66TH IHC – WG/HWSOR ACTION ITEM SUMMARY
(Current as of 2 May 2012)

NEW ACTION ITEMS (66th IHC)

1

Title — **Administrative Change to NHOP: Pronunciation Changes to Tables 3-1 & 3-2**

Submitter — James Franklin, NOAA/NWS/National Hurricane Center

Submitted — 19 Jan 2012

Discussion — Pronunciation Changes to Tables 3-1 & 3-2, Atlantic & Eastern Pacific Tropical Cyclone Names (see ADDITIONAL INFO below, yellow highlights).

Recommendation — Incorporate into 2012 NHOP. IHC to forward to RA-IV and RA-V Committees

Action — Accepted recommendation and information forwarded to RA-IV and RA-V committees. Item will be **CLOSED** once 2012 NHOP is updated.

Additional Info

Table 3-1. Atlantic Tropical Cyclone Names

2012		2013		2014	
Name	Pronunciation	Name	Pronunciation	Name	Pronunciation
Alberto	al-BAIR-toe	Andrea	AN-dree-uh	Arthur	AR-thur
Beryl	BER-ril	Barry	BAIR-ree	Bertha	BUR-thuh
Chris	kris	Chantal	shahn-TAHL	Cristobal	krees-TOH-bahl
Debby	DEH-bee	Dorian	DOR-ee-an	Dolly	DAH-lee
Ernesto	er-NES-toh	Erin	AIR-rin	Edouard	eh-DWARD
Florence	FLOOR-ence	Fernand	fair-NAHN	Fay	fay
Gordon	GOR-duhn	Gabrielle	ga-bree-ELL	Gonzalo	gohn- SAH-low
Helene	heh-LEEN	Humberto	oom-BAIR-toh	Hanna	HAN-uh
Isaac	EYE-zik	Ingrid	ING-grid	Isaias	ees-ah-EE-ahs
Joyce	joyss	Jerry	JEHR-ee	Josephine	JOH-seh-feen
Kirk	kurk	Karen	KAIR-ren	Kyle	KY-ull
Leslie	LEHZ-lee	Lorenzo	loh-REN-zoh	Laura	LOOR-ruh
Michael	MY-kuhl	Melissa	meh-LIH-suh	Marco	MAR-koe
Nadine	nay-DEEN	Nestor	NES-tor	Nana	NA-na
Oscar	AHS-kur	Olga	OAL-guh	Omar	OH-mar
Patty	PAT-ee	Pablo	PAHB-lo	Paulette	pawl-LET
Rafael	rah-fah--ELL	Rebekah	reh-BEH-kuh	Rene	re-NAY
Sandy	SAN-dee	Sebastien	suh-BASH-chuhn	Sally	SAL-ee
Tony	TOH-nee	Tanya	TAHN-yuh	Teddy	TEHD-ee
Valerie	VAH-lur-ee	Van	van	Vicky	VIH-kee
William	WILL-yum	Wendy	WEN-dee	Wilfred	WILL-fred

2015		2016		2017	
Name	Pronunciation	Name	Pronunciation	Name	Pronunciation
Ana	AH-nah	Alex	AL-leks	Arlene	ar-LEEN
Bill	bill	Bonnie	BAH-nee	Bret	bret
Claudette	klaw-DET	Colin	KAH-lihn	Cindy	SIN-dee
Danny	DAN-ee	Danielle	dan-YELL	Don	dahn
Erika	eh-RIH-kuh	Earl	URR-ull	Emily	EH-mih-lee
Fred	frehd	Fiona	fee-OH-nuh	Franklin	FRANK-lin
Grace	grayss	Gaston	ga-STAWN	Gert	gert
Henri	ahn-REE	Hermine	her-MEEN	Harvey	HAR-vee
Ida	EYE-duh	Ian	EE-an	Irma	ER-mah
Joaquin	wah-KEEN	Julia	JOO-lee-uh	Jose	ho-ZAY
Kate	kayt	Karl	KAR-ull	Katia	KAH-tyah
Larry	LAIR-ree	Lisa	LEE-suh	Lee	lee
Mindy	MIN-dee	Matthew	MATH-yoo	Maria	ma-REE-ah
Nicholas	NIH-kuh-luss	Nicole	nih-KOHL	Nate	nait
Odette	oh-DEHT	Otto	AHT-toh	Ophelia	o-FEEL-ya
Peter	PEE-tur	Paula	PAHL-luh	Philippe	fee-LEEP
Rose	rohz	Richard	RIH-churd	Rina	REE-nuh
Sam	sam	Shary	SHAHR-ee	Sean	shawn
Teresa	tuh-REE-suh	Tobias	Toh-BEE-uss	Tammy	TAM-ee
Victor	VIK-tur	Virginie	vir-JIN-ee	Vince	vinss
Wanda	WAHN-duh	Walter	WALL-tur	Whitney	WHIT-nee

1	**Additional Info (continued)**	

Table 3-2. Eastern Pacific Tropical Cyclone Names

2012		2013		2014	
Name	Pronunciation	Name	Pronunciation	Name	Pronunciation
Aletta	a-LET-ah	ALVIN	AL-vin	Amanda	uh-MAN-duh
Bud	buhd	BARBARA	BAR-bruh	Boris	bor-EES
Carlotta	kar-LOT-uh	COSME	COS-may	Cristina	kris-TEE-nuh
Daniel	DAN-yuhl	DALILA	Dah-LY-lah	Douglas	DUG-luss
Emilia	ee-MILL-ya	ERICK	EHR-ik	Elida	ELL-ee-dah
Fabio	FAH-bee-o	FLOSSIE	FLOSS-ee	Fausto	FOW-sto
Gilma	GIL-mah	GIL	gill	Genevieve	jeh-nuh-VEEV
Hector	HEHK-tor	HENRIETTE	hen-ree-ETT	Hernan	her-NAHN
Ileana	ill-ay-AH-nah	IVO	eye-voh	Iselle	ee-SELL
John	jahn	JULIETTE	jew-lee-EHT	Julio	HOO-lee-o
Kristy	KRIS-tee	KIKO	KEE-ko	Karina	kuh-REE-nuh
Lane	layne	LORENA	low-RAY-na	Lowell	LO-uhl
Miriam	MEER-yim	MANUEL	mahn-WELL	Marie	muh-REE
Norman	NOR-muhn	NARDA	NAHR-duh	Norbert	NOR-bert
Olivia	uh-LIV-ee-uh	OCTAVE	AHK-tayv	Odile	oh-DEAL
Paul	pall	PRISCILLA	prih-SIH-luh	Polo	POH-loh
Rosa	ROH-zuh	RAYMOND	RAY-mund	Rachel	RAY-chull
Sergio	SIR-gee-oh	SONIA	SOHN-yah	Simon	SY-muhn
Tara	TAIR-uh	TICO	TEE-koh	Trudy	TROO-dee
Vicente	vee-CEN-tay	VELMA	VELL-muh	Vance	vanss
Willa	WIH-lah	WALLIS	WAHL-lis	Winnie	WIN-ee
Xavier	ZAY-vee-ur	XINA	ZEE-nah	Xavier	ZAY-vee-ur
Yolanda	yo-LAHN-da	YORK	york	Yolanda	yo-LAHN-da
Zeke	zeek	ZELDA	ZEL-dah	Zeke	zeek

2015		2016		2017	
Name	Pronunciation	Name	Pronunciation	Name	Pronunciation
Andres	ahn-DRASE	Agatha	A-guh-thuh	Adrian	AY-dree-uhn
Blanca	BLAHN-kah	Blas	Blahs	Beatriz	BEE-a-triz
Carlos	KAR-loess	Celia	SEEL-yuh	Calvin	KAL-vin
Dolores	deh-LOOR-ess	Darby	DAR-bee	Dora	DOR-ruh
Enrique	ahn-REE-kay	Estelle	eh-STELL	Eugene	YOU-jeen
Felicia	fa-LEE-sha	Frank	frank	Fernanda	fer-NAN-dah
Guillermo	gee-YER-mo	Georgette	jor-JET	Greg	greg
Hilda	HILL-duh	Howard	HOW-urd	Hilary	HIH-luh-ree
Ignacio	eeg-NAH-see-oh	Isis	EYE-sis	Irwin	UR-win
Jimena	he-MAY-na	Javier	Hahv-YAIR	Jova	HO-vah
Kevin	KEH-vin	Kay	Kay	Kenneth	KEH-neth
Linda	LIHN-duh	Lester	LESS-tur	Lidia	LIH-dyah
Marty	MAR-tee	Madeline	MAD-eh-luhn	Max	maks
Nora	NOOR-ruh	Newton	NOO-tuhn	Norma	NOOR-muh
Olaf	OH-lahf	Orlene	or-LEEN	Otis	OH-tis
Patricia	puh-TRIH-shuh	Paine	payne	Pilar	Pee-LAHR
Rick	rik	Roslyn	RAWZ-luhn	Ramon	rah-MOHN
Sandra	SAN-druh	Seymour	SEE-mor	Selma	SELL-mah
Terry	TAIR-ree	Tina	TEE-nuh	Todd	tahd
Vivian	VIH-vee-uhn	Virgil	VUR-jill	Veronica	vur-RAHN-ih-kuh
Waldo	WAHL-doh	Winifred	WIN-ih-fred	Wiley	WY-lee
Xina	ZEE-nah	Xavier	ZAY-vee-ur	Xina	ZEE-nah
York	york	Yolanda	Yo-LAHN-da	York	york
Zelda	ZEL-dah	Zeke	zeek	Zelda	ZEL-dah

2 | **Title** | **Administrative Change to NHOP: NESDIS Satellite Analysis Branch (SAB)**

Submitter | Michael Turk, Satellite Analysis Branch

Submitted | 17 Dec 2011

Discussion | Minor administrative change to Table 6-1. Communications Headings for SAB Dvorak Analysis Products. Add the following WMO Heading to Table 6-1 to account for new SAB Dvorak fix bulletins in the South Atlantic Ocean:

Table 6-1. Communications Headings for SAB Dvorak Analysis Products

WMO HEADING	OCEANIC AREA	TYPE OF DATA
TXST20-21 KNES	South Atlantic Ocean	VIS/IR

Recommendation | Incorporate into 2012 NHOP.

Action | Accepted recommendation. Item will be **CLOSED** once 2012 NHOP is updated. (Note that chapter 6 is now chapter 7 in 2012 NHOP.)

3 | **Title** | **Administrative Change to NHOP: Update Appendix O**

Submitter | OFCM/STC (Sabrina Taijeron)

Submitted | 17 Nov 2011

Discussion | Current information doesn't reflect smaller number of hardcopies being mailed.

Recommendation | Incorporate into 2012 NHOP.

Action | Accepted recommendation. Item will be **CLOSED** once 2012 NHOP is updated.

4 | **Title** | **Breakpoint change from WFO Upton**

Submitter | NOAA/NWS

Submitted | 19 Jan 2012

Discussion | For storms forecast to pass far enough to the east of New York City, an additional breakpoint between Sandy Hook NJ and Fire Island Inlet NY is desirable. This would provide NHC the opportunity to issue a Tropical Cyclone Watch and/or Warning for Nassau and Suffolk counties of Long Island, while not having to issue one for New York City. In the case of Hurricane Earl (2010), there was high confidence any impacts would be felt east of New York City. Yet because of the breakpoints, it was necessary to include New York City. An additional breakpoint provides the flexibility to reduce unnecessary preparation for the biggest city on the east coast in high confidence situations.
Add East Rockaway Inlet, on the border of Queens and Nassau counties, as a new breakpoint:
East Rockaway Inlet, NY Latitude 40.58°N Longitude 73.75°W

Recommendation | Informational; brief at 66th IHC and forward to RA-IV Committee.

Action | Informational, briefed at 66th IHC and forwarded to RA-IV committee. Item is **CLOSED**.

5 | **Title** | **Breakpoint change from WFO Wakefield**

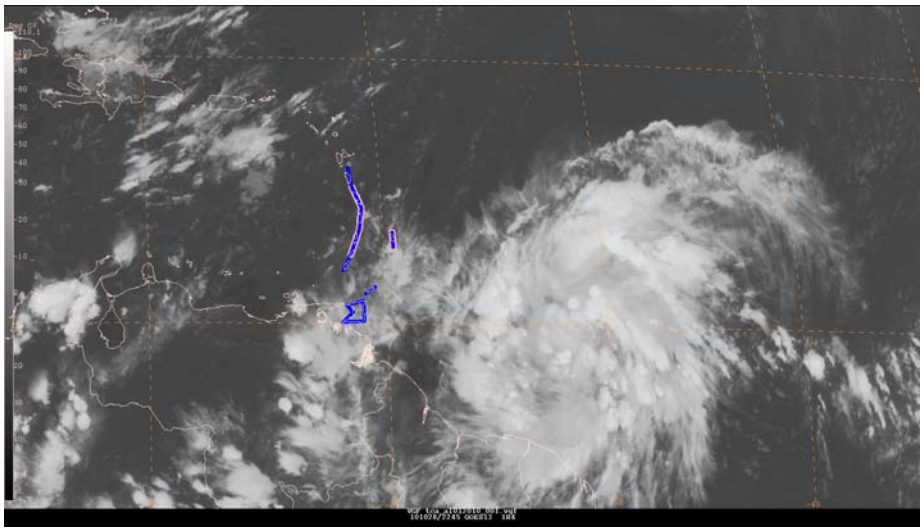
Submitter | NOAA/NWS

Submitted | 19 Jan 2012

Discussion | Several years ago, the Fenwick Island, DE breakpoint was eliminated due to evacuation coordination concerns expressed by emergency managers in Ocean City, MD and Sussex County, DE. While these concerns do exist, not having the Fenwick Island breakpoint limits flexibility when it comes to dropping tropical cyclone watches/warnings.
Add the Fenwick Island breakpoint, with the caveat that it will be used primarily for ending tropical cyclone watches/warnings.
Fenwick Island, DE Latitude 38.46°N Longitude 75.05°W

Recommendation | Informational; brief at 66th IHC and forward to RA-IV Committee.

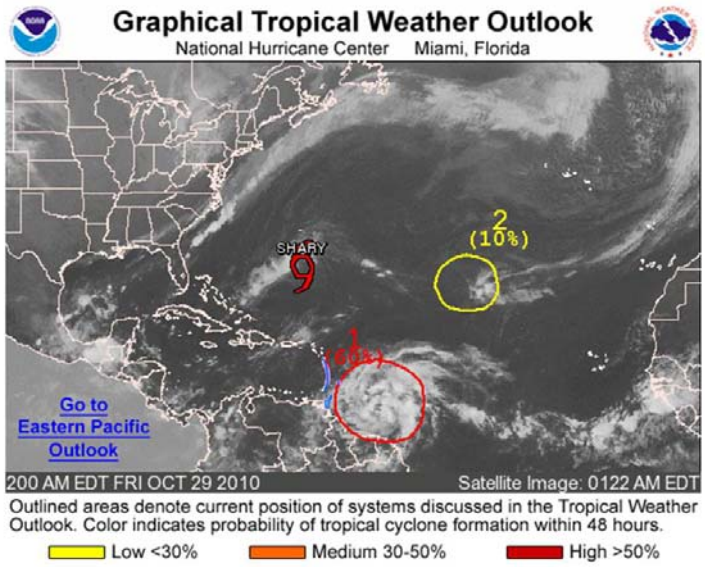
Action | Informational, briefed at 66th IHC and forwarded to RA-IV committee. Item is **CLOSED**.

