515 $101A_{df} A_{df}$ or
 $101A_{df} A_{df}$ $0P_n P_n P'_n P'_n$ or
 $101A_{df} A_{df}$ $P_n P_n h_n h_n h_n$

SECTION 10 61616
 62626

Table K-6. TEMP DROP CODE (continued)

PART ALPHA (A)

IDENTIFICATION LETTERS: M_JM_J

Identifier: M_JM_J - Identifier for Part A of the report.

DATE/TIME GROUP: YYGGI_d

Identifier: YY - Date group

Identifier: GG - Time group

Identifier: I_d - The highest mandatory level for which wind is available.

LATTITUDE: 99L_aL_aL_a

Identifier: 99 – Indicator for data on position follows.

Identifier: L_aL_aL_a – Latitude in tenths of degrees

LONGITUDE: Q_cL_oL_oL_oL_o

Identifier: Q_c – The octant of the globe.

Identifier: L_oL_oL_oL_o – Longitude in tenths of degrees

MARSDEN SQUARE: MMMU_{la}U_{lo}

Identifier: MMM - Marsden square.

Identifier: U_{la}U_{lo} – Units digits in the reported latitude and longitude.

SEA LEVEL PRESSURE: 99P_oP_oP_o T_oT_oT_oD_oD_o d_od_of_of_o

Identifier: 99 – Indicator for data at the surface level follows

Identifier: P_oP_oP_o – Indicator for pressure of specified levels in whole millibars (thousands digit omitted)

Identifier: T_oT_oT_o – Tens and digits of air temperature (not rounded off) in degrees Celsius, at specified levels beginning with surface.

Identifier: D_oD_o – Dewpoint depression at standard isobaric surfaces beginning with surface level.

NOTE

When the depression is 4.9C or less encode the units and tenths digits of the depression. Encode depressions of 5.0 through 5.4C as 50. Encode depressions of 5.5C through 5.9C as 56. Dew point depressions of 6.0 and above are encoded in tens and units with 50 added. Dew point depressions for relative humidities less than 20% are encoded as 80. When air temperature is below –40C report D_nD_n as //.

Identifier: 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.

Identifier: f_of_of_o – Wind speed in knots. Hundreds digit is sum of speed and unit digit of direction, i.e. 29₅^o at 125 knots encoded as 29₆25.

NOTE: 1. When flight level is just above a standard surface and in the operator's best meteorological judgment, 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 //

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

Table K-6. TEMP DROP CODE (continued)

STANDARD ISOBARIC SURFACES : P₁P₁h₁h₁h₁ T₁T₁T₁D₁D₁ d₁d₁f₁f₁

Identifier: **P₁P₁** – Pressure of standard isobaric surfaces in units of tens of millibars.

(1000 mbs = 00, 925mbs = 92, 850mbs = 85, 700mbs = 70, 500mbs = 50, 400mbs = 40, 300mbs = 30, 250mbs = 25).

Identifier: **h₁h₁h₁** – Heights of the standard pressure level in geopotential meters or decameters above the surface. Encoded in decameters at and above 500mbs omitting, if necessary, the thousands or tens of thousands digits. Add 500 to hhh for negative 1000mb or 925mb heights. Report 1000mb group as 00/// ////
 /// when pressure is less than 950mbs.

Identifier: **T₁T₁T₁D₁D₁** – Same temperature/dew point encoding procedures apply to all levels.

Identifier : **d₁d₁f₁f₁** – Same wind encoding procedures apply to all levels.

DATA FOR TROPOPAUSE LEVELS: 88 P_tP_tP_t T_tT_tT_tD_tD_t d_td_tf_tf_t

Identifier: **88** – Indicator for Tropopause level follows

Identifier: **P_tP_tP_t** – Pressure at the tropopause level reported in whole millibars. Report 88P_nP_nP_n as 88999 when tropopause is not observed.

Identifier: **T_tT_tT_tD_tD_t** – Same temperature/ dew point encoding procedures apply.