6	**Title**	**Issuance of watches and warnings before tropical cyclone formation**
	Submitter	NOAA/NWS
	Submitted	19 Jan 2012
	Discussion	Previous NOAA Hurricane Conferences and other discussions established an interest by the NHC and its WFO and international meteorological partners for the capability to issue tropical cyclone watches and warnings for tropical disturbances. For illustrative purposes, the satellite picture below with annotated hypothetical watches/warnings below shows the pre-Tomas (2010) disturbance about 21 hours prior to NHC's first advisory with watches/warnings that could have been in place (see ADDITIONAL INFO below).
	Recommendation	Informational, brief at 66th IHC and forward to RA-IV Committee. Obtain feedback on plan and activities from RA-IV partners.
	Action	Informational, briefed at 66th IHC and forwarded to RA-IV committee. Item will be **CLOSED** once feedback received from RA-IV partners on plan and activities.
	Additional Info	 The parties have not heretofore settled on the product type, content and format for the information. To move toward this capability, the NHC plans to: -Generate experimental, in-house text-only watches/warnings for the coastline for qualifying disturbances in 2012. -Request that the WFO-NHC watch/warning collaboration team take up the issues noted in the supplemental information and examples, and those identified during the experiment. -Report their findings/recommendations at the 2012 NOAA Hurricane Conference. **Supplemental information:** NHC has conducted initial discussions among staff. While subject to change, the NHC informs the Conference of its currents plans: 1. During 2012, generate experimental watches/warnings as if they were to be included in the NHC Tropical Weather Outlook (TWO) product. 2. Decide whether watches are useful. 3. Decide whether the probabilities in the TWO can be used in some way to decide whether and where to place watches. 4. Warnings would be "issued" for the United States coastline only for disturbances where the Tropical Weather Outlook indicates a HIGH (>50%) chance of the system becoming a tropical cyclone during the following 48 hours. Justification: Warnings indicate an expected occurrence, which we interpret as >50%. TWO probabilities provide the chance of a system becoming a tropical cyclone in 48 hours. The chance of it becoming a tropical storm or hurricane (i.e., not just a tropical depression), of it producing tropical storm (or hurricane) force winds in the warned area, and for those conditions to be met within about 36 hours (maximum warning lead time) rather than 48 hours, is less than or equal to the TWO probability. Therefore, the TWO probability must be >50% to satisfy the definition of a warning. NHC would intend to recommend that its international partners employ the same threshold, and will use this threshold for international areas during the experimental stage. a. The >50% probability is considered a threshold for issuing a warning and a consideration for retaining one. If the probability drops to 50% or lower in TWOs following the warning

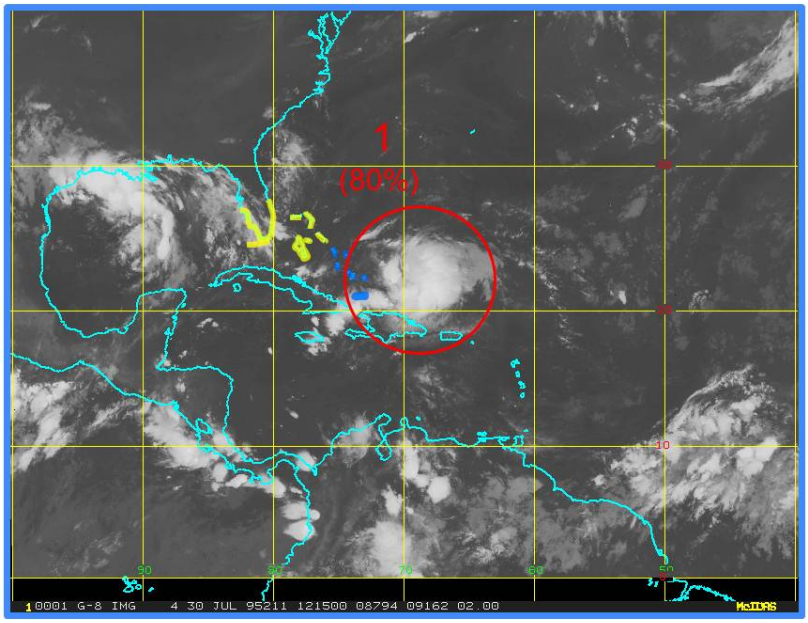
6	**Additional Info (continued)**	issuance, then the warning could be discontinued, changed to a watch or be retained. b. This is consistent with current practice where we don't necessarily drop warnings right away even if the risk has diminished a little, because it might be temporary condition or perception. c. A greater than 50% probability does not require that a warning be issued as, for example, it may be desirable (as is the case of existing tropical cyclones) for the NHC and WFOs to agree to retain a pre-existing gale warning rather than introduce a tropical storm warning. 5. Decide if and how NHC's "provisional forecasts" for disturbances will influence the watches and warnings. 6. Develop a proposed best text content and format. Among the considerations: a. The text would not include track or intensity forecast information beyond what is normally contained in the TWO. b. Use of the format for watches/warnings found in Public Advisories, including reference to the definition of watches/warnings and references to monitoring products from meteorological services. c. Place information about the disturbance(s) with watches/warnings appear(s) first in the TWO. d. Employ standard free text discussion about the relevant disturbance along with a phrase of the form "BECAUSE OF THE POTENTIAL FOR DEVELOPMENT AND THE PROXIMITY OF THE SYSTEM TO LAND…TROPICAL CYCLONE WATCHES AND WARNINGS ARE IN EFFECT FOR THE AREAS IDENTIFIED." e. Contain appropriate brief transition/introduction to the first non-watch/warning disturbance. f. Decide whether to explicitly distinguish (e.g., number) the paragraphs to identify the individual disturbances for the graphics software. g. Determine whether the watch/warning information be placed at the top, in front of the description of the disturbance, or after the description, embedded in the product? Examples of each are provided below. h. Decide whether to leave out "CHANGES" section that is included in the TCP product. Examples, with and without, are provided below. i. Consider whether the watch/warning information should be formatted differently to accommodate the paragraph structure of the TWO (rather than segmented format of the TCP)? An example of a less segmented format is also provided below. j. Decide whether a headline is required or allowable, e.g., "…Tropical storm warnings issued for part of the Lesser Antilles…" **Additional considerations:** 1. Is there a better way to convey the text information than in the TWO? 2. NHC believes an operational text product should be established as early as 2013 even if a companion graphical product(s) and/or TCV are not then available. 3. Decide whether it is appropriate to use tropical cyclone watches/warnings for tropical disturbances (e.g., tropical waves) that could or are expected to produce 34 kt or stronger winds on land, but which are not expected to become a tropical cyclone during the forecast period. 4. Additional technical development activities should be addressed. Decide whether we want to modify NHC's GUI to generate for qualifying tropical disturbances (1) TCV product and (2) vg file for graphical display. Target date for implementation is start of 2013 hurricane season. For (1), determine and introduce appropriate PIL for the TCV, considering as a first choice TCVAT0 and TCVEP0. Address rare potential for multiple disturbances in same TWO requiring watches/warnings. For (2), decide whether to use an enhanced Graphical TWO making use of vg file to show watches/warnings for associated systems where advisories are not being issued, or whether a separate "product" is more appropriate. 5. Determine if rainfall statement from HPC would be required for pre-genesis warnings. **Three examples follow**, the first for a case not threatening the United States, the second for a case threatening both the United States and another RA-IV country, and the third shows a compressed format. **Example 1. Pre-Tomas (2010) disturbance** The NHC issued its first advisory at 2100 UTC 29 October 2010. The following TWO shows how this product could have appeared 21 hours earlier, at 0000 UTC 29 October, with watches and warnings. In this example, the watch/warning information comes first and there is no "CHANGES" section. 000 ABNT20 KNHC 282342 TWOAT TROPICAL WEATHER OUTLOOK NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL 800 PM EDT THU OCT 28 2010 FOR THE NORTH ATLANTIC...CARIBBEAN SEA AND THE GULF OF MEXICO...

6	**Additional Info (continued)**	WATCHES AND WARNINGS ---------- SUMMARY OF WATCHES AND WARNINGS IN EFFECT... A TROPICAL STORM WARNING IS IN EFFECT FOR... * BARBADOS...MARTINIQUE...DOMINICA…ST. LUCIA...ST. VINCENT AND THE GRENADINES...GRENADA...AND TRINIDAD AND TOBAGO A HURRICANE WATCH IS IN EFFECT FOR... * BARBADOS…MARTINIQUE…ST. LUCIA…AND ST. VINCENT AND THE GRENADINES A TROPICAL STORM WARNING MEANS THAT TROPICAL STORM CONDITIONS ARE EXPECTED SOMEWHERE WITHIN THE WARNING AREA...IN THIS CASE WITHIN 24 HOURS. A HURRICANE WATCH MEANS THAT HURRICANE CONDITIONS ARE POSSIBLE WITHIN THE WATCH AREA...IN THIS CASE WITHIN 24 HOURS. FOR STORM INFORMATION SPECIFIC TO YOUR AREA...PLEASE MONITOR PRODUCTS ISSUED BY YOUR NATIONAL METEOROLOGICAL SERVICE. A VIGOROUS TROPICAL WAVE LOCATED OVER THE TROPICAL ATLANTIC ABOUT 725 MILES EAST-SOUTHEAST OF THE WINDWARD ISLANDS IS PRODUCING A LARGE AREA OF SHOWERS AND THUNDERSTORMS. THIS SYSTEM CONTINUES TO SHOW SIGNS OF ORGANIZATION...AND ENVIRONMENTAL CONDITIONS APPEAR TO BE FAVORABLE FOR GRADUAL DEVELOPMENT OF THIS DISTURBANCE DURING THE NEXT COUPLE OF DAYS AS THE SYSTEM IT MOVES WESTWARD OR WEST-NORTHWESTWARD AT 15 TO 20 MPH. THERE IS A HIGH CHANCE...60 PERCENT...OF THIS SYSTEM BECOMING A TROPICAL CYCLONE DURING THE NEXT 48 HOURS. REGARDLESS OF DEVELOPMENT...THIS SYSTEM IS EXPECTED TO BRING LOCALLY HEAVY RAINFALL AND STRONG GUSTY WINDS TO THE WINDWARD ISLANDS... VENEZUELA...AND NORTHERN PORTIONS OF GUYANA DURING THE NEXT COUPLE OF DAYS. BECAUSE OF THE POTENTIAL FOR DEVELOPMENT AND THE PROXIMITY OF THE SYSTEM TO LAND…TROPICAL CYCLONE WATCHES AND WARNINGS ARE IN EFFECT FOR AREAS IDENTIFIED. A SURFACE LOW PRESSURE AREA LOCATED ABOUT 450 MILES SOUTH-SOUTHEAST OF BERMUDA IS MOVING WEST-NORTHWEST AT 20 TO 25 MPH. SHOWERS AND THUNDERSTORMS ASSOCIATED WITH THE LOW CONTINUE TO SHOW SOME SIGNS OF ORGANIZATION...AND THE CIRCULATION APPEARS TO BE GRADUALLY BECOMING BETTER DEFINED. ENVIRONMENTAL CONDITIONS ARE FORECAST TO REMAIN SOMEWHAT CONDUCIVE FOR THE DEVELOPMENT OF A TROPICAL OR SUBTROPICAL DEPRESSION THROUGH FRIDAY...HOWEVER UPPER-LEVEL WINDS ARE EXPECTED TO BECOME LESS FAVORABLE AFTER THAT. THERE IS A HIGH CHANCE...70 PERCENT...OF THIS SYSTEM BECOMING A SUBTROPICAL OR TROPICAL CYCLONE BEFORE IT MERGES WITH A COLD FRONT ON SATURDAY. A LOW PRESSURE SYSTEM IS LOCATED ABOUT 1200 MILES NORTHWEST OF THE NORTHERNMOST CAPE VERDE ISLANDS. ALTHOUGH SHOWER AND THUNDERSTORM ACTIVITY ASSOCIATED WITH THE LOW HAS INCREASED DURING THE PAST FEW HOURS...UPPER-LEVEL WINDS ARE EXPECTED TO BECOME LESS FAVORABLE FOR DEVELOPMENT ON FRIDAY. THERE IS A MEDIUM CHANCE...30 PERCENT...OF THIS SYSTEM BECOMING A TROPICAL CYCLONE DURING THE NEXT 48 HOURS AS IT MOVES SLOWLY WESTWARD. ELSEWHERE...TROPICAL CYCLONE FORMATION IS NOT EXPECTED DURING THE NEXT 48 HOURS. $$ FORECASTER READ

6	**Additional Info (continued)**	Here's how the corresponding GTWO could have looked:



Example 2. Pre-Erin (1995)
The NHC issued its first advisory for Erin at 0330 UTC 31 July 1995 when hurricane hunters closed off a surface circulation center for a system that already had 40 kt surface winds. Tropical storm warnings were issued then for the Bahamas and a tropical storm watch was issued for Florida. Here is how the satellite picture looked about 15 hours earlier, shown with the same watches and warnings if they had then been in effect and with the possible GTWO information annotated. It is easy to extrapolate from this image how a GTWO would have looked.



This is how the TWO could have appeared.
000
ABNT20 KNHC 301142
TWOAT
TROPICAL WEATHER OUTLOOK
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
800 AM EDT SUN JUL 30 1995
FOR THE NORTH ATLANTIC...CARIBBEAN SEA AND THE GULF OF MEXICO...
A LARGE AREA OF DISTURBED WEATHER LOCATED JUST NORTH OF HISPANIOLA IS ASSOCIATED WITH A STRONG TROPICAL WAVE MOVING WESTWARD AT 15 TO 20 MPH.

6	**Additional Info (continued)**	THE SYSTEM IS PRODUCING STRONG THUNDERSTORMS AND SHIPS HAVE REPORTED SQUALLS WITH WINDS TO NEAR 40 MPH. SATELLITE IMAGES OVERNIGHT SUGGEST THAT THIS SYSTEM HAS BECOME A LITTLE BETTER ORGANIZED. CONDITIONS REMAIN FAVORABLE FOR FURTHER DEVELOPMENT. AN AIR FORCE HURRICANE HUNTER PLANE WILL INVESTIGATE THE SYSTEM LATER THIS MORNING TO DETERMINE WHETHER A CLOSED CIRCULATION HAS DEVELOPED. THERE IS AN 80% CHANCE OF THIS SYSTEM BECOMING A TROPICAL CYCLONE DURING THE NEXT DAY OR TWO. BECAUSE OF THE POTENTIAL FOR DEVELOPMENT AND THE PROXIMITY OF THE SYSTEM TO LAND…TROPICAL CYCLONE WATCHES AND WARNINGS ARE IN EFFECT FOR THE AREAS IDENTIFIED. WATCHES AND WARNINGS ---------- CHANGES WITH THIS OUTLOOK... THE GOVERNMENT OF THE BAHAMAS HAS ISSUED A TROPICAL STORM WARNING FOR THE CENTRAL AND SOUTHEAST BAHAMAS…AND A TROPICAL STORM WATCH FOR THE NORTHWEST BAHAMAS. A TROPICAL STORM WATCH HAS BEEN ISSUED FOR THE FLORIDA EAST COAST SOUTHWARD FROM SESBASTIAN INLET THROUGH THE FLORIDA KEYS INCLUDING DRY TORTUGAS AND FLORIDA BAY…ANDFOR THE FLORIDA WEST COAST SOUTHWARD FROM VENICE. SUMMARY OF WATCHES AND WARNINGS IN EFFECT... A TROPICAL STORM WARNING IS IN EFFECT FOR... * SOUTHEASTERN AND CENTRAL BAHAMAS A TROPICAL STORM WATCH IS IN EFFECT FOR... * NORTHWEST BAHAMAS…FLORIDA EAST COAST SOUTH OF SEBASTIAN INLET…FLORIDA KEYS…FLORIDA BAY…AND THE FLORIDA WEST COAST SOUTHWARD FROM VENICE. A TROPICAL STORM WARNING MEANS THAT TROPICAL STORM CONDITIONS ARE EXPECTED SOMEWHERE WITHIN THE WARNING AREA...IN THIS CASE WITHIN 24 HOURS. A TROPICAL STORM WATCH MEANS THAT TROPICAL STORM CONDITIONS ARE POSSIBLE WITHIN THE WATCH AREA WITHIN 48 HOURS. FOR STORM INFORMATION SPECIFIC TO YOUR AREA IN THE UNITED STATES...INCLUDING POSSIBLE INLAND WATCHES AND WARNINGS...PLEASE MONITOR PRODUCTS ISSUED BY YOUR LOCAL NATIONAL WEATHER SERVICE FORECAST OFFICE. FOR STORM INFORMATION SPECIFIC TO YOUR AREA OUTSIDE THE UNITED STATES...PLEASE MONITOR PRODUCTS ISSUED BY YOUR NATIONAL METEOROLOGICAL SERVICE. A DISTURBANCE IN THE NORTHERN GULF OF MEXICO… ELSEWHERE...TROPICAL CYCLONE FORMATION IS NOT EXPECTED DURING THE NEXT 48 HOURS. $$ FORECASTER PASCH **Example 3. Compressed format, with alternate use of "Elsewhere" wording** ABNT20 KNHC 282342 TWOAT TROPICAL WEATHER OUTLOOK NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL 800 PM EDT THU OCT 28 2010 FOR THE NORTH ATLANTIC...CARIBBEAN SEA AND THE GULF OF MEXICO... ...WATCHES AND WARNINGS CONTINUE FOR TROPICAL WAVE APPROACHING THE LESSER ANTILLES... A VIGOROUS TROPICAL WAVE LOCATED OVER THE TROPICAL ATLANTIC ABOUT 725 MILES EAST-SOUTHEAST OF THE WINDWARD ISLANDS IS PRODUCING A LARGE AREA OF SHOWERS AND THUNDERSTORMS. THIS SYSTEM CONTINUES TO SHOW SIGNS OF ORGANIZATION...AND ENVIRONMENTAL CONDITIONS ARE FAVORABLE FOR DEVELOPMENT OF THIS DISTURBANCE DURING THE NEXT COUPLE OF DAYS AS THE SYSTEM MOVES WESTWARD OR WEST-NORTHWESTWARD AT 15 TO 20 MPH. THIS SYSTEM HAS A MEDIUM CHANCE...50 PERCENT...OF BECOMING A TROPICAL CYCLONE DURING THE NEXT 48 HOURS. REGARDLESS OF DEVELOPMENT...THIS SYSTEM IS EXPECTED TO BRING LOCALLY HEAVY RAINFALL AND STRONG GUSTY WINDS TO THE WINDWARD ISLANDS...VENEZUELA...AND NORTHERN PORTIONS OF GUYANA DURING THE NEXT COUPLE OF DAYS. BECAUSE OF THE POTENTIAL FOR DEVELOPMENT AND THE PROXIMITY OF THE SYSTEM TO LAND...TROPICAL CYCLONE WATCHES AND WARNINGS ARE IN EFFECT FOR THE FOLLOWING AREAS AS FOLLOWS... A TROPICAL STORM WARNING IS IN EFFECT FOR...

6	**Additional Info (continued)**	* BARBADOS...MARTINIQUE...DOMINICA...ST. LUCIA...ST. VINCENT AND THE GRENADINES...GRENADA...AND TRINIDAD AND TOBAGO A HURRICANE WATCH IS IN EFFECT FOR... * BARBADOS...MARTINIQUE...ST. LUCIA...AND ST. VINCENT AND THE GRENADINES A TROPICAL STORM WARNING MEANS THAT TROPICAL STORM CONDITIONS ARE EXPECTED SOMEWHERE WITHIN THE WARNING AREA...IN THIS CASE WITHIN 24 HOURS. A HURRICANE WATCH MEANS THAT HURRICANE CONDITIONS ARE POSSIBLE WITHIN THE WATCH AREA...IN THIS CASE WITHIN 24 HOURS. FOR STORM INFORMATION SPECIFIC TO YOUR AREA...PLEASE MONITOR PRODUCTS ISSUED BY YOUR NATIONAL METEOROLOGICAL SERVICE. ELSEWHERE IN THE ATLANTIC BASIN...A SURFACE LOW PRESSURE AREA LOCATED ABOUT 450 MILES SOUTH-SOUTHEAST OF BERMUDA IS MOVING WEST-NORTHWEST AT 20 TO 25 MPH. SHOWERS AND THUNDERSTORMS ASSOCIATED WITH THE LOW CONTINUE TO SHOW SOME SIGNS OF ORGANIZATION...AND THE CIRCULATION APPEARS TO BE GRADUALLY BECOMING BETTER DEFINED. ENVIRONMENTAL CONDITIONS ARE FORECAST TO REMAIN SOMEWHAT CONDUCIVE FOR THE DEVELOPMENT OF A TROPICAL OR SUBTROPICAL DEPRESSION THROUGH FRIDAY...HOWEVER UPPER-LEVEL WINDS ARE EXPECTED TO BECOME LESS FAVORABLE AFTER THAT. THIS SYSTEM HAS A HIGH CHANCE...70 PERCENT...OF BECOMING A SUBTROPICAL OR TROPICAL CYCLONE BEFORE IT MERGES WITH A COLD FRONT ON SATURDAY. A LOW PRESSURE SYSTEM IS LOCATED ABOUT 1200 MILES NORTHWEST OF THE NORTHERNMOST CAPE VERDE ISLANDS. ALTHOUGH SHOWER AND THUNDERSTORM ACTIVITY ASSOCIATED WITH THE LOW HAS INCREASED DURING THE PAST FEW HOURS...UPPER-LEVEL WINDS ARE EXPECTED TO BECOME LESS FAVORABLE FOR DEVELOPMENT ON FRIDAY. THIS SYSTEM HAS A MEDIUM CHANCE...30 PERCENT...OF BECOMING A TROPICAL CYCLONE DURING THE NEXT 48 HOURS AS IT MOVES SLOWLY WESTWARD. THERE ARE NO OTHER DISTURBANCES THAT POSE A THREAT OF TROPICAL CYCLONE FORMATION DURING THE NEXT 48 HOURS. $$ FORECASTER READ
7	**Title**	**Modify the placement of "Additional Header Information" in TWO products**
	Submitter	NOAA/NWS
	Submitted	19 Jan 2012
	Discussion	When advisories are issued, additional information is added to the TWOAT product which includes WMO and AWIPS header dissemination information (see example 1). This added information is typically not aired on WFO-driven NOAA Weather Radio (NWR). When AWIPS receives and relays the TWOAT product to the NWR software interface (NWRWaves), all information within the body of the TWOAT product, including unintended WMO and AWIPS header information, is automatically aired to listeners, in an unintelligent, garbled manner. Subsequently, the WFO must manually edit and remove the WMO and AWIPS header information prior to transmission on NWR in order to ensure only the most concise and pertinent information is aired to listeners (see ADDITIONAL INFO below).
	Recommendation	Informational, OS21 will issue a National Service Change Notice. Informational and IHC to forward to RA-IV and RA-V Committees.
	Action	Informational, briefed at 66th IHC and forwarded to RA-IV and RA-V committees. Item is **CLOSED**.
	Additional Info	**Example 1:** ABNT20 KNHC 081755 TWOAT TROPICAL WEATHER OUTLOOK NWS NATIONAL HURRICANE CENTER MIAMI FL 200 PM EDT SAT OCT 8 2011 FOR THE NORTH ATLANTIC...CARIBBEAN SEA AND THE GULF OF MEXICO... THE NATIONAL HURRICANE CENTER IS ISSUING ADVISORIES ON TROPICAL STORM PHILIPPE...LOCATED ABOUT 1215 MILES WEST OF THE AZORES.

7	**Additional Info (continued)**	A SURFACE TROUGH LOCATED FROM THE EXTREME NORTHWESTERN CARIBBEAN SEA ACROSS CENTRAL CUBA AND INTO THE CENTRAL BAHAMAS IS PRODUCING WIDESPREAD CLOUDINESS AND THUNDERSTORMS OVER MUCH OF CENTRAL AND EASTERN CUBA...MOST OF THE FLORIDA PENINSULA AND THE FLORIDA KEYS...ALL OF THE BAHAMAS...AND ADJACENT ATLANTIC WATERS. THE TROUGH HAS BECOME A LITTLE BETTER DEFINED AND SURFACE PRESSURES ARE SLOWLY FALLING. GRADUAL DEVELOPMENT OF THIS LARGE AREA OF DISTURBED WEATHER IS POSSIBLE OVER THE NEXT FEW DAYS AS IT MOVES WESTWARD OR NORTHWESTWARD AT 5 TO 10 MPH. THIS SYSTEM HAS A MEDIUM CHANCE...30 PERCENT...OF BECOMING A TROPICAL OR SUBTROPICAL CYCLONE DURING THE NEXT 48 HOURS. REGARDLESS OF DEVELOPMENT...THIS DISTURBANCE WILL PRODUCE STRONG GUSTY WINDS AND LOCALLY HEAVY RAINFALL ACROSS PORTIONS OF THE BAHAMAS AND THE FLORIDA PENINSULA OVER THE NEXT COUPLE OF DAYS. **ADDITIONAL INFORMATION ON THIS DEVELOPING GALE AREA CAN BE FOUND IN HIGH SEAS FORECASTS ISSUED BY THE NATIONAL WEATHER SERVICE...UNDER AWIPS HEADER NFDHSFAT1 AND WMO HEADER FZNT01 KWBC.** ELSEWHERE...TROPICAL CYCLONE FORMATION IS NOT EXPECTED DURING THE NEXT 48 HOURS. $$ FORECASTER STEWART NWR software (NWRWaves) has functionality which allows automatic truncation of information not intended for NWR broadcast. The double ampersand (&&) is the code NWRWaves recognizes to invoke this functionality. The && may be used (one or more times) to separate differing kinds of information (e.g. narrative text, data) within the content block of a non-segmented, non-VTEC product, such as the TWOAT. Moving the additional header information in the TWOAT product below the && (see examples 2-4 below) would afford the following benefits: 1) Mitigate the needed for inefficient WFO manual editing of the TWOAT product required to prevent unintended text and numerical information from being aired on NWR. 2) Provide a consistent, standardized and accepted dissemination protocol for private sector vendors to more effectively parse and distribute information to their customers. **Example 2:** ZCZC MIATWOAT ALL TTAA00 KNHC DDHHMM TROPICAL WEATHER OUTLOOK NWS NATIONAL HURRICANE CENTER MIAMI FL 800 AM EDT MON JUL 18 2011 FOR THE NORTH ATLANTIC...CARIBBEAN SEA AND THE GULF OF MEXICO... THE NATIONAL HURRICANE CENTER IS ISSUING ADVISORIES ON TROPICAL STORM BRET...LOCATED ABOUT 65 MILES NORTH-NORTHWEST OF GREAT ABACO ISLAND IN THE NORTHWEST BAHAMAS. ELSEWHERE...TROPICAL CYCLONE FORMATION IS NOT EXPECTED DURING THE NEXT 48 HOURS. **&&** **PUBLIC ADVISORIES ON BRET ARE ISSUED UNDER WMO HEADER WTNT32 KNHC AND UNDER AWIPS HEADER MIATCPAT2. FORECAST/ADVISORIES ARE ISSUED UNDER WMO HEADER WTNT22 KNHC AND UNDER AWIPS HEADER MIATCMAT2.** **$$** FORECASTER PASCH NNNN

7	**Additional Info (continued)**	**Example 3:** ABNT20 KNHC 081755 TWOAT TROPICAL WEATHER OUTLOOK NWS NATIONAL HURRICANE CENTER MIAMI FL 200 PM EDT SAT OCT 8 2011 FOR THE NORTH ATLANTIC...CARIBBEAN SEA AND THE GULF OF MEXICO... THE NATIONAL HURRICANE CENTER IS ISSUING ADVISORIES ON TROPICAL STORM PHILIPPE...LOCATED ABOUT 1215 MILES WEST OF THE AZORES. A SURFACE TROUGH LOCATED FROM THE EXTREME NORTHWESTERN CARIBBEAN SEA ACROSS CENTRAL CUBA AND INTO THE CENTRAL BAHAMAS IS PRODUCING WIDESPREAD CLOUDINESS AND THUNDERSTORMS OVER MUCH OF CENTRAL AND EASTERN CUBA...MOST OF THE FLORIDA PENINSULA AND THE FLORIDA KEYS...ALL OF THE BAHAMAS...AND ADJACENT ATLANTIC WATERS. THE TROUGH HAS BECOME A LITTLE BETTER DEFINED AND SURFACE PRESSURES ARE SLOWLY FALLING. GRADUAL DEVELOPMENT OF THIS LARGE AREA OF DISTURBED WEATHER IS POSSIBLE OVER THE NEXT FEW DAYS AS IT MOVES WESTWARD OR NORTHWESTWARD AT 5 TO 10 MPH. THIS SYSTEM HAS A MEDIUM CHANCE...30 PERCENT...OF BECOMING A TROPICAL OR SUBTROPICAL CYCLONE DURING THE NEXT 48 HOURS. REGARDLESS OF DEVELOPMENT...THIS DISTURBANCE WILL PRODUCE STRONG GUSTY WINDS AND LOCALLY HEAVY RAINFALL ACROSS PORTIONS OF THE BAHAMAS AND THE FLORIDA PENINSULA OVER THE NEXT COUPLE OF DAYS. **ADDITIONAL INFORMATION ON THIS DEVELOPING GALE AREA CAN BE FOUND IN HIGH SEAS FORECASTS ISSUED BY THE NATIONAL WEATHER SERVICE.** ELSEWHERE...TROPICAL CYCLONE FORMATION IS NOT EXPECTED DURING THE NEXT 48 HOURS. **&&** **HIGH SEAS FORECASTS ISSUED BY THE NATIONAL WEATHER SERVICE CAN BE FOUND** **UNDER AWIPS HEADER NFDHSFAT1 AND WMO HEADER FZNT01 KWBC.** $$ FORECASTER STEWART **Example 4:** ZCZC MIATWOAT ALL TTAA00 KNHC DDHHMM TROPICAL WEATHER OUTLOOK NWS NATIONAL HURRICANE CENTER MIAMI FL 100 PM EST MON NOV 7 2011 FOR THE NORTH ATLANTIC...CARIBBEAN SEA AND THE GULF OF MEXICO... A NON-TROPICAL LOW PRESSURE SYSTEM LOCATED ABOUT 425 MILES SOUTHWEST OF AZORES ISLANDS CONTINUES TO PRODUCE GALE FORCE WINDS OVER AN AREA EXTENDING SEVERAL HUNDRED MILES TO THE NORTH OF THE CENTER. THE ASSOCIATED SHOWERS AND THUNDERSTORMS CONTINUE TO SHOW SIGNS OF ORGANIZATION...AND THE LOW COULD ACQUIRE SUBTROPICAL CHARACTERISTICS TONIGHT OR ON TUESDAY. THIS SYSTEM HAS A HIGH CHANCE...60 PERCENT...OF BECOMING A SUBTROPICAL CYCLONE DURING THE NEXT 48 HOURS AS IT MOVES SLOWLY WESTWARD TODAY AND NORTHWESTWARD ON TUESDAY. **ADDITIONAL INFORMATION ON THIS LOW PRESSURE AREA CAN BE FOUND IN HIGH SEAS FORECASTS ISSUED BY THE METEO FRANCE MET OFFICE.** ELSEWHERE...TROPICAL CYCLONE FORMATION IS NOT EXPECTED DURING THE NEXT 48 HOURS. && **HIGH SEAS FORECASTS ISSUED BY THE METEO FRANCE MET OFFICE CAN BE FOUND UNDER WMO HEADER FQNT50 LFPW.** $$ FORECASTER PASCH NNNN

8	**Title**	**Revise the wording for overall tropical cyclone MAX WIND location in the Remarks Section of the VORTEX message for the 2012 season (see Item 21 from 65th IHC below)**
	Submitter	NOAA/AOC – A. Barry Damiano
	Submitted	19 Jan 2012
	Discussion	The 2011 Interdepartmental Hurricane Conference approved an action item to provide the bearing and range (rather than the quadrant) when reporting maximum winds in the Remarks section of the Vortex Data Message. The old and new formats are as listed below in ADDITIONAL INFO.
	Recommendation	A National Service Change Notice will be issued. Amend NHOP for 2012. Forward to RA-IV and RA-V committees.
	Action	Item remains **OPEN**. AF and NOAA agreed to keep item open until the 53 WRS is able to make software adjustments; implementation delayed until 2013.
	Additional Info	Old format: MAX FLT LVL WIND 77 KTS N QUAD 1234Z MAX OUTBOUND FLT LVL WIND 77 KTS N QUAD 1234Z MAX OUTBOUND AND MAX FLT LVL WIND 77 KTS N QUAD 1234Z New format: MAX FLT LVL WIND 77 KTS 357/12 1234Z MAX OUTBOUND FLT LVL WIND 77 KTS 357/12 1234Z MAX OUTBOUND AND MAX FLT LVL WIND 77 KTS 357/12 1234Z In addition, via subsequent discussions NHC, AOC, and the 53WRS agreed that the reference to "any portion of the storm" in NHOP Table 5-2 Item P, will refer to an octant (i.e., 337.5-22.5 degrees, 22.5-67.5 degrees, etc.). Table 5-2 will require a wording change to reflect this.
9	**Title**	**Minor modification of Saffir-Simpson Hurricane Wind Scale**
	Submitter	NOAA/NWS
	Submitted	19 Jan 2012
	Discussion	This item proposes a minor change to the Saffir-Simpson Hurricane Wind Scale in order to Resolve awkwardness associated with conversions among the various units used for wind speed. Currently, Category 4 is defined to be 131-155 mph (~114-135 kt and ~210-249 km/h). The proposal broadens the Category 4 wind speed range by one mph at each end of the range, giving a new range of 130-156 mph (~113-136 kt, ~209-251 km/h). *Because NHC assigns intensity using 5-kt increments, neither storms in the historical record nor any future storms would have their SSHWS category changed as a result of this adjustment.* NHC's assigned intensities in 5-kt increments are converted to other units in advisory products, and the converted intensities are also rounded to the nearest 5 mph or 5 km/h. However, the current Category 4 range is problematic when a hurricane's intensity is 115 kt (132.3 mph). Although 115 kt falls within the Category 4 range, the equivalent wind speed in miles per hour rounds to 130 mph, which falls in the Category 3 range. In order to show the hurricane as Category 4 in both sets of units, NHC must incorrectly convert 115 kt to 135 mph in its advisory products. A similar problem occurs at the current category 4/5 boundary when 135 kt is converted to km/h. Changing the Category 4 range to 130-156 mph (113-136 kt, 209-251) km/h would allow all unit conversions from knots to be done correctly in advisory products and keep storms in the correct category regardless of the units used. NHC conducted a web survey on this proposed change early this summer, and received 381 responses. Of these, 76% were in favor, and 14% were opposed. Ten percent of the respondents did not directly address the survey question.

9	**Recommendation**	Adjust the SSHWS as shown below (changes highlighted in yellow). OS21 to issue a National Service Change Notice. An explanation will be provided on the NHC web page. The online (national) tropical cyclone brochure will be amended. Category — Existing range — Proposed range 1: 74-95 mph / 64-82 kt / 119-153 km/h — 74-95 mph / 64-82 kt / 119-153 km/h 2: 96-110 mph / 83-95 kt / 154-177 km/hr — 96-110 mph / 83-95 kt / 154-177 km/h 3: 111-130 mph / 96-113 kt / 178-209 km/h — 111-129 mph / 96-112 kt / 178-208 km/h 4: 131-155 mph / 114-135 kt / 210-249 km/h — 130-156 mph / 113-136 kt / 209-251 km/h 5: 156 mph or higher / 136 kt or higher / 250 km/h or higher — 157 mph or higher / 137 kt or higher / 252 km/h or higher Informational: IHC to forward decision to RA-IV and RA-V Committees.
	Action	Informational, briefed at 66th IHC and forwarded to RA-IV and RA-V committees. Item is **CLOSED**. No action required for 2012 NHOP since current document links to NOAA's SSHWS web pages, of which these changes will be reflected.
10	**Title**	**Update definition of subtropical cyclone**
	Submitter	NOAA/NWS
	Submitted	19 Jan 2012
	Discussion	The current definition of subtropical cyclone is too vague. It defines a subtropical cyclone as having characteristics of both tropical and extratropical cyclones, but doesn't indicate what those specific defining characteristics are. Adding specificity to the definition would promote greater consistency among forecasters in its application, and promote better understanding with users. Adopt the following definition for subtropical cyclone: A non-frontal low-pressure system that has characteristics of both tropical and extratropical cyclones. Like tropical cyclones, they are non-frontal, synoptic-scale cyclones that originate over tropical or subtropical waters, and have a closed surface wind circulation about a well-defined center. In addition, they have organized moderate to deep convection, but lack a central dense overcast. Unlike tropical cyclones, subtropical cyclones derive a significant proportion of their energy from baroclinic sources, and are generally cold-core in the upper troposphere, often being associated with an upper-level low or trough. In comparison to tropical cyclones, these systems generally have a radius of maximum winds occurring relatively far from the center (usually greater than 60 n mi), and generally have a less symmetric wind field and distribution of convection.
	Recommendation	NWS Directive and NHC website glossary will be updated. Amend definition in the NHOP Glossary. IHC to forward decision to RA-IV and RA-V Committees.
	Action	Accepted recommendation and forwarded to RA-IV and RA-V committees. Item will be **CLOSED** once 2012 NHOP is updated.