Identifier: **d_td_tf_tf_t** - Same wind encoding procedures apply.

MAXIMUM WIND DATA: 77P_nP_nP_n d_nd_nf_nf_n 4v_bv_bv_av_a

Identifier: **77** – Indicator that data for maximum wind level and for vertical wind shear follow when max wind does not coincide at flight. If the maximum wind level coincides with flight level encode as 66

Identifier: **P_nP_nP_n** – Pressure at maximum wind level in whole millibars.

Identifier: **d_nd_nf_nf_n** - Same wind encoding procedures apply.

VERTICAL WIND SHEAR DATA: 4v_bv_bv_av_a

Identifier: **4** – Data for vertical wind shear follow.

Identifier: **v_bv_b** – Absolute value of vector difference between max wind and wind 3000 feet BELOW the level of max wind, reported to the nearest knot. Use “//” if missing and a 4 is reported. A vector difference of 99 knots or more is reported with the code figure “99”.

Identifier: **v_av_a** – Absolute value of vector difference between max wind and wind 3000 feet above the level of max wind, reported to the nearest knot. Use “//” if missing and a 4 is reported. A vector difference of 99 knots or more is reported with the code figure “99”.

SOUNDING SYSTEM INDICATION, RADIOSONDE/ SYSTEM STATUS, LAUNCH TIME:

31313 s_rr_ar_as_as_a 8GGgg

Identifier: **s_rr_ar_as_as_a** - Sounding system indicator, radiosonde/ system status: s_rr_ar_as_as_a

Identifier: **s_a** - Solar and infrared radiation correction (**0** – no correction)

Identifier: **r_ar_a** – Radiosonde/sounding system used (**96** – Descending radiosonde)

Identifier: **s_as_a** – Tracking technique/status of system used (**08** – Automatic satellite navigation)

Identifier: **8GGgg** – Launch time

Identifier: **8** – Indicator group

Identifier: **GG** – Time in hours

Identifier: **gg** – Time in minutes

Table K-6. TEMP DROP CODE (continued)

ADDITIONAL DATA GROUPS: 51515 101XX 0P_nP_nP_nP_n

Identifier: **51515** – Additional data in regional code follow

Identifier: **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 one level to another.

Identifier: **10167** – Temperature data are doubtful between the following levels 0P_nP_nP_nP_n. This code figure shall be reported when only the 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.

Identifier: **10190** – Extrapolated altitude data follows:

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 A and B as 1019030966.

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 also at the end of Part A and Part B of the code in the format as **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.

Identifier: **10191** – Extrapolated surface pressure precedes. Extrapolated surface pressure is only reported when the termination occurs between 850mbs and the surface. Surface pressure is reported in Part A as 99P₀P₀P₀ //// and in Part B as 00P₀P₀P₀ ////. When surface pressure is extrapolated the 10191 group is the last additional data group reported in Part B.

AIRCRAFT AND MISSION IDENTIFICATION: 61616 AFXXX XXXXX XXXXX OB X

Identifier: **61616** – Aircraft and mission identification data follows.

Identifier: **AFXXX** – The identifier AF for U.S. Air Force and the last three digits of the aircraft's tail number.

Identifier: **XXXXX XXXXX** – The identifier for the type of mission being flown.

If a training mission the mission identifier is **WXWXA TRAIN**. The fifth letter "A" is the only character that could possibly change. The "A" indicates that the flight originated in the Atlantic basin. The letter "C" identifies the Central Pacific area, the letter "E" identifies the Eastern Pacific, and the letter "W" identifies the Western Pacific.

If an operational winter storm mission: the first two numbers identify the sequential number of the mission being flown in the given basin (Atlantic or Pacific), followed by the letters "WS" to signify a winter storm mission. The last character again identifies the basin flown. The track number designation would replace "TRAIN." EXAMPLE: AF300 06WSA TRACK64 – Aircraft tail number 5300, sixth Atlantic basin winter storm flight of the season, and along track WSRP-A64.