11	**Title** **Submitter** **Submitted**	**Use of the "EYE" Remark in TEMP DROP Code** 53 WRS (AFRC) 31 Jan 2012
	Discussion	Some dropsonde operators use the word "EYE" in remarks of all sondes released in the center of a cyclone. Since there are often multiple sondes released in and around a storm, "EYE" flags *this* is the sonde dropped in the center, and not intended to indicate the storm has an actual eye. Other flight meteorologists have pointed to the definition of "EYE" used for the Vortex message (must have at least 50% of an eyewall), and do not use the EYE remark on the sonde unless the storm meets that criterion. An alternative is to create a standard remark, "CENTER" or "CTR" in the Aspen and AVAPS programs. Although the software change is relatively simple, it would require that OS21 would have to issue a Software Change Notice (SCN), and we do not have the desired 120-day lead time for this, according to Timothy Schott (NOAA). If the community wants to add a "CENTER" remark as an option, this should be proposed now for implementation in 2013. James Franklin (NHC) requested we use the word "EYE" for all center drops in the meantime (or forever, if no one objects to using "EYE" on a tropical depression/tropical storm dropsonde). Since "EYE" already exists as a standard remark, no change to the software or WMO code is required to continue using EYE this way, merely clarification and standardization of the use of the word.
	Recommendation	**Change para 5.8.1.2. Vortex fix data.** …. Center dropsonde data will also be provided for scheduled fixes made at 850 hPa or above. The dropsonde will be released at the flight-level center coordinates (item BRAVO of the vortex data message), *and may be marked with the word "EYE" in the 62626 section of the TEMP DROP code, for all tropical cyclones regardless of whether an actual eye exists.* **Appendix N, Glossary, Pg N-3** **Eye**. The relatively calm center of the tropical cyclone that is more than one half surrounded by wall cloud. *Note: when used in the remarks of a TEMP DROP message, it only means the sonde was released in the center of a tropical cyclone, regardless of whether an actual eye exists.* *For 2013, remove the above changes, and add:* **Appendix G TEMP DROP CODES** Identifier: **62626** – This is the remarks section. Only the remarks EYE, CENTER, EYEWALL XXX, MXWNDBND, or RAINBAND will be used.
	Action	This item remains **OPEN**. At this time, there will be no changes to the 2012 NHOP. NOAA and the 53 WRS determined at the NOAA Dropsonde User Group meeting (Apr 2012) that the term "center" is the appropriate term to use. In order to ensure that there is enough time to conduct software changes as well as the desired 120-day lead time for the issuance of the Software Change Notice (SCN), the above proposal is tabled and will be addressed next year for changes to the 2013 NHOP.
12	**Title**	**Coding Banded Eyes on the VDM**
	Submitter	53 WRS (AFRC)
	Submitted	31 Jan 2012
	Discussion	The standard format for coding a radar eye on the Vortex Data Message (VDM) allows for three choices: "Circular", "Elliptical", and "Concentric" eyes, along with the diameter of the eye. This assumes the classic, donut-shaped eyewall. However, a spiral-shaped, banding eye is relatively common, and difficult to describe under the existing choices. Would the Hurricane Specialists find it useful to describe the eye as "SPIRAL BAND" or "BANDING EYE" in part LIMA of the VDM, in place of the words "CLOSED WALL" or "OPEN XX"?
	Recommendation	Change **Table 5-2, Item L (Lima).** Only report if at least 50 percent of the center has an eyewall, otherwise enter NA. Closed wall--if the center has 100 percent coverage with no eyewall weakness. Open XX--if the center has 50 percent or more but less than 100 percent coverage. State the direction of the eyewall weakness. *Spiral Band—Report Item Juliet with the best approximation of the shape/diameter of the inner core.*
	Action	Accepted recommendation for 2012 NHOP. NHOP will be updated but this item will remain **OPEN** for the following: 1. AFRC to explore and report on options and plans to deliver to NOAA graphic imagery when flight concludes. 2. Long term plan is to assemble representatives of relevant organizations to define requirements for NOAA and AF aircraft, discuss next steps, review results, and make recommendation to include incorporating these changes into future NHOPs (AFRC, AOC, NWS). 3. OFCM explores funding opportunities. (Updated on Apr 30, 2012 - no short-term funding available.)

13	**Title**	**DoD, Joint Staff (JS) Requests NHOP Coordination with Office of Secretary of Defense (OSD)**
	Submitter	DoD, Joint Staff (JS), J4, Distribution Division (Larry Kinder, 703-571-9891 (DSN 671-9891), KinderL@js.pentagon.mil)
	Submitted	17 Jan 2012
	Discussion	Request NHOP be vetted through the Office of the Secretary of Defense (OSD) to allow validation of recommended changes. It is important that the interagency operations plan reflect current authorities and guidance.
	Recommendation	Include OSD in future annual NHOP coordination.
	Action	Item **DEFFERED**; further coordination is required with Joint Staff.
14	**Title**	**Issuance Of Invitational Travel Orders (ITO)**
	Submitter	DoD, Joint Staff (JS), J4, Distribution Division (Larry Kinder, 703-571-9891 (DSN 671-9891), KinderL@js.pentagon.mil)
	Submitted	17 Jan 2012
	Discussion	Based on review of 2011 NHOP, recommend paragraph 2.5.4 be replaced with the edited version below. Unable to find standing authority for AFRC to provide non-reimbursable transportation. In the MOA, appendix F of the NHOP, the authority cited is with DOC, which appears to make this a DOC mission. Additionally, Joint Federal Travel Regulations don't support the issuance of ITO to U.S. government employees. **Current NHOP Wording** **2.5.4.** The synergy created by all participants traveling together on the 53rd WRS WC-130 aircraft is essential to efficiently accomplishing the overall objectives of the mission while exercising fiscal responsibility. AFRC will fly the mission and issue invitational travel orders (ITO) on a noninterference, non-reimbursable basis for: the Director of the National Hurricane Center (NHC) of the National Weather Service (NWS) National Oceanic and Atmospheric Administration (NOAA), U.S. Department of Commerce (DOC); the NHC Hurricane Warning Program staff, NWS staff, other U.S. officials, and the media.
	Recommendation	**Recommended NHOP Wording** **2.5.4.** The synergy created by all participants traveling together on the 53rd WRS WC-130 aircraft is essential to efficiently accomplishing the overall objectives of the mission while exercising fiscal responsibility. AFRC may support the mission on a reimbursable, non-interference basis for: U.S. Department of Commerce (DOC) and National Oceanic and Atmospheric Administration (NOAA) staff, and other U.S. officials as appropriate. Media support may be provided within appropriate public affairs guidelines.
	Action	Item **DEFFERED**; further coordination is required with Joint Staff.
15	**Title**	**NHOP Administrative Changes (Chapter 5 - Aircraft Reconnaissance, Appendix I –Telephone Listing, and Appendix L – Mission Coordination Sheet)**
	Submitter	WG/HWSOR Executive Secretary on Behalf of the FAA, 53rd WRS, and NOAA AOC
	Submitted	17 Jan 2012
	Discussion	Last year an extensive rewrite on chapter 5 was completed, but multiple administrative changes still remain.
	Recommendation	Appropriate representatives conduct a two day sidebar at the 66th IHC to review and update of chapter 5, appendix I, and appendix L using "Track Changes."
	Action	A small team consisting of representatives of NOAA AOC, FAA, and 53rd WRS met at the 66th IHC from March 6-7, 2012. A revision of chapter 5, appendix I, and appendix L was handed to the WG/HWSOR Executive Secretary (see attachment). Changes will be incorporated into the NHOP. Item will be **CLOSED** once 2012 NHOP is updated. (Note for the 2012 NHOP, per the attachment, paragraphs 5.5.4. to 5.5.5.3.4. were removed from chapter 5 and used to create a new chapter, chapter 6. As a result, the contents of chapters 6-10 in the 2011 NHOP were moved to chapters 7-11 in the 2012 NHOP, respectively.)

16	**Title**	**Request 53 WRS Mission Support for Eastward Expansion of Tropical Cyclone Reconnaissance to 52.5W**
	Submitter	NOAA/NWS
	Discussion	By prior agreement among the WMO RA-IV, NHC, the 53WRS, and AOC, the eastern boundary to initiate tropical cyclone reconnaissance has been moved, requiring a modification to the NHOP, page 5-9, paragraph 5.5.1.3.1. Change the eastern boundary of Atlantic reconnaissance fix requests from 55°W to 52.5°W. This change is consistent with the recent change to extend the watch and warning lead times. Surveillance missions conducted by NOAA/AOC and the 53WRS are intended to provide environmental data to the numerical guidance and to NHC forecasters in time to influence the watch/warning decision process for potential land-falling hurricanes. The 12-h increases in lead time associated with the new watch/warning definitions mean that surveillance missions will generally need to be tasked 12 h earlier than in previous years. A tasking for a mission takeoff for the following afternoon can be expected when the storm at 1200 UTC is within about 102 h of projected landfall. This timeline gets the mission data into the models that the forecaster sees roughly 42 h later, or 60 h prior to landfall. While this is a general guideline, actual requests for surveillance flights in any particular situation may occur either earlier or later than this, as conditions warrant. Change NHOP, page 5-9, paragraph 5.5.1.3.1 as indicated above.
	Recommendation	Two actions resulted from discussions: • NHC will use climatological data to estimate the average annual additional support that would be levied on the 53rd WRS to support the Atlantic reconnaissance fix requests if the eastern boundary moved from 55°W to 52.5°W. Forward the information as follows: TO: Col Brian "Bear" Kraemer (22 AF A5A8) (Brian.Kraemer@dobbins.af.mil) CC: Lt Col Rob Stanton (403 OG/CD) (Robert.Stanton@keesler.af.mil) Mark Welshinger (OFCM) (Mark.Welshinger@noaa.gov) • Col Kraemer will forward the information provided by NHC to Higher Headquarters to determine if moving the eastern boundary from 55°W to 52.5°W is supportable.
	Status (03/22/2010)	NHC forwarded the climatological data to Col Kraemer and the other addressees on 3/15/2010.
	Status (01/18/2011)	AFRC to elevate for high-level decision; AFRC will support for 2011 hurricane season, resources permitting.
	Status (11/18/2011)	Lt Col Pierce (53rd WRS/DO) will pick up where Col Kraemer left off and elevate request for high-level decision. Until official approval can be coordinated, Lt Col Pierce mentioned that AFRC has agreed to extend support of the 53rd WRS supporting the eastern boundary movement through the 2012 hurricane season (resources permitting). Therefore, in regards to this issue, the NHOP remains unchanged.
	Action	At the 66th IHC, the 403 WG/CC, 403 OG/CC, and the 53 WRS/DO agreed that the 2012 NHOP would reflect the 53 WRS supporting the eastward boundary movement (from 55W to 52.5 W), as long as resources are permitting. This action **CLOSES the 64th IHC action item #10,** once the 2012 NHOP is updated. However, this **action item (66th IHC AI#16) was OPENED** in order to initiate actions needed to eliminate the explicit reference to resources. It was suggested that the NHC draft a formal request, for these resources, to be sent from the Director of the NWS to the USTRANSCOM J3 and AFRC.

OLD ACTION ITEMS: FROM 65th IHC (2011)		
2	**Title**	**Reconnaissance Support for Development of In-Situ Ocean Data Base for use in Initializing/Validating Navy and NOAA Operational Air-Sea Coupled Tropical Cyclone Prediction Models**
	Submitter	Peter Black, Naval Research Lab, Marine Meteorology Division and SAIC, Inc.
	Discussion	Overcoming earlier restrictions in obtaining ocean thermal structure data via AXBT deployment, NRL has developed a Mobile Ocean Observing System (MOOS) consisting of two portable processing-receiving-recording units for use on WC-130J reconnaissance aircraft and demonstrated the capability for real-time processing and transmission of ocean thermal profiles, accomplishing data ingest into Navy TC and ocean prediction models. A supply of several thousand de-mil'd AXBT probes has been identified for future use at minimal cost for shipping and fumigation. Deployment of 1,000 of these probes over 2 years has demonstrated an overall 92% success rate. Over 100 additional AXBTs were deployed from operational reconnaissance flights in 2011 with similar results. The capability to transmit AXBT data in real time for real-time QC and assimilation into COAMPS-TC was successfully demonstrated. In 2012, the Navy coupled COAMPS-TC model, in addition to NOAA coupled models, will be run operationally, requiring ocean as well as atmospheric data inputs for initialization and validation.
	Recommendation	53rd WRS is requested to support Navy TC coupled operational numerical model forecast development by deploying AXBT data during operational TC missions tasked by the National Hurricane Center on a not-to-interfere basis with normal reconnaissance operations for a minimum of two additional seasons on a trial basis. AFRC is requested to support crew augmentation by one addition loadmaster with dropsonde and AXBT deployment training. NOAA/NCEP/EMC is planning on operational implementation of their regional hurricane model (HWRF) coupled to HYCOM for the 2012 hurricane season. This coupled modeling system has advanced real-time ocean DA capabilities within the system. EMC and NRL are designing a work plan in collaboration with AOML and RSMAS to demonstrate impact of assimilating AXBT datasets (collected during past TC research missions and potential future deployment of AXBTs using operational and research flights of opportunity from both WC-130J and WP-3D aircraft) on hurricane intensity forecasts using their respective coupled models. NRL will work with the 53rd WRS to refine WC-130J AXBT launch and data acquisition procedures for use on requested hurricane reco flights on a not-to-interfere basis with routine mission requirements.
	Status (1/16/2012)	The first year of the hurricane ABXT demo project mandated at the 65th Interdepartmental Hurricane Conference Working Group for Hurricanes and Winter Storms has been completed. A total of 107 AXBTs were deployed and transmitted in near-time from WC-130J aircraft on 12 flights in 4 storms, including Hurricane Irene where 40 ABXTs were deployed. A total of 85 AXBTs passed the quality control tests and were ingested into the Stennis ocean model and the coupled COAMPS-TC model. Initial model runs for Emily and Irene showed that including AXBT data resulted in a significant change in initial ocean analyses with a small impact on intensity prediction.
	Action	Item remains **OPEN**. The 53 WRS received approval for the next 2 seasons. Work will ultimately require significant aircraft upgrade (potential modification to launcher and receiver equipment, pending requirement from NHC). Estimated 3000 AXBTs remaining. Need to pursue additional sensors if research warrants continued usage. Explore deployment strategy for operations. Progress and results will be presented during the NOAA Hurricane Conference in December 2012 and the 67th IHC in 2013.

OLD ACTION ITEMS: FROM 65th IHC (2011)		
21	**Title**	**Revise the wording for overall tropical cyclone MAX WIND location in the remarks section of the VORTEX message for the 2012 season**
	Submitter	NOAA/AOC (Barry Damiano) and NHC (James Franklin)
	Discussion	Currently, the VORTEX message contains a specific bearing and range for max surface wind inbound (item E) and max flight level wind inbound (item G). Also, the remarks section of the VORTEX message highlights the max flight level temperature with a bearing and range if that temperature value location is greater than 5 nautical miles from the tropical cyclone flight level center and likewise for a surface center that is offset by more than 5 nautical miles from the flight level center. However with respect to the wording in the remarks section of the VORTEX message describing the overall tropical cyclone Max Wind value and corresponding observation time, the location relative to the tropical cyclone center uses the word "QUAD" and an abbreviated cardinal heading (NE, NW, etc.). Recently, this wording has generated some confusion among neophyte meteorologists onboard the aircraft. Some individuals have interpreted the word "QUAD" to mean quadrants and subsequently a NE (northeast), SE (southeast), SW (southwest) and NW (northwest) azimuth from the tropical cyclone center. However, a bearing of 357^{o} would indicate an azimuth of N (north) from the tropical cyclone center even though technically it is in the NW quadrant.
	Recommendation	To minimize confusion, provide greater precision to users, and exhibit consistency with other storm-related items, it is recommended to remove the word "QUAD" from the REMARKS section of the vortex message and replace it with the observed bearing and range of the of the overall tropical cyclone MAX WIND value. This change would go into effect for the 2012 hurricane season. See the example below: <u>Old format:</u> MAX FLT LVL WIND 77 KTS N QUAD 1234Z MAX OUTBOUND FLT LVL WIND 77 KTS N QUAD 1234Z MAX OUTBOUND AND MAX FLT LVL WIND 77 KTS N QUAD 1234Z <u>New format:</u> MAX FLT LVL WIND 77 KTS 357/12 1234Z MAX OUTBOUND FLT LVL WIND 77 KTS 357/12 1234Z MAX OUTBOUND AND MAX FLT LVL WIND 77 KTS 357/12 1234Z
	Action	AOC and 53WRS will implement the new format for 2012 season. However, since software onboard 53rd WRS aircraft may need updating and the ability to update the software only occurs every 18 months, this item needs to be resolved by 30 April 2011. Therefore, by 30 April 2011, NOAA AOC, 53WRS, and NHC will determine whether revised wording for overall tropical cyclone MAX WIND location in the REMARKS section of the VORTEX message is needed, and if they are needed, finalize/agree on the exact changes to be made. This item is **CLOSED** and replaced by 66th IHC action item #8.

OLD ACTION ITEMS: FROM 64th IHC (2010)		
10	**Title**	**Advanced Tasking of Reconnaissance and Surveillance Missions**
	Submitter	NOAA/NWS
	Discussion	By prior agreement among the WMO RA-IV, NHC, the 53WRS, and AOC, the eastern boundary to initiate tropical cyclone reconnaissance has been moved, requiring a modification to the NHOP, page 5-9, paragraph 5.5.1.3.1. Change the eastern boundary of Atlantic reconnaissance fix requests from 55°W to 52.5°W. This change is consistent with the recent change to extend the watch and warning lead times. Surveillance missions conducted by NOAA/AOC and the 53WRS are intended to provide environmental data to the numerical guidance and to NHC forecasters in time to influence the watch/warning decision process for potential land-falling hurricanes. The 12-h increases in lead time associated with the new watch/warning definitions mean that surveillance missions will generally need to be tasked 12 h earlier than in previous years. A tasking for a mission takeoff for the following afternoon can be expected when the storm at 1200 UTC is within about 102 h of projected landfall. This timeline gets the mission data into the models that the forecaster sees roughly 42 h later, or 60 h prior to landfall. While this is a general guideline, actual requests for surveillance flights in any particular situation may occur either earlier or later than this, as conditions warrant.
	Recommendation	Informational. Change NHOP, page 5-9, paragraph 5.5.1.3.1 as indicated above.
	Action	*Two actions resulted from discussions:* • *NHC will use climatological data to estimate the average annual additional support that would be levied on the 53rd WRS to support the Atlantic reconnaissance fix requests if the eastern boundary moved from 55°W to 52.5°W. Forward the information as follows: TO: Col Brian "Bear" Kraemer (22 AF A5A8) (Brian.Kraemer@dobbins.af.mil) CC: Lt Col Rob Stanton (403 OG/CD) (Robert.Stanton@keesler.af.mil) Mark Welshinger (OFCM) (Mark.Welshinger@noaa.gov)* • *Col Kraemer will forward the information provided by NHC to Higher Headquarters to determine if moving the eastern boundary from 55°W to 52.5°W is supportable.*
	Status (03/22/2010)	NHC forwarded the climatological data to Col Kraemer and the other addressees on 3/15/2010.
	Status (01/18/2011)	AFRC to elevate for high-level decision; AFRC will support for 2011 hurricane season, resources permitting.
	Status (11/18/2011)	Lt Col Pierce (53rd WRS/DO) will pick up where Col Kraemer left off and elevate request for high-level decision. Until official approval can be coordinated, Lt Col Pierce mentioned that AFRC has agreed to extend support of the 53rd WRS supporting the eastern boundary movement through the 2012 hurricane season (resources permitting). Therefore, in regards to this issue, the NHOP remains unchanged.
	Action	Item will be **CLOSED** once 2012 NHOP is updated to reflect 53 WRS supports eastward boundary movement (from 55W to 52.5 W), resources permitting. However, **OPENED new action item (66th IHC AI #16)** requesting support of permanent resources via formal request from the Director of NWS to USTRANSCOM J3 and AFRC.

OLD ACTION ITEMS: FROM 62ND IHC (2008)		
10	**Title**	**Update Memorandum of Agreement between United States Air Force Reserves and NOAA**
	Submitter	NOAA
	Discussion	The Memorandum of Agreement (MOA) between the U.S. Air Force Reserves and NOAA was last updated in 2000, seven years ago. AOC recently received a couple of phone calls from other DOD agencies inquiring about revision and update to this MOA.
	Recommendation	Request Office of the Federal Coordinator for Meteorology (OFCM) to facilitate the update of the MOA.
	Status (2/24/09)	*MOA has been updated and completely reorganized. NOAA/NWS has signed the MOA (Dr. Jack Hayes); AFRC is reviewing the MOA.*
	Status (01/26/10)	*AFRC still has not signed the MOA.*
	Status (03/10/10)	*The Joint Staff is staffing a tasking to AFRC to take action on the MOA.*
	Status (01/18/2011)	The MOA is now at USTRANSCOM, which will be the DoD signatory element.
	Status (03/09/2011)	USTRANSCOM working with AFRC to staff to signatory element.
	Status (11/18/2011)	USTRANSCOM internal coordination still underway.
	Status (02/26/2012)	USTRANSCOM internal coordination still underway.
	Actions	At the 66th IHC (5 March 2012) a sidebar meeting took place, which resulted in the following: 1. This action item remains **OPEN**. USTRANSCOM is awaiting AFRC MOA signature before commencing formal signatory coordination with the NWS. 2. As an outcome of the sidebar meeting, it was determined that federal agency representatives need more time to review, discuss, and work solutions within their respective agencies before the annual WG/HWSOR meeting. Therefore, the WG/HWSOR Executive Secretary will solicit action items from the working group members by mid-December of each year instead of the former January-February timeframe. NOAA has agreed to try to provide its action items in December. The WG/HWSOR Executive Secretary will then consolidate and distribute action items NLT 60 days prior to the annual working group meeting. This will give members more time to coordinate, work solutions, obtain consensus, and request leadership approval (if needed) within their respective agencies before the annual working group meeting.

ATTACHMENT

CHAPTER 5

AIRCRAFT RECONNAISSANCE

5.1. General. All Department of Commerce (DOC) tropical and subtropical cyclone aircraft reconnaissance needs will be requested and provided in accordance with the procedures of this chapter. As outlined in the Air Force Reserve Command (AFRC)/National Oceanic and Atmospheric Administration (NOAA) Memorandum of Agreement (see Appendix F), DOC has identified a requirement for, and the Department of Defense (DOD) maintains aircraft to support, up to five sorties per day. Requirements exceeding five sorties will be accomplished on a "resources-permitting" basis. In times of national emergency or war, some or all DOD reconnaissance resources may not be available to fulfill DOC needs. 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.)

5.2. Responsibilities. The DOD, through the AFRC's 53rd Weather Reconnaissance Squadron (53 WRS), and DOC, through NOAA's Aircraft Operations Center (AOC), operate a complementary fleet of aircraft to conduct hurricane/tropical cyclone reconnaissance, synoptic surveillance, and research missions.

5.2.1. DOD. The DOD is responsible for:

5.2.1.1. Providing operational aircraft for vortex fixes and data, synoptic surveillance missions, and investigative flights in response to DOC needs (see Figure 5-1).

5.2.1.2. Developing operational procedures and deploying data buoys to satisfy DOC needs.

5.2.2. DOC. The DOC is responsible for aircraft operations that may be requested to:

5.2.2.1. Provide synoptic surveillance soundings (see Figure 5-2).

5.2.2.2. Augment AFRC aircraft reconnaissance when DOC needs exceed the capabilities of DOD resources (see Figure 5-2).

5.2.2.3. Assume responsibility for hurricane reconnaissance over foreign airspace that may be restricted for military operations.

5.2.2.4. Conduct research flights.

5.2.3. 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. Procedures for the expeditious handling of reconnaissance aircraft are documented in paragraph 5.5.4, Aircraft Operations—Pre-mission Coordination and paragraph 5.5.5, Aircraft Operations—Mission Execution.

Figure 5-1. WC-130J Weather Reconnaissance Aircraft

Figure 5-2. NOAA G-IV and WP-3D Weather Surveillance/Hurricane Aircraft

5.3. Control of Aircraft. Operational control of aircraft flying tropical and subtropical cyclone reconnaissance will remain with the operating agencies which own the aircraft.

5.4. Reconnaissance Requirements.

5.4.1. Meteorological Parameters. Data needs in priority order are as follows:

- Geographical position of the flight level vortex center (vortex fix) and relative position of the surface center, if known.
- Center sea-level pressure determined by dropsonde or extrapolation from within 1,500 ft of the sea surface or from the computed 925 hPa, 850 hPa, or

700 hPa height.

- Minimum 700, 850 or 925 hPa height, if available.
- Wind data (continuous observations along the flight track) for surface and flight level.
- SFMR surface wind.
- High density three-dimensional Doppler radial velocities of the tropical cyclone core circulation.
- Temperature at flight level.
- SFMR rain rate.
- Sea-surface temperature.
- Dew-point temperature at flight level.

5.4.2. Accuracy.

5.4.2.1. Geographic Position.

- Aircraft position: within 3 nm.
- Storm surface center (wind/pressure): within 6 nm.
- Flight level storm center (wind/pressure): within 6 nm.

5.4.2.2. Wind Direction.

- Surface: within 10 deg.
- Flight level for winds greater than 20 kt: within 5 deg.

5.4.2.3. Wind Speed.

- Surface: within 10 kt.
- Flight level: within 4 kt.

5.4.2.4. Pressure Height.

- Surface: within 2 hPa.
- Flight level at or below 500 hPa: within 10 m.
- Flight level above 500 hPa: within 20 m.

5.4.2.5. Temperature.

- Sea surface: within lºC.
- Flight level: within lºC.

5.4.2.6. Dew-Point Temperature.

- From -20ºC to +40°C: within lºC.
- Less than -20ºC: within 3ºC.

5.4.2.7. Absolute Altitude: Within 10 m.

5.4.2.8. Vertical Sounding.

- Pressure: within 2 hPa.
- Temperature: within 1ºC.
- Dew-point temperature:

- From -20ºC to +40ºC: within lºC.
- Less than -20ºC: within 3ºC.
- Wind direction: within 10 deg.
- Wind speed: within 5 kt.

5.4.2.9. Core Doppler Radar.

- Horizontal resolution along aircraft track: 1.5 km
- Radar beam width: 3 degrees.
- Radar radial resolution (gate length): 150 m.
- Error in radar radial velocity: 1 m/s.
- Range: 50 km.

[NOTE: Present weather reconnaissance capabilities do not completely satisfy these requirements; data will be collected as close to stated requirements as possible.]

5.4.3. High-Density/High-Accuracy (HD/HA) Data Requirements. 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 G for HDOB message formats. The DOC requires rapid acquisition and transmission of tropical cyclone data, especially within the 24-hour period prior to landfall. If HD/HA capability is lost on an operational mission, the airborne meteorologist will immediately contact Chief, Aerial Reconnaissance Coordination, All Hurricanes (CARCAH) to determine data requirements for the remainder of the mission.

5.4.4. Synoptic Surveillance Data Requirements. When required, NHC will request sounding data on the periphery of systems approaching the United States. NHC will provide specific tracks including control points, control times and dropwindsonde frequency allocations to CARCAH for coordination with the reconnaissance units.

5.4.5. Core Doppler Radar Requirements. When required, NHC and the Environmental Modeling Center (EMC) will coordinate to request high-density three-dimensional Doppler radial velocities in the tropical cyclone core for potential storms impacting the United States, including Puerto Rico and the Virgin Islands. EMC, NHC, and HRD will coordinate to provide specific flight plans to CARCAH for coordination with the reconnaissance units.

5.4.6. Required Frequency and Content of Observations. Observation requirements are summarized in Table 5-1. Deviations to these requirements will be coordinated through CARCAH. The Vortex message format and information are shown in Figure 5-3, Figure 5-4, and Table 5-2. Other data message formats and code breakdowns can be found in Appendix G.

Table 5-1. Requirements for Aircraft Reconnaissance Data

	RECCO Section 1 plus 4ddff and 9VTTT as applicable	Vortex Data Message (VDM)	Vertical Data WMO Temp Drop Code (FM37-VII)	High Density Observation (HDOB)
En route	Approx. every 30 minutes over water not to exceed 200 nm	NA	Approx every 400 nm over water, or fewer/relocated per request or sonde conservation	30-sec interval
Invest area	At major turn turnpoints. Also, every 15 minutes if HDOBs are INOP.	After closing a circulation	NA	30-sec interval
Fix pattern	End points of Alpha pattern legs. When necessary with radar fix information.	Each fix.	Each tasked fix at or above 850 mb. Intermediate fixes and eyewall modules as requested.	30-sec interval

5.4.7. WP-3D Configuration. The minimum operational configuration of the WP-3D will include the stepped frequency microwave radiometer (SFMR), Doppler radar and the advanced vertical atmospheric profiling system (AVAPS).

5.5. Reconnaissance Planning and Flight Notification.

5.5.1. DOC Requests for Aircraft Reconnaissance Data.

5.5.1.1. Coordination. Any agency requesting aircraft reconnaissance (e.g., the NWS Environmental Modeling Center (EMC), the Central Pacific Hurricane Center (CPHC)) should contact the National Hurricane Center (NHC) no later than 1630 UTC the day prior to the requirement, and within the constraints of paragraph 5.5.2.1. NHC will compile the list of the total DOC requirements for data on tropical and subtropical cyclones or disturbances for the next 24-hour period (1100 to 1100 UTC) and an outlook for the succeeding 24-hour period. This coordinated request will be considered the agency's request for assistance (RFA) to DOD and will be provided to CARCAH as soon as possible, but no later than 1630 UTC each day in the format of Figure 5-5.

5.5.1.2. Tropical Cyclone Plan of the Day. From the coordinated DOC request, CARCAH will publish the Tropical Cyclone Plan of the Day (TCPOD). The format for the TCPOD is shown in Figure 5-6. When DOC reconnaissance needs exceed DOD and DOC resources, CARCAH will coordinate with the NHC to establish priorities of requirements.

DATE		SCHEDULED FIX TIME	AIRCRAFT NUMBER	ARWO
WX MISSION IDENTIFICATION		STORM NUMBER IDENTIFIER		OB
VORTEX DATA MESSAGE				
A		DATE AND TIME OF FIX		
B	DEG MIN N S	LATITUDE OF VORTEX FIX		
	DEG MIN E W	LONGITUDE OF VORTEX FIX		
C		MINIMUM HEIGHT AT STANDARD LEVEL		
D		ESTIMATE OF MAXIMUM SURFACE WIND OBSERVED		
E		BEARING AND RANGE FROM CENTER OF MAXIMUM SURFACE WIND		
F		MAXIMUM FLIGHT LEVEL WIND NEAR CENTER		
G		BEARING AND RANGE FROM CENTER OF MAXIMUM FLIGHT LEVEL WIND		
H		MINIMUM SEA LEVEL PRESSURE COMPUTED FROM DROPSONDE OR EXTRAPOLATED FROM FLIGHT LEVEL. IF EXTRAPOLATED, CLARIFY IN REMARKS.		
I		MAXIMUM FLIGHT LEVEL TEMP/PRESSURE ALTITUDE OUTSIDE EYE		
J		MAXIMUM FLIGHT LEVEL TEMP/PRESSURE ALTITUDE INSIDE EYE		
K		DEWPOINT TEMP/SEA SURFACE TEMP INSIDE EYE		
L		EYE CHARACTER: Closed wall, poorly defined, open SW, etc.		
M		EYE SHAPE/ORIENTATION/DIAMETER. **CODE EYE SHAPE AS:** C -Circular; CO - Concentric; E- Elliptical. **TRANSMIT ORIENTATION OF MAJOR AXIS IN TENS OF DEGREE** (i.e., 01-010 to 190; 17-170 to 350). **TRANSMIT DIAMETER IN NAUTICAL MILES.** Examples: C8 - Circular eye 8 miles in diameter. EO9/15/5 - Elliptical eye, major axis 090-270, length of major axis 15 NM, length of minor axis 5NM. CO8-14 - Concentric eye, diameter inner eye 8 NM, outer eye 14 NM.		
N		FIX DETERMINED BY/FIX LEVEL**. FIX DETERMINED BY:** 1 - Penetration; 2 - Radar; 3 - Wind; 4 - Pressure; 5 - Temperature. **FIX LEVEL:** Indicate surface center if visible; indicate both surface and flight level centers only when same: 0 - Surface; 1 - 1500ft; 9-925mb; 8 - 850 mb; 7 - 700 mb; 5 - 500 mb; 4 - 400 mb; 3 - 300 mb; 2 - 200 mb; NA - Other.		
O		NAVIGATION FIX ACCURACY/METEOROLOGICAL ACCURACY		
P	REMARKS MAX FL WIND_____KT_____QUAD_____Z MAX OUTBOUND FL WIND_____KT_____QUAD_____Z SLP EXTRAP FROM (Below 1500 FT/ 925 MB/ 850 MB/ DROPSONDE) SFC CNTR_____/_____NM FROM FL CNTR MAX FL TEMP _____C_____/_____NM FROM FL CNTR SURFACE WIND OBSERVED VISUALLY			
INSTRUCTIONS: Items A through G (and H when extrapolated) are transmitted from the aircraft immediately following the fix. The remainder of the message is transmitted as soon as available.				

Figure 5-3. Vortex Data Message Worksheet

Table 5-2. Vortex Data Message Entry Explanation

DATA ITEM	ENTRY
Mission Identifier	As determined in Chapter 5, paragraph 5.7.6.
Storm Identifier	As determined in Chapter 4, paragraph 4.3.3.
Observation Number	A two digit number determined by the sequential order in which the observation is transmitted from the aircraft.
A (ALPHA)	Date and time (UTC) of the flight level center fix. If the flight level center cannot be fixed and the surface center is visible, enter the time of the surface center fix.
B (BRAVO)	The latitude and longitude of the center fix associated with item ALPHA. NOTE: If the surface center is fixable, enter bearing and range from the FL center in Remarks; e.g., SFC CNTR 270/15 nm, if the centers are separated by over 5 nm.
C (CHARLIE)	Indicate the standard atmospheric surface e.g. 925, 850 or 700 hPa. The minimum height of the standard surface observed inside the center. If at 1,500 ft or below or not within 1,500 ft of a standard surface, enter NA.
D (DELTA)	The maximum surface wind observed during the inbound leg associated with this fix. When SFMR surface wind data are unavailable, the surface wind is determined visually.
E (ECHO)	Bearing and range of the maximum surface wind observed (item DELTA) from the coordinates reported in item BRAVO.
F (FOXTROT)	The maximum flight level wind observed during the inbound leg associated with this fix. If a significant secondary maximum wind is observed, report it in remarks. All winds reported should be 10-s averages.
G (GOLF)	Bearing and range of the maximum flight level wind observed (item FOXTROT) from the coordinates reported in item BRAVO.
H (HOTEL)	The minimum sea level pressure (SLP) to the nearest hectopascal observed at the coordinates reported in item BRAVO. Preface the SLP with "EXTRAP" (extrapolated) when the data are not derived from dropsonde or when the SLP is extrapolated from a dropsonde that terminated early. Clarify the difference in remarks (e.g., SLP EXTRAPOLATED FROM BELOW 1500 FEET/850 HPA/DROPSONDE).
I (INDIA)	MAX FLT LVL TEMP--This temperature is taken just outside the central region of a cyclone (i.e., just outside the eyewall or just beyond the maximum wind band). This temperature may not be the highest recorded on the inbound leg but is representative of the environmental temperature just outside the central region of the storm. PRESSURE ALT--Pressure altitude data (meters) are taken at the same location as the maximum temperature data reported in item INDIA.