Identifier: **OB 14** – The observation (both vertical and horizontal) number as transmitted from the aircraft.

NATIONALLY DEVELOPED CODES: 62626

Identifier: **62626** – This is the remarks section.

Identifier: **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

Identifier: **MBL WND dddff** — Mean boundary level wind. The mean wind in the lowest 500 meters of the sounding

Identifier: **AEV XXXXX** — This is the software version being used for the sounding.

Table K-6. TEMP DROP CODE (continued)

Identifier: **DLM WND ddfb bbbttt** — The Deep Layer Mean wind. It is the average wind over the depth of the sounding, where ddfb is the wind averaged from the first to the last available wind (these would correspond to the first and last significant levels for wind); tt 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).

Identifier: **WL150 ddfb zzz** — Average wind over the lowest available 150 m of the wind sounding. Where ddfb is the mean wind over the 150 m layer centered at zzz m.

Identifier: **REL XXXXNXXXXXW hhmss** – Release location of the sonde and the release time.

Identifier: **SPG XXXXNXXXXXW hhmss** — Impact location of the sonde based on its last GPS position and the splash time

PART ALPHA (B)

DATA FOR SIGNIFICANT TEMPERATURE AND RELATIVE HUMIDITY LEVELS SIGNIFICANT ISOBARIC LEVELS:

n₀n₀P₀P₀P₀ T₀T₀T₀D₀D₀

IDENTIFICATION LETTERS: M_JM_J

Identifier: **M_JM_J** - Identifier for Part B of the report.

DATE/TIME GROUP: YYGG8

Identifier: **YY** - Date group

Identifier: **GG** - Time group

Identifier: **8** - Indicator for the use of satellite navigation for wind finding.

LATTITUDE: 99L_aL_aL_a (Same as Part A)

LONGITUDE: QL₀L₀L₀L₀ (Same as Part A)

MARSDEN SQUARE: MMMU_{1a}U_{1a} (Same as Part A)

SEA LEVEL PRESSURE: n₀n₀P₀P₀P₀ T₀T₀T₀D₀D₀

Identifier: **nono** – Indicator for number of level starting with surface level. Only surface will be numbered as “00”.

Identifier: **P₀P₀P₀** – Indicator for pressure of specified levels in whole millibars (thousands digit omitted)

Identifier: **T₀T₀T₀** – Tens and digits of air temperature (not rounded off) in degrees Celsius, at specified levels beginning with surface.

Identifier: **D₀D₀** – Dewpoint depression at standard isobaric surfaces beginning with surface level. Encoded the same as Part A.

FOR STORM DROPS ONLY. If SLP is less than 950mb encode the 1000mb group as 00/// //// // //. When the SLP is between 950mb and 999mb encode 1000mb as 00PoPoPo //// // // (500 meters are added to height below surface).

DATA FOR SIGNIFICANT WIND LEVELS: n₀n₀P₀P₀P₀ d₀d₀f₀f₀

Identifier: **n₀n₀** – Number of level starting with surface level. Only surface will be numbered as “00”.

Identifier: **P₀P₀P₀** – Pressure at specified levels in whole millibars.

Identifier: **d₀d₀** – 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.

Identifier: **f₀f₀f₀** – Wind speed in knots. Hundreds digit is sum of speed and unit digit of direction, i.e. 295° at 125 knots encoded as 29625.

Same notes in Part A apply.