Table 5-2 (continued). Vortex Data Message Entry Explanation

DATA ITEM	ENTRY
J (JULIET)	MAX FLT LVL TEMP--The maximum temperature observed within 5 nm of the center fix coordinates. If a higher temperature is observed at a location more than 5 nm away from the flight level center (item BRAVO), it is reported in Remarks, including bearing and distance from the flight level center. PRESSURE ALT--Pressure altitude data (meters) are taken at the same location as the maximum temperature data reported in item JULIET.
K (KILO)	Dewpoint temperature/sea surface temperatures are collected at the same location as the maximum temperature reported in item JULIET. Enter NA if not observed.
L (LIMA)	Only report if at least 50 percent of the center has an eyewall, otherwise enter NA. Closed wall--if the center has 100 percent coverage with no eyewall weakness. Open XX--if the center has 50 percent or more but less than 100 percent coverage. State the direction of the eyewall weakness.
M (MIKE)	Self explanatory. Report only if item LIMA is reported, otherwise enter NA.
N (NOVEMBER)	Fix determined by: Always report 1. Report 2 if radar indicates curvature or banding consistent with fix location. Report 3 if recorded or observed winds indicate a closed center. Report 4 if the fix pressure is lower than all reported on the inbound leg. Report 5 if the fix temperature is at least higher than any reported on the inbound leg. Fix level: Report 0 alone if fix is made solely on surface winds. Report 0 and the flight-level code if the centers are within 5 nm of each other.
O (OSCAR)	Navigational and meteorological accuracy are reported as the upper limit of probable error. Meteorological accuracy is normally reported as one-half of the diameter of the light and variable wind center.
P (PAPA)	Remarks to enhance the data reported above. Required remarks include: (1) mission identifier and observation number; (2) the maximum flight level wind observed, time of observation, and the relative quadrant of the storm of the observed wind on the latest pass through any portion of the storm; (3) the maximum flight-level wind observed on the outbound leg following the center fix just obtained, if it is higher than the inbound maximum reported in item F. Include time of observation and the relative quadrant of the storm of the qualifying outbound max wind. If, after the transmission of the vortex message but prior to the aircraft reaching the cross-leg turn point, a higher qualifying outbound wind is observed, then the vortex message will be amended with the higher outbound wind reported. If the outbound max FL wind becomes the new overall max FL wind, then consolidate the two max FL wind remarks into one remark; (4) the method of deriving the central SLP when extrapolated; and (5) the bearing and range of the surface center and/or maximum flight level temperature if not within 5 nm of the flight level center.

```
URNT12 KNHC 072030
VORTEX DATA MESSAGE AL092008
A. 07/20:09:20Z
B. 21 deg 01 min N
  074 deg 26 min W
C. 700 mb 2624 m
D. 90 kt
E. 045 deg 13 nm
F. 147 deg 106 kt
G. 047 deg 016 nm
H. 945 mb
I. 10 C/ 3045 m
J. 16 C/ 3057 m
K. 13 C/ NA
L. CLOSED WALL
M. CO16-48
N. 12345/7
O. 0.02 / 1 nm
P. AF307 0909A IKE          OB 11
MAX FL WIND 107 KT NW QUAD 18:21:10 Z
```

Figure 5-4. Example Vortex Data Message (VDM) for the WC-130J

NHOP COORDINATED REQUEST FOR AIRCRAFT RECONNAISSANCE

___ Original
___ Amendment
(Check One)

I. ATLANTIC REQUIREMENTS

STORM NAME DEPRESSION # SUSPECT AREA	FIX OR ON STATION TIME	COORDINATES	FLIGHT PATTERN	FCST MVMT	NHC PRIORITY

GULF STREAM _____

SUCCEEDING DAY OUTLOOK _____

_____

REMARKS _____

_____

II. PACIFIC REQUIREMENTS

STORM NAME DEPRESSION # SUSPECT AREA	FIX OR ON STATION TIME	COORDINATES	FLIGHT PATTERN	FCST MVMT	NHC PRIORITY

SUCCEEDING DAY OUTLOOK _____

_____

REMARKS _____

_____

III. DISTRIBUTION

A. TO CARCAH BY 1630Z OR AMEND AT ANY TIME
B. Date _____ Time _____ FCSTR INITIAL _____
C. 53 WRS _____ AOC _____ Other _____

Figure 5-5. NHOP Coordinated Request for Aircraft Reconnaissance

TROPICAL CYCLONE PLAN OF THE DAY FORMAT
ATLANTIC AND CENTRAL PACIFIC OCEANS

NOUS42 KNHC _____ (DATE/UTC TIME)
WEATHER RECONNAISSANCE FLIGHTS
CARCAH, TPC/NATIONAL HURRICANE CENTER, MIAMI, FL
_____ (LOCAL TIME) ___ (TIME ZONE) ___ (DAY) ___ (MONTH/DATE), ____ (YEAR)
SUBJECT: THE TROPICAL CYCLONE PLAN OF THE DAY (TCPOD)
VALID _____Z (MONTH) TO _____Z (MONTH) (YEAR)
TCPOD NUMBER.....(YR)- _____

I. ATLANTIC REQUIREMENTS

1. (STORM NAME, DEPRESSION, SUSPECT AREA) or (NEGATIVE RECON RQMTS)

   FLIGHT ONE (NHC PRIORITY, if applicable)

   TEAL or NOAA _____ (number)

   A. _____Z FIX/INVEST TIME
   B. _____ MISSION IDENTIFIER
   C. _____Z DEPARTURE TIME
   D. _____ FORECAST POSITION
   E. _____Z TIME ON STATION
   F. _____ ALTITUDE(S) ON STATION
   G. _____ REMARKS (if needed)

   FLIGHT TWO (if applicable, same as FLIGHT ONE)

2. (SECOND SYSTEM, if applicable, same as in 1. above)
3. OUTLOOK FOR SUCCEEDING DAY (NHC PRIORITY, if applicable)
   A. POSSIBLE _(Unit)_ ON STATION REQUIREMENT NEAR _(Location)_ AT (Time) Z.

II. PACIFIC REQUIREMENTS (Same as in ATLANTIC)

Figure 5-6. Tropical Cyclone Plan of the Day Format

5.5.1.3. Anticipated Reconnaissance Requests. Reconnaissance requests can be anticipated for a forecast or actual storm location.

5.5.1.3.1. For the Atlantic, Gulf of Mexico, Caribbean, and Central Pacific areas, the requests can be:

- Up to four 6-hourly fixes per day when a storm is within 500 nm of landfall and west of 55ºW in the Atlantic.
- Up to eight 3-hourly fixes per day when a storm is forecast to be within 300 nm of the U.S. coast, Hawaiian Islands, Puerto Rico, Virgin Islands, DOD installations, and other DOD assets when specified.
- Up to two synoptic surveillance missions per 24-hour period for potentially land-falling storms.

5.5.1.3.2. In the Eastern Pacific, reconnaissance missions may be tasked when necessary to carry out warning responsibilities.

5.5.1.3.3. Investigative flights may be requested for disturbances in areas defined above, i.e., one or two flights per day dependent upon proximity of landfall and upon known or suspected stage of development.

5.5.1.3.4. Exceptions may be made when additional reconnaissance is essential to carry out warning responsibilities.

5.5.2. DOD and DOC Reconnaissance Aircraft Responsiveness.

5.5.2.1. Requirement Notification. Notification of requirements must proceed tasked-on-station time by at least 16 hours plus en route time to the area of concern.

5.5.2.2. Prepositioning. The "Succeeding Day Outlook" portion of the TCPOD provides advance notification of requirements and authorizes units to preposition aircraft to forward operating locations. For missions requiring prepositioning, the "Succeeding Day Outlook" may not provide adequate advance notification. In this situation, an "Additional Day Outlook" may be included in the TCPOD to authorize units to preposition aircraft.

5.5.2.3. Resources Permitting. When circumstances preclude the appropriate notification lead time, the requirement will be levied as "resources permitting." When a "resources permitting" requirement is levied in an amendment, the NHC will indicate the priority of all existing or remaining requirements.

5.5.2.4. Emergency Requirement. If a storm develops unexpectedly and could cause a serious threat to lives and property within a shorter time than provided for in the paragraphs above, CARCAH will contact the reconnaissance units, or higher headquarters, as appropriate, and request assistance in implementing emergency procedures not covered in this plan. The NHC and CPHC directors have authority to declare an emergency.

5.5.2.5. NOAA WP-3D Availability. At least one WP-3D will be operationally configured (per paragraph 5.4.7) and available to respond to requirements within 24 hours from June 1 through November 30 annually. A second WP-3D with the same operational configuration will be available each hurricane season from July 15 to September 30.

When maintenance and programmatic considerations permit, the second aircraft could be made available until November 30 also. The frequency of flights when two aircraft are available and with present staffing shall be every 12 hours.

5.5.3. Reconnaissance Tropical Cyclone Plan of the Day.

5.5.3.1. Preparation. CARCAH will coordinate the TCPOD (Figure 5-6) daily during the period from June 1 to November 30 and at other times during the year as required. Transmitted TCPODs will be serially numbered each season.

5.5.3.1.1. CARCAH will coordinate the TCPOD with NHC, the 53 WRS, and NOAA AOC before publication.

5.5.3.1.1.1. The coordinated TCPOD is the agency's RFA to DOD. Since DOD's support to NOAA is congressionally mandated and funded through the DOD Appropriations Act, the coordinated TCPOD is considered a validated and approved RFA.

5.5.3.1.1.2. Combatant command headquarters and their air component command headquarters will coordinate on missions by reviewing the proposed TCPOD posted at http://www.nhc.noaa.gov/reconlist.shtml link, then click 'For Tomorrow' under 'Plan of the Day.'

5.5.3.1.1.3. Combatant command headquarters and their air component command headquarters will pull current DOD missions from http://www.nhc.noaa.gov/reconlist.shtml link, then click 'For Today' under 'Plan of the Day.' Additionally, the 403rd Current Operations provides mission setup sheet with reason of deviation from TCPOD, as required, to combatant command and their air component operations/command centers.

5.5.3.1.2. The TCPOD will list all DOC/NOAA AOC and DOD required tropical and subtropical cyclone operational reconnaissance missions. Research missions will also be listed in the TCPOD when available by transmission time.

5.5.3.1.3. Amendments to the TCPOD will be published only when requirements change. When amended, the impact on each listed flight will be identified (i.e., No Change, Change Added, or Cancel).

5.5.3.2. Dissemination. The TCPOD will be made available to appropriate agencies, such as FAA, DOD, and NOAA, which provide support to or control of reconnaissance aircraft or are a part of the tropical cyclone warning service. Under normal circumstances, the TCPOD will be disseminated 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. Amendments will be disseminated as required.

NOTE: The TCPOD is disseminated under the header "MIAREPRPD" for AWIPS users and "NOUS42 KNHC" for AWDS users. The TCPOD can be accessed via the Internet at the National Hurricane Center homepage at www.nhc.noaa.gov, then click on 'Aircraft Reconnaissance' and then on 'Plan of the Day.'

Chapter ~~TBD~~ 6 AIRSPACE OPERATIONS (old 5.5.4 & 5.5.5 inclusive)

5.5.4. ~~Aircraft Operations~~ Pre-mission Coordination.

5.5.4.1. Federal Aviation Administration (FAA) Coordination.

5.5.4.1.1. Responsibilities. The Air Traffic Control System Command Center (ATCSCC) and Air Route Traffic Control Centers (ARTCC) are responsible for coordination in support of the NHOP.

5.5.4.1.2. ATCSCC Procedures.

- Review the TCPOD available at http://www.nhc.noaa.gov/reconlist.shtml, by 1830 UTC. Normal notification of scheduled NHOP flights is accomplished through the TCPOD (1 June through 30 November).
- Activate the Hurricane Desk, when required.
- ~~Prepare a public Flow Evaluation Area (FEA) based on the latitude/longitude points specified in the TCPOD when a mission is scheduled to be flown. The FEA naming convention is the aircraft call sign. Modify the FEA when requested by the affected facilities.~~
- Review the Mission Coordination Sheet (see Appendix L). Prepare a public Flow Evaluation Area (FEA) based on the latitude/longitude points specified in the Mission Coordination sheet when a mission is scheduled to be flown.~~, modify the FEA and coordinate with the impacted ARTCCs as required.~~ The FEA naming convention is the aircraft call sign. Modify the FEA when requested by the affected facilities. (The flying unit will fax their Mission Coordination Sheet to the ATCSCC and affected ARTCCs 1-2 hours prior to flight departure time).
- Coordinate with the impacted ARTCCs as required and ~~D~~designate a Primary ARTCC when the Operations Area includes multiple ARTCCs.
- In the event of an unscheduled mission that is not listed on the TCPOD, the flying unit will contact the ATCSCC. The ATCSCC will initiate a conference call with the unit and all affected ARTCCs.
- When requested, ~~A~~assist ARTCCs with traffic flow priorities if the hurricane reconnaissance flight will impact air traffic. ~~As necessary, ensure t~~The hurricane reconnaissance flight receives priority as specified in JO Order 7110.65.
- Coordinate with Air Traffic Services Cell (ATSC), as needed, when informed by an ARTCC of a disapproval of hurricane

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reconnaissance flight to enter a Special Use Airspace (SUA) or Special Activity Airspace (SAA).

- Conduct hurricane and customer teleconferences, as necessary~~required~~.

5.5.4.1.3. ARTCC Procedures.

- Review the TCPOD at http://www.nhc.noaa.gov/reconlist.shtml, by 1830 UTC. Normal notification of scheduled NHOP flights is accomplished through the TCPOD (1 June through 30 November).
- Review the Mission Coordination Sheet (see Appendix L) - the flying unit will fax their Mission Coordination Sheet to the ATCSCC and affected ARTCCs 1-2 hours prior to flight departure time.
- Coordinate with all impacted Center and Terminal facilities within their area of responsibility.
- Coordinate with all impacted military facilities (e.g., FACSFAC) through the applicable Military Operation Desks within their area of operations and responsibility to ensure all offshore airspace (i.e., Warning Areas, SUA, SAA) that is activated by the military is protected for NHOP flights, when required. If SUA or SAA release is not approved, contact the ATCSCC.
- When requested, assign 53 WRS and NOAA aircraft the dedicated NORAD transponder code associated with their call sign, which is listed on the Mission Coordination Sheet.
- When designated by ATCSCC as the Primary ARTCC, ~~their~~ responsibilities will include:
    - Coordinate with CARCAH and aircrew(s) on flight plan specifics, when necessary.
    - If the mission profile changes, coordinate with the ATCSCC for FEA modifications, and ensure affected ARTCC~~'~~s are aware of the change.
    - Advise the ATCSCC and affected ARTCCs of any mission cancellation or delay information received from the flying unit.

5.5.4.2. Pre-Mission Coordination.

5.5.4.2.1. Flying Agencies (other than the 53 WRS or NOAA AOC) Pre-mission Coordination.

- NASA, NRL, NSF or any other agency planning research missions, including Unmanned Aircraft Systems (UAS), into or around the forecast or actual storm location will coordinate with affected ARTCCs and CARCAH as soon as possible prior to all flights.

- The flying unit will fax their Mission Coordination Sheet to the ATCSCC and affected ARTCCs 1-2 hours prior to flight departure time.
- ~~For each flight, provide the affected ARTCCs the Mission Coordination Sheet (see Appendix L).~~
- Flights in support of the NHOP (conducted by the 53 WRS and NOAA AOC operations) are normally published in the TCPOD at http://www.nhc.noaa.gov/reconlist.shtml~~,~~ by 1830 UTC. Reference the TCPOD to assist in de-confliction efforts. Required operational reconnaissance missions flown by the 53 WRS and NOAA AOC will be outlined in the TCPOD. Flights other than 53 WRS and NOAA AOC tasked operational missions should be listed in the TCPOD remarks section.
- CARCAH coordination is normally restricted to what is required between the 53 WRS, NOAA AOC, NHC, and ARTCC~~'~~s in support of operational tasking. Due to staffing constraints, the CARCAH unit's operating hours vary and often depend on the requirements levied. Its ability to coordinate non-operational missions is extremely limited. Research missions can only be considered on a non-interference basis when flown concurrently with a tasked mission or when data collected will be directly beneficial to NHC in real time. However, CARCAH will need to have advance notification of *all* planned research missions in areas where operations are being conducted, including proposed flight tracks, aircraft altitudes, and locations where expendables may be deployed; this information can be e-mailed to ncep.nhc.carcah@noaa.gov or faxed to 305-553-1901 (please indicate "CARCAH" on faxed materials).
- IAW JO 7110.65, only 53 WRS and NOAA aircraft performing tasked operational missions will have priority for access to the operations area.
- **Dedicated NORAD Mode 3/A Transponder Codes.** N/A.

5.5.4.2.2. CARCAH Pre-mission Coordination. CARCAH's pre-mission coordination procedures include:

- Publishing the TCPOD when required.
- Coordinating with the affected ARTCCs and ATCSCC as required.
- For unscheduled missions, notifying the flying units and ATCSCC.
- Notifying 53 WRS and NOAA AOC flight crews when other research missions will be airborne in the operations area at the same time.

5.5.4.2.3. 53 WRS and NOAA AOC Pre-mission Coordination.

- **Mission Coordination Sheet.** As soon as possible, but no later than 1-2 hours prior to departure time, fax the Mission Coordination Sheet (see Appendix L) to the ATCSCC and affected ARTCCs (see Appendix I).
- **Missions Not Listed in the TCPOD.** In the event of an unscheduled mission, the flying unit will contact the ATCSCC. The ATCSCC will initiate a conference call with the unit and all affected ARTCCs.
- **Dedicated NORAD Mode 3/A Transponder Codes.** 53 WRS and NOAA NHOP missions have dedicated NORAD mode 3/A transponder codes. These codes are only applicable in FAA controlled airspace in the Gulf of Mexico and Atlantic. They are issued by ~~AF North Airspace (CONR)~~the 601st Air & Space Operations Center, Airspace Management Team (DSN 523-5837 or COM 850-283-5837) and ~~are~~ must be renewed on an annual basis. ~~; contact~~ For season 2012 the codes are as follows:
  - TEAL 70–79: 7552-57 & 7560-63 (expire 31 Dec 2012)
  - NOAA 42, 43, and 49: ~~TBD~~5050-5054

~~- NEADS/DOAS at (DSN 587-6784) to renew these codes.~~

5.5.4.2.4. Mission Coordination Sheet. All missions must provide a Mission Coordination Sheet to the affected ARTCCs and the ATCSCC 1-2 hours prior to departure time (see Appendix L).

5.5.4.2.5. Aircraft Call Signs.

- 53 WRS: "TEAL 70 through 79" (WC-130J aircraft)
- NOAA AOC: "NOAA 42 and 43" (WP-3D aircraft); "NOAA 49" (G-IV aircraft)
- NASA: "NASA817" (DC-8 aircraft); "NASA 871 & 872" (Global Hawk UAS)
- NRL: "WARLOCK 587" (NP-3 aircraft)
- NSF/NCAR: "N677F" (G-V aircraft)

5.5.4.2.6. Flight Plan Filing Procedures. Flight plans must be filed with the FAA as soon as practicable before departure time. For flights into all U.S. FIRs, include delay time in the Route portion of the International Flight Plan - this will keep the IFR flight plan active throughout operations in the delay area while in FAA controlled airspace. Due to limited information that is displayed on FAA controller screens, it is recommended that only the following remarks be included in the "Other Information" block:

- "EET" to FIR boundaries~~, "STS" with storm delay information,~~

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- Navigation Performance (ex. RNP-10)~~;~~ and
- "RMK/MDCN" diplomatic clearance information.

5.5.4.2.7. Mission Cancellation. When a mission is cancelled or delayed, the unit flying the mission must notify the Primary ARTCC as soon as possible.