31313, 51515, 61616, 62626 – Repeated from Part A.

```

UZNT13 KNHC 080958
XXAA 58103 99372 70729 11672 99015 12214 ///// 00122 11416 08522
92771 07623 12532 85461 02020 14037 70014 01709 20049 50563 15131
22550 40728 26547 24049 30929 437// 24563 88999 77300 24563 404//
31313 09608 80942
61616 AF308 09WSA TRACK62          OB 04
62626 LST WND 013 MBL WND 10023 AEV 07489 DLM WND 20531 013287 WL
150 08020 087 REL 3716N07290W 094217 SPG 3726N07283W 095446 =
XXBB 58108 99372 70729 11672 00015 12214 11969 10632 22850 02020
33765 01909 44736 01108 55636 05115 66467 18135 77374 30550 88330
38356 99287 465//
21212 00015 ///// 11013 08020 22991 09021 33980 11027 44850 14037
55787 14030 66756 17037 77705 20048 88573 20540 99519 23050 11393
24048 22287 24563
31313 09608 80942
61616 AF308 09WSA TRACK62          OB 04
62626 LST WND 013 MBL WND 10023 AEV 07489 DLM WND 20531 013287 WL
150 08020 087 REL 3716N07290W 094217 SPG 3726N07283W 095446 =

```

FIGURE K-3. EXAMPLE TEMP DROP MESSAGE FOR WINTER STORMS

APPENDIX L

RECONNAISSANCE ORGANIZATIONS CONTACT INFORMATION

Table L-1. Primary Reconnaissance Organizations Contact Information

OFFICE	ADDRESS	TELEPHONE
NCEP Weather Prediction Center (WPC)	NCEP/WPC College Park, MD	301-683-1530
NCEP's NCEP Central Operations (NCO) Senior Duty Meteorologist (SDM)	NCEP/NCO SDM College Park, MD	301-683-1500 Fax: 301-683-1501
Chief, Aerial Reconnaissance Coordination, All Hurricanes (CARCAH)	National Hurricane Center 11691 SW 17th Street Miami, FL 33165-2149	DSN 434-3420 305-229-4474
NOAA Aircraft Operations Center (AOC)	AOC MacDill AFB, Tampa, FL	DSN 968-3310 813-828-3310
53rd Weather Reconnaissance Squadron (WRS)	53 WRS 817 H Street, Suite 201 Keesler AFB, MS 39534-2453	Supervisor of Flights: DSN 597-2409 228-377-2409 Chief ARWO: DSN 597-3207 228-377-3207 Alternate CARCAH: DSN 597-9060 228-377-9060
Office of the Federal Coordinator for Meteorological Services and Supporting Research (OFCM)	1325 East West Highway Suite 7130 Silver Spring, MD 20910	301-628-0112
Naval Meteorology and Oceanography Center (NAVMETOCOM), Norfolk	NMOC 9141 Third Avenue Norfolk, VA 23511-2394	DSN 564-7750 757-444-7750
Naval Meteorology and Oceanography Center (NAVMETOCOM), Pearl Harbor	NMOC 425 Luapele Road Pearl Harbor, HI 96860-3104	DSN 471-0004 808-471-0004
Air Force Weather Agency	AFWA Offutt AFB, NE	DSN 271-2586 402-294-2586

Table L-1 (continued). Primary Reconnaissance Organizations Contact Information

FAA AIR TRAFFIC CONTROL		
	OCEANIC SUPERVISOR	MISSIONS COORDINATOR
ATC SYSTEM COMMAND CENTER		(703) 904-4525
CENTRAL ALTITUDE RESERVATION FUNCTION (CARF)		(703) 904-4426 DSN 725-3331
ANCHORAGE	(907) 269-1108 FAX: (907) 269-1343	
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
OAKLAND ARTCC	(501) 745-3342 / 3000 (SWITCHBOARD) FAX: (510) 745-3411	(510) 745-3334 DSN 730-1595
BOSTON ARTCC		(603) 879-6666 DSN 881-1635
NEW YORK ARTCC	(631) 468-1496	(516) 468-1429 DSN 881-3730 FAX: (631) 468-1428
WASHINGTON ARTCC		(703) 771-3472 DSN 937-1420 FAX: (703) 771-3590
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
MIAMI ARTCC	(305) 716-1781 (GULF OF MEXICO) FAX: (305) 716-1511 (305) 716-1786 (ATLANTIC) (305) 716-1785 (BAHAMAS & SOUTH) (305) 716-1784 (BAHAMAS & NORTH)	(305) 716-1589 DSN 434-1910
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)