5.5.4.3. Annual Liaison Meetings.

5.5.4.3.1. At a minimum, an annual liaison meeting will be conducted between the following participants: 53 WRS, NOAA AOC, the ATCSCC and affected ~~,~~ ARTCCs ~~(Houston, San Juan, Miami, Jacksonville, D.C., New York, and Boston)~~. This meeting will review the previous season's operations, any proposed changes to the current NHOP, FAA liaison flights, and ICAO operations. This meeting ~~should~~will take place ~~after the hurricane season but before~~ annually, normally in conjunction with the OFCM-sponsored Interdepartmental Hurricane Conference (IHC).

5.5.4.3.2. Annual ARTCC and ATCSCC visits and briefings by 53 WRS and NOAA AOC aircrews and FAA Military Liaisons are encouraged. These joint visits emphasize the unique challenges and non-standard operational procedures, communication and coordination required to successfully and safely accomplish the Hurricane Hunter mission.

5.5.4.4. FAA Familiarization Flights. FAA Familiarization Flights on USAF (IAW AFI 11-401 and DOD 4515.13-R) and NOAA Hurricane Hunter aircraft are authorized and encouraged. These flights are important to ensure FAA controllers have a better understanding of Hurricane Hunter operations and how these missions play a vital role to inform emergency planners and coastal citizens on the storm's track and intensity as they approach the U.S. coastline.

5.5.5. ~~Aircraft Operations~~ Mission Execution.

Note: No procedure in the NHOP precludes Aircraft Commanders from exercising their authority in the interest of safety or during an aircraft emergency.

5.5.5.1. NHOP Missions (~~Surface to~~ At or Below FL150). NOAA and 53 WRS NHOP (and NWSOP) missions have dedicated NORAD mode 3/A transponder codes associated with call signs TEAL 70–79 ~~(see paragraph 5.5.4.2.3)~~7552-57 & 7560-63 (expire 31 Dec 2012) and NOAA 42, 43, and 49 (~~5043-5047~~~~TBD~~5050-5054), respectively. Both NOAA and 53 WRS aircrews ~~may~~ will request to be assigned their dedicated mode 3/A code on the ground or after airborne.

5.5.5.1.1. Priority Handling. When requested by the aircrew, ATC will provide TEAL and NOAA aircraft priority handling. The aircraft commander will only ask for priority handling when necessary to accomplish the mission.

5.5.5.1.2. International Airspace. International Airspace is defined as the Airspace beyond a Sovereign State's 12nm territorial seas limit. Beyond this limit ICAO rules apply. In International Airspace, VFR flight is not allowed at night~~.~~. In Class A Controlled Airspace, aircraft must operate using IFR procedures; ATC separation is provided between IFR

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aircraft. In Class E Controlled Airspace, both VFR and IFR operations are allowed; separation is provided between IFR aircraft but not with VFR traffic; traffic information is provided to VFR traffic and about VFR traffic, as far as practical. In Class F and G Uncontrolled Airspace, both VFR and IFR operations are allowed.~~:~~ ~~-~~When operating in uncontrolled airspace, flight information service, which includes known traffic information, is provided and the pilot is responsible for arranging the flight to avoid other traffic (ICAO, Annex 11).
~~Advisory Services are provided between IFR aircraft (to ensure separation, in so far as possible). In Class G Uncontrolled Airspace, both VFR and IFR operations are allowed; no traffic information is provided, only Flight Information Services are *available* (reference DoD FLIP General Planning, Chapter 7).~~

5.5.5.1.3. IFR Procedures and Clearance. Aircrews will conduct flight operations to the maximum extent possible utilizing IFR procedures and will not normally conduct flight operations under the provisions of "Due Regard." While entering, within, or exiting the Operational Delay Area, if the aircraft commander determines that mission, weather, and/or safety requirements dictate, then they may exercise their operational prerogative and declare "Due Regard." When conducting "Due Regard" operations, aircrews will comply with as many IFR procedures as possible. Before declaring "Due Regard," the aircrew will notify ATC of their intentions – ATC will retain flight plan information. If an aircrew is unable to notify ATC beforehand, they will inform them when able. As soon as practical, the aircrew will notify ATC that they are terminating "Due Regard" operations and request resumption of IFR services. These procedures do not preclude ~~the~~ aircraft commanders from exercising their authority in the interest of safety or during an aircraft emergency.

5.5.5.1.4. Altitude Assignment and Aircraft Separation. Authorized aircraft may request to operate at a single altitude or within a block. Multiple aircraft may operate in the same vicinity but at different altitudes at the same time. In order to promote mission effectiveness, aircrews from NOAA AOC and the 53 WRS will file and request the minimum block altitudes to meet their mission requirements (i.e., do not request the block ~~altitude surface to~~ at or below FL150 if the mission can be accomplished in the block FL090-110).

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- **Operations in Controlled Airspace.** While IFR, ATC will assign an altitude or a block of altitudes and provide standard vertical separation between all IFR aircraft and will provide VFR traffic advisories as far as practical. ~~When~~ Prior to departing controlled airspace, advise ATC and state your intentions; ATC will not cancel your IFR flight plan.
- **Operations in Uncontrolled Airspace (Class F and G).** Per JO 7110.65, ATC is not authorized to assign altitudes in~~,~~ nor provide separation between aircraft in uncontrolled airspace. While in uncontrolled airspace~~, aircrews will advise ATC of their planned altitudes and~~ the Aircraft Commander is the IFR clearance authority. In addition, aircrews are responsible for maintaining their own separation from the surface of the sea, obstacles, and oil platforms while operating below the Minimum IFR Altitude (MIA). In Class F and G Uncontrolled Airspace, both VFR and IFR operations are allowed. When operating in uncontrolled airspace, flight information service, which includes

known traffic information, is provided and the pilot is responsible for arranging the flight to avoid other traffic (ICAO, Annex 11). ~~In Class F Uncontrolled Airspace, both VFR and IFR operations are allowed; Advisory Services are provided between IFR aircraft (to ensure separation, in so far as possible). In Class G Uncontrolled Airspace, both VFR and IFR operations are allowed; no traffic information is provided, only Flight Information Services are available (reference DoD FLIP General Planning, Chapter 7).~~

- **Note: When an aircraft declares "Due Regard," ATC will not be responsible for that aircraft's separation from other aircraft, but the Operational Delay Area will remain active.**

5.5.5.1.5. Operational Delay Area. The Operational Delay Area is ATC Assigned Airspace (ATCAA) and is a cylinder of airspace *typically* defined by a block altitude ~~from~~ at or below ~~the surface to~~ FL150, with a radius of 150 nm around a set of center coordinates. The operations area may include several different classifications of airspace and environments: controlled, uncontrolled, radar contact, non-radar contact, oceanic, international airspace, domestic airspace, and/or terminal areas and may encompass several controlling agencies. This area excludes the terminal areas (Class D Airspace) depicted on the NHOP Operational Maps (see Appendix K)~~,~~ and any other airspace within 50 NM of the CONUS shoreline until radio contact is established with ~~the~~ ATC ~~terminal facility (if in operation)~~. If not in radar contact within the area as shown on the NHOP Operational Maps (see Appendix K), the aircrew will make position reports in relation to designated navigational aids as requested by ATC along the coast~~;~~. ~~after coordination with ATC, the aircraft will be allowed to fly within 50NM of the coastline.~~ Any changes to the operating area will be coordinated with the primary ARTCC.

5.5.5.1.6. ATC Communications. The aircrew normally maintains ATC communications with only the primary ARTCC. When operating within an ATC Terminal Area depicted on the NHOP Operational Maps (see Appendix K), the aircrews will be in contact with both the primary ARTCC and the Terminal Facility if it is operating. Normally, VHF, UHF or HF radios will be used for communications with ATC, when within range. In the storm environment, HF exhibits poor propagation tendencies. When HF is unusable, satellite communications (SATCOM) may be used as a back-up (see Appendix I). IFR aircraft flying in domestic or international airspace are required to maintain continuous two-way communications with the ATC/FIR even while flying in Uncontrolled Airspace (Class F or G). Monitor the active ATC radio frequency for any traffic transiting the Area.

- **Note: While in international airspace, aircrews will make periodic "Operations Normal" calls to the primary ARTCC if not in radar contact and no transmissions have been made within the previous 20–40 minutes (reference: ICAO 4444/RAC 501/12 VI, 2.1).**

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5.5.5.1.7. Backup ARTCC Communications Procedures. CARCAH maintains contact with p~~P~~articipating a~~A~~ircraft at all times and is allowed to relay ATC clearances through any means available. CARCAH is responsible for ensuring that ATC clearances, clearance requests and messages are relayed in an accurate manner. Only use this

method when the aircraft or ATC is unable to contact each other.

5.5.5.1.8. Participating Aircraft/Aircrew Procedures. A "Participating Aircraft/Aircrew" is defined as an Aircraft, Remote Piloted Aircraft (RPA) or Unmanned Aerial System (UAS) listed in the TCPOD or conducting a tasked operational mission. CARCAH will advise aircrews when other participating aircraft, RPA or UAS will be in the operations area and brief call signs and mission information.

~~**No procedure in the NHOP precludes the Aircraft Commander from exercising their authority in the interest of safety or during an aircraft emergency.**~~

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The following actions will be taken by the aircrews to de-conflict operations and enhance situational awareness with other ~~P~~participating ~~a~~Aircraft while in the Operational Delay Area:

- Set 29.92 (inches Hg) in at least one pressure altimeter per aircraft.
- Contact (Primary: VHF 123.05 MHZ, Secondary: UHF 304.8 MHZ, Back-up: HF 4701 KHz) the other ~~p~~Participating ~~a~~Aircraft and confirm (as a minimum) the pressure altitude, location relative to a center point position, true heading, and operating Altitude or Block Altitude. Continue to monitor the frequency during the duration of the flight.
- Even if aircraft are cleared by ATC to operate in blocks altitudes that are 1,000 feet apart (i.e., TEAL 70 is Block 090-110 and NOAA 42 is Block 060-080), aircrews will not fly within 2,000 feet (vertical) if closer than 10NM (using Air-to-Air TACAN and/or TCAS) of other ~~p~~Participating ~~a~~Aircraft operating in the same area of interest without concurrence of the other ~~p~~Participating ~~a~~Aircraft. **Note:** If unable to maintain assigned altitude or block, immediately notify all participating aircraft and take actions to ensure sufficient vertical and/or lateral separation is maintained or attained as soon as practical.
- While in the Operational Delay Area use: "see and avoid" operations, operating in a different operational area sector (NW, NE, SW, SE), airplane-to-airplane communication position reports, Air-to-Air TACAN, TCAS, RADAR, GPS and situational displays/maps to maintain awareness of the other aircraft's location.

5.5.5.1.9. Weather Dropwindsonde Instrument Release. The aircraft commander is the sole responsible party for all dropwindsonde releases or sensor activations. Aircraft commanders will ensure coordination with other ~~p~~Participating ~~a~~Aircraft prior to release or activation. (Examples of weather instruments are dropwindsondes and oceanographic profilers (OP)).

5.5.5.2. Buoy Deployment Mission ~~(Surface to FL050)~~. Regardless of the Designated Class ~~designated class~~ of ~~A~~airspace (A through G) the following rules apply~~:~~.

5.5.5.2.1. Flight Plan. A normal IFR flight plan will be filed for this mission. The coordinates for some of the planned deployments may need to be changed while en route to adjust to the forecast track of the storm. The aircraft routing will not be altered by ATC because the buoys must exit the aircraft in a specified order and they cannot be rearranged in flight.

5.5.5.2.2. IFR Procedures and Clearance. It is preferred that these missions be filed and flown using IFR procedures in either controlled or uncontrolled airspace. However, with the concurrence of the aircraft commander, they may be flown VFR. If this change is made en route, ATC flight following and traffic advisories will be requested by the aircrew, and any changes to the route of flight must be relayed to ATC by the aircrew.

5.5.5.2.3. Altitude. ~~These missions will be flown from 1000' AGL up to FL050.~~ Aircrews are responsible for maintaining their own clearance from the surface of the sea, obstacles, and oil platforms while operating below the Minimum IFR Altitude (MIA).

5.5.5.2.4. Communications. See paragraphs 5.5.5.1.6 and 5.5.5.1.7.

5.5.5.2.5. Participating Military Aircraft (does not apply to NOAA aircraft). If there are two or more TEAL aircraft deploying buoys in the same area at the same time, they can accept MARSA operations with each other and must relay that to ATC. This will not cancel their IFR clearance but will allow ATC to no longer be responsible for providing aircraft separation between TEAL aircraft. The TEAL aircraft must be in communication with each other and have operating TCAS on at least one of the aircraft. At least one of these aircraft will have SATCOM data relay capability on board.

5.5.5.2.6. Priority Handling. ATC will provide ~~TEAL~~ aircraft priority handling to and from the deployment area only when specifically requested by the aircrew. The aircraft commander will only ask for priority handling when necessary to accomplish the mission.

5.5.5.3. High Altitude Synoptic Track Missions.

5.5.5.3.1. Flight Plan. A normal IFR flight plan will be filed for this mission. An Altitude Reservation (ALTRV) request is not required.

5.5.5.3.2. NOTAM. A NOTAM will be submitted by the 53 WRS, NOAA AOC, NASA, NSF, or NRL for any High Altitude Synoptic Track mission that will release weather instruments. The NOTAM must contain individual coordinates or an area defined by coordinates for all releases. Submit NOTAM request per Appendix D procedures.

5.5.5.3.3. Priority Handling. ATC must provide priority handling, for TEAL and NOAA mission aircraft~~,~~ during Synoptic Track Missions only when specifically requested by the aircrew.

5.5.5.3.4. Release of Dropsondes. During NHOP missions and when operationally feasible, dropsonde instrument releases from FL 190 or higher and sensor activation must be coordinated with the appropriate ARTCC/CERAP (Combined Center/RAPCON) by advising of a pending drop or sensor activation about 10 minutes prior to the event when in direct radio contact with ATC. When ATC has radar contact with the aircraft, they will notify the aircrew of any known traffic below them that might be affected. The aircraft

commander is solely responsible for release of the instrument after clearing the area by all means available.

- When contact with ATC is via ARINC, event coordination must 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: "NOAA 49, SLATN at 1215, FL290 block 310, estimating FLANN at 1250, CHAMP next; Weather instrument release at FLANN."~~ Contact between participating aircraft must be made using the frequencies listed in paragraph 5.5.5.1.8., second bullet.
- During NHOP missions, ~~commencing~~ approximately five (5) minutes prior to release ~~from FL190 or higher,~~ the aircrew will broadcast in the blind on radio frequencies 121.5 MHZ and 243.0 MHZ to advise any traffic in the area of the impending drop. Pilots must not make these broadcasts if they will interfere with routine ATC communications within the vicinity of an ATC facility. The aircraft commander is responsible for determining the content and duration of a broadcast, concerning the release or sensor activation.

End of ~~New~~ 6 Chapter

5.6. Reconnaissance Effectiveness Criteria.

5.6.1. General. Specified reconnaissance times are established to allow sufficient time for the forecaster to analyze the data before issuing an advisory. Every effort should be made to obtain data at scheduled times. The following criteria will be used to assess reconnaissance mission effectiveness:

5.6.1.1. Tropical Cyclone Fix Mission.

- ON-TIME. The fix is made no earlier than 1 hour before nor later than ½ hour after scheduled fix time.
- EARLY. The fix is made from 1 hour before scheduled fix time to one-half of the time interval to the preceding scheduled fix, not to exceed 3 hours.
- LATE. The fix is made within the interval from ½ hour after scheduled fix time to one-half of the time interval to the succeeding scheduled fix, not to exceed 3 hours.
- MISSED. Data are not obtained within the parameters specified for on-time, early, or late.

[NOTE: Appropriate credit will be given when the aircraft arrives in the requested area but is unable to locate a center due to storm dissipation, the absence of a fixable center, or rapid movement. Credit will also be given for radar fixes if penetration is not possible due to geographic or other flight restrictions.]

5.6.1.2. Tropical Cyclone Investigative Missions.

- ON-TIME. An observation must be taken within 250 nm of the specified coordinates by the scheduled time.
- LATE. An observation is taken within 250 nm of the specified coordinates after the scheduled time but not later than the scheduled time plus 2 hours.
- MISSED. When the aircraft fails to be within the 250 nm of the specific coordinates by the scheduled time plus 2 hours or is unable to provide meaningful data.

5.6.1.3. Synoptic Surveillance Missions.

- SATISFIED. Requirements are considered satisfied upon completion of the assigned track and the acquired dropwindsonde data are transmitted from the aircraft prior to the HPC/OPC deadline for synoptic analysis.
- MISSED. When the requirements listed above are not satisfied.

5.6.2. Mission Assessment. The NHC or CPHC will provide CARCAH a written assessment of the reconnaissance mission anytime its timeliness or quality is outstanding or substandard (see Figure 5-7). Mission requirements levied as "resources permitting" will not be assessed for timeliness but may be assessed for quality of data gathered.

5.6.3. Summaries. CARCAH will maintain monthly and seasonal reconnaissance summaries, detailing requirements tasked by NHC and CPHC and missions accomplished.

5.7. Aerial Reconnaissance Weather Encoding, Reporting, and Coordination.

5.7.1. Vortex Data. A vortex data message (Figure 5-4) will be prepared for all fixes, using all observed vortex fix information, each time the aircraft penetrates the center.

5.7.2. Aircraft Radar Fix Data. When proximity to land, air traffic control restriction, or other factors prevent actual penetration of the vortex by the reconnaissance aircraft, it is permissible to fix the cyclone by radar. Radar fixes may be reported in a vortex data message using available observed information or as a remark appended to a RECCO observation taken at fix time. The remark stating the type of radar fix and quality of the radar presentation is in accordance with Chapter 7, paragraph 7.3.2. Two examples follow:

Example 1: RADAR FIX PSBL CENTER 21.5N 83.0W, POOR RADAR PRESENTATION, SPIRAL BAND, MET ACCURACY 15NM

Example 2: RADAR FIX EYE 21 DEG 23 MIN N 78 DEG 42 MIN W GOOD RADAR PRESENTATION CIRCULAR EYE DIAM 25 NM OPEN SW.

5.7.3. Peripheral Data. Storm penetration and collection of peripheral data will

normally begin at the operational altitude approximately 105 nm from the center as determined by the flight meteorologist.

5.7.4. Mission Coordination. Mission coordination for all missions will be accomplished through CARCAH. Meteorological discussions for Central Pacific missions may be accomplished directly with the CPHC; however, any changes to tasking will be accomplished through CARCAH.

5.7.5. Post-flight Debriefing. Unless otherwise directed, the flight meteorologist will provide either an airborne or post-flight debriefing to the appropriate hurricane center through CARCAH to ensure all observations were received and understood.

5.7.6. Mission Identifier. Regular weather and hurricane reconnaissance messages will include the five-digit agency/aircraft indicator followed by the CARCAH-assigned mission/storm-system indicator. Table 5-3 summarizes elements of the mission identifier.

5.7.7. Storm Identifier <Storm ID>. To facilitate the automatic ingest into the NHC, CPHC, and DOD tropical cyclone forecast computing systems, the storm identifier will be added 3 spaces after the Vortex Data Message title (see Figure 5-4) in the following format: **Vortex Data Message BBCCYYYY**. For the definition of BBCCYYYY, see Chapter 4, paragraph 4.3.3., page 4-2.

5.7.8. Observation Numbering and Content. Air Force aircraft movement information (i.e., departure time and location, and ETA's 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. All observations (RECCO, vortex, dropsonde) from the first to the last will be numbered sequentially. HDOBs will be automatically numbered sequentially but separately from other observations. When an aircraft is diverted from its original mission to fulfill NHC requirements, conclude the original mission by using the last report remark.

The next observation from the diverted aircraft will use the CARCAH-assigned mission identifier, will be numbered OB 01, and will include the time of diversion.

-EXAMPLE-
RMK AF306 0lBBA INVEST OB 01 DPTD AF306 WXWXA AT 05/1235Z

MISSION EVALUATION FORM

MEMORANDUM FOR: OL-A, 53 WRS/CARCAH

FROM:_____(Director, NHC, CPHC)_____.

SUBJECT: Mission _____Evaluation
(Mission Identifier)

PUBLISHED REQUIREMENTS:

Premission Coordinates (As Updated Prior to TKO)_____N_____W

Flight Pattern _____

Mission Requirements Times _____

RECONNAISSANCE MISSION PERFORMANCE:

Flight Flown:	_____Completely	_____Partially	_____Other
Horizontal Data Coverage:	_____Complete	_____Timely	_____Accurate
	_____Incomplete	_____Untimely	_____Inaccurate
Vertical Data Coverage:	_____Complete	_____Timely	_____Accurate
	_____Incomplete	_____Untimely	_____Inaccurate
Requirements Accomplished:	_____On Time	_____Early	_____Late
	_____Missed		

OVERALL MISSION EVALUATION:

OUTSTANDING_____

UNSATISFACTORY_____ FOR:

COMPLETENESS_____ TIMELINESS_____ ACCURACY_____

EQUIPMENT_____ PROCEDURES_____ OTHER_____

REMARKS: (Brief but specific)

_____
FORECASTER's SIGNATURE

Figure 5-7. Mission Evaluation Form

Table 5-3. Elements of the Mission Identifier

AGENCY/ AIRCRAFT	Mission Storm System Indicator			
Agency + Aircraft Number[1][2]	Sequential number of mission in this storm	Two-digit depression number or two letter identifier if not a depression or greater[3]	Location A, E, C, or W[4]	Storm name or mission type (i.e., CYCLONE or INVEST
-EXAMPLES-				
AF306 0201C CYCLONE	USAF aircraft 5306 on the second mission for Tropical or Subtropical Depression One in the Central Pacific. Mission type can be fix or surveillance, as specified in the TCPOD.			
AF307 0403E CARLOS	USAF aircraft 5307 on the fourth mission for the third classified tropical or subtropical system that formed in the Eastern Pacific and acquired the name Carlos.			
NOAA2 01BBA INVEST	NOAA aircraft 42RF on the first mission to investigate the second unclassified suspect area in the Atlantic, Gulf of Mexico, or Caribbean.			
NOAA9 WAWXA AL92	NOAA aircraft N49RF on the first flight of a sequence of non-tasked research missions into Atlantic suspect area AL92.			
NOAA3 WF13A KARL	NOAA aircraft N43RF on the sixth flight of a sequence of non-tasked research missions into the system that developed from suspect area AL92 into the thirteenth tropical or subtropical cyclone in the Atlantic Basin and acquired the name Karl.			

5.7.9 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, Item P in a vortex data, 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 5-4 below:

[1] AF plus last 3 digits of tail number
[2] NOAA, plus last digit of aircraft registration number
[3] The letters CC should not be used in an invest identifier
[4] A=Atlantic, Caribbean, or Gulf of Mexico; E=Eastern Pacific; C=Central Pacific; W=Western Pacific

Table 5-4. Examples of Corrected Observations

EXAMPLES	
URNT11 KNHC 111629 CCA 97779 16264 51286 90000 30400 09054 11071 /3136 40545 RMK AF303 2709A IKE OB 01 CCA	Correction for RECCO message OB 01 from the AF303 02709A IKE mission.
URNT12 KNHC 130552 CCB VORTEX DATA MESSAGE AL092008 A. 13/04:47:20Z B. 28 deg 52 min N 094 deg 37 min W . . . P. AF301 3509A IKE OB 02 CCB MAX FL WIND 103 KT NE QUAD 04:30:40 Z CORRECTED FOR TIME IN ITEM A	Second correction for vortex data message OB 02 from the AF301 3509A IKE mission.
UZNT13 KWBC 080739 CCA XXAA 58062 99300 70760 11606 99/// ///// ///// 00956 25616 09512 . . . 61616 NOAA9 1109A IKE OB 03 CCA 62626 0629 LST WND 894 AEV 20704 CORRECTED RPT DLM WND 08509 0071 82 = XXBB 58068 99300 70760 11606 00/// ///// 11007 26217 22977 24010 . . . 61616 NOAA9 1109A IKE OB 03 CCA 62626 0629 LST WND 894 AEV 20704 CORRECTED RPT DLM WND 08509 0071 82 =	Correction for sonde TEMP DROP code message OB 03 from the NOAA9 1109A IKE mission.

5.8. Operational Flight Patterns. This section details the operational flight patterns that provide vortex and peripheral data on tropical and subtropical cyclones.

5.8.1. Flight Pattern ALPHA Operational Details.

5.8.1.1. Flight Levels and Sequence. Flight levels will normally be 1,500 ft, 925 hPa, 850 hPa, or 700 hPa, depending on data requirements and flight safety. Legs will normally be 105 nm long and flown on intercardinal tracks (45 degrees off cardinal tracks). The flight sequence is shown in Figure 5-8. The pattern can be started at any intercardinal point and then repeated throughout the mission. Prior to starting an inbound or outbound track the aircrew should evaluate all available data, e.g., radar presentation, satellite photo, for flight safety. Once started on course, every effort should be made to maintain a straight track and the tasked altitude. A horizontal observation is required at each leg end point. This data is transmitted immediately. The ALPHA pattern may be modified to satisfy unique customer requirements (such as

extending legs to examine the wind profile of a strong storm) or because of proximity of land or warning areas.

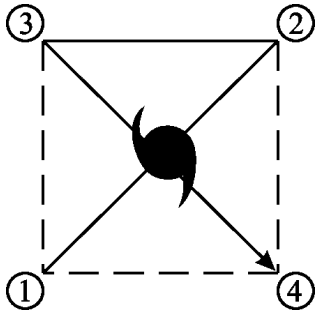

Figure 5-8. Flight Pattern ALPHA

5.8.1.2. Vortex fix data. On each transit of the center a fix will be made and a vortex data message completed, using data gathered on the inbound track since the previous fix and will be transmitted immediately. Center dropsonde data will also be provided for scheduled fixes made at 850 hPa or above. The dropsonde will be released at the flight-level center coordinates (item BRAVO of the vortex data message). For fixes when dropsonde-measured SLP is not available, an extrapolated SLP will be computed and reported.

5.8.2. Investigative Missions. An investigative mission is tasked on tropical or subtropical disturbances to determine the existence or non-existence of a closed circulation, supply reconnaissance observations in required areas, and locate the vortex center, if any.

5.8.2.1. Flight Levels. Flight level will normally be at or below 1,500 ft absolute altitude but may be adjusted as dictated by data requirements, meteorological conditions, or flying safety factors.

5.8.2.2. Vortex Fix. A vortex data message is required if a vortex fix is made.

5.8.2.3. Closed Circulation. A closed circulation is supported by at least one sustained wind reported in each quadrant of the cyclone. Surface winds are preferred.

5.8.2.4. Flight Pattern. The preferred approach is to fly to the tasked coordinates of the forecasted center and then execute a pattern as observed conditions dictate. Suggested patterns are the X, Box, or Delta patterns, but the flight meteorologist may choose any approach. See Figure 5-9. Turns are usually made to take advantage of tailwinds whenever possible. Note: The depicted pattern may be converted to a mirror image if entry is made from a different direction.

- On the X pattern, the aircraft is turned to head directly towards the center, as indicated by the surface or flight level winds. The aircraft is flown through the calm center until winds from the opposite direction occur (second quadrant). The aircraft is then turned to a cardinal heading until a wind shift occurs (third quadrant). Finally, the aircraft is turned towards the center and flown straight through the center to the last quadrant.

- On the Box pattern, the aircraft is flown on cardinal headings around the suspected center. The track resembles three sides of a square.
- On the Delta pattern, the aircraft is flown on a cardinal heading to pass 60 nm from the forecasted center. After observing a wind shift (second quadrant) the aircraft is turned to pass through the center until winds from the opposite direction occur (third quadrant). Finally, the aircraft is turned on a cardinal heading (parallel to the initial heading) to pick up the fourth quadrant winds. If data indicate that the aircraft is far north of any existing circulation, the pattern is extended as shown by the dashed lines.

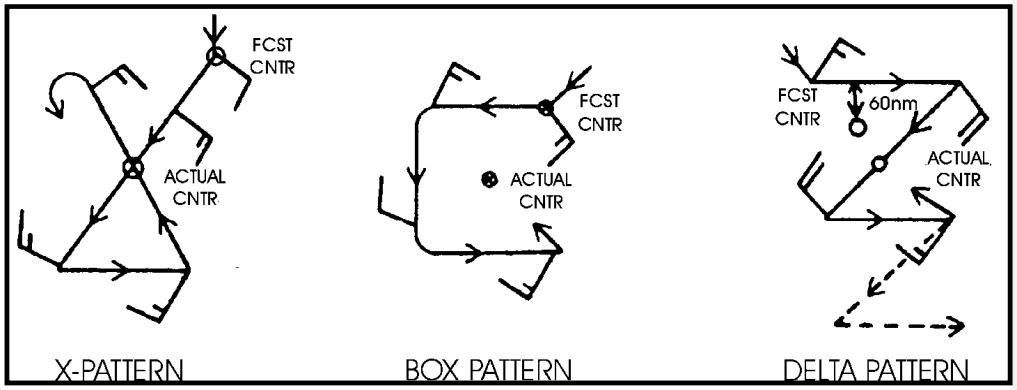

Figure 5-9. Suggested Patterns for Investigative Missions

5.8.3. Synoptic Surveillance Missions. A synoptic surveillance mission is tasked to measure the large-scale wind and thermodynamic fields within approximately 800 nautical miles of tropical cyclones. Specific flight tracks will vary depending on storm location and synoptic situation, and multiple aircraft may be required to satisfy surveillance mission requirements.

5.8.4. Eyewall and Outer-Wind Field Sampling Modules. These are patterns of dropwindsonde releases designed to measure the maximum surface wind, as well as the extent of hurricane and tropical storm force surface winds. They are meant to be flown using the operational alpha pattern. Dropwindsonde releases in these modules are in addition to any other releases required by Table 5-1.

5.8.4.1. Eyewall Module. While executing a standard alpha pattern to satisfy a fix requirement, one sounding will be taken during each inbound and outbound passage through the eyewall (except as noted below), for a total of four soundings. The releases should be made at or just inward (within 1-2 km) of the flight-level radius of maximum wind (RMW). If the radar presentation is suitable, the inner edge of the radar eyewall may be used to identify the release point. If possible, and when resources and safety permit, two dropwindsondes, spaced less than 30 seconds apart, should be deployed on the inbound leg on the side of the storm believed to have the highest surface winds (normally the right-hand side). In this case, the

outer of the two releases should be made at the RMW, with the second release following as soon as possible. Typically, the eyewall module will be tasked within 48 hours of a forecasted hurricane landfall.

5.8.4.2. Outer-Wind Field Module. On an alpha pattern, deploy dropwindsondes at 50 nm intervals from the center on each of two successive inbound and outbound legs, outward to 200 nm. A release should also be made at the midpoint of the cross (downwind) leg, for a total of 19 soundings, including center drops. The length of the legs and the sounding interval may be adjusted, depending on the size of the storm.

5.9. Aircraft Reconnaissance Communications.

5.9.1. General. The 53 WRS WC-130 and NOAA WP-3D aircraft will normally transmit reconnaissance observations via the Air Force Satellite Communications System (AFSATCOM) or commercial SATCOM. Figures 5-10 and 5-11 depict the ASDL and AFSATCOM communications links. The NOAA G-IV will normally transmit WMO Temp Drop messages via commercial SATCOM. Flight meteorologists should contact CARCAH following the first fix, and periodically throughout the mission.

5.9.2. Backup Air-to-Ground Communications. The weather reconnaissance crew may relay weather data via SATPHONE or HF phone patch to the weather data monitor. Monitors will evaluate these reports and disseminate them through the Air Force's Automated Weather Network (AWN) or to the weather communications facility at Suitland, Maryland. Specific radio procedures and terminology will comply with Allied Communications Publication 125, Standard Telephone and Radio Procedures.

5.9.3. Aircraft-to-Satellite Data Link (ASDL)-Equipped Aircraft. Aircraft equipped with ASDL have the option to utilize the ASDL system. Prior to the beginning of the hurricane season, each ASDL-equipped aircraft will perform a ground or airborne test of the equipment and data ground handling procedures to determine the equipment reliability, transmission errors, and time lapse between transmission of the data from the aircraft and receipt of the data by the hurricane forecaster. Test data will be forwarded to the Chair, Working Group for Hurricane and Winter Storms Operations and Research.

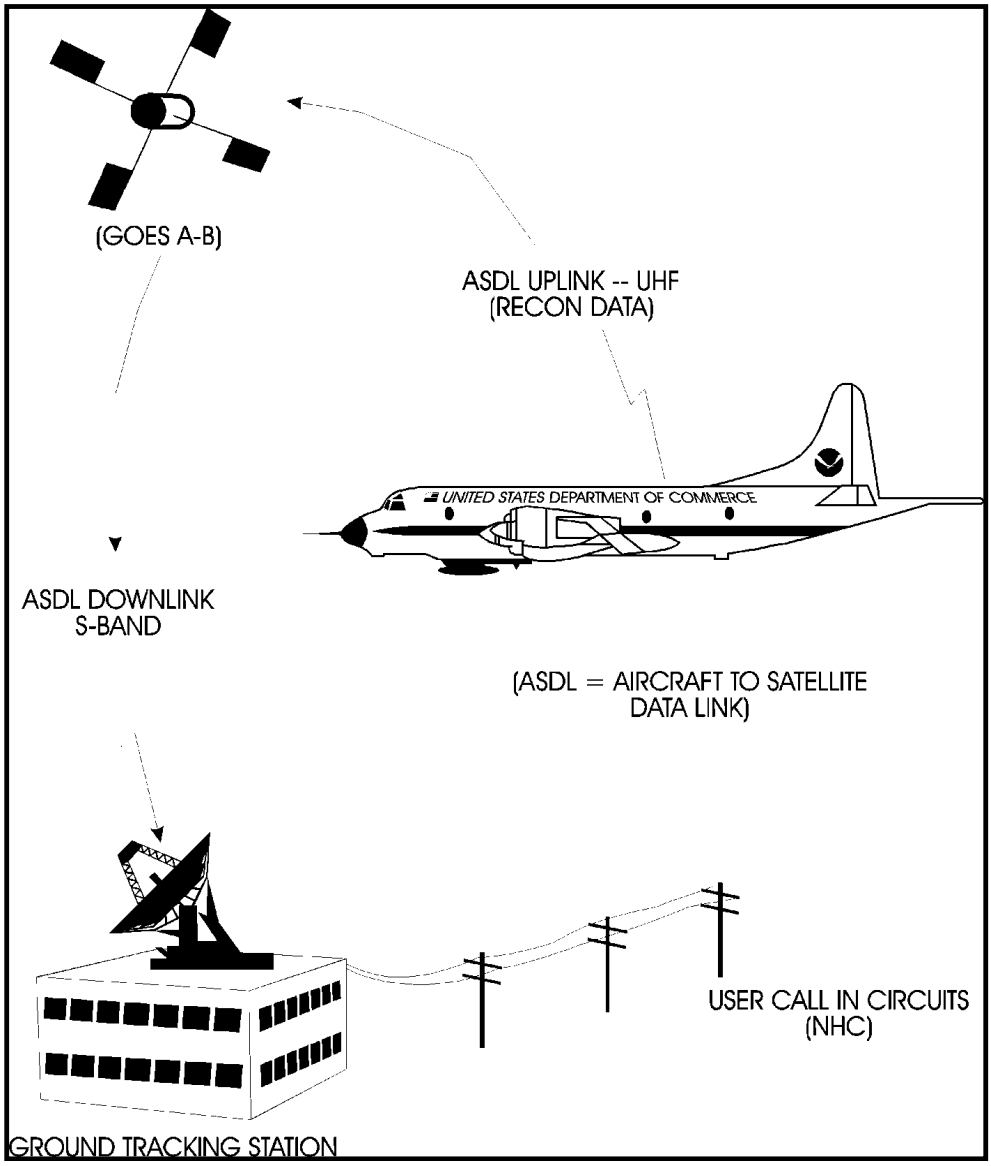

Figure 5-10. Schematic of Aircraft-To-Satellite Data Link for NOAA P-3 Aircraft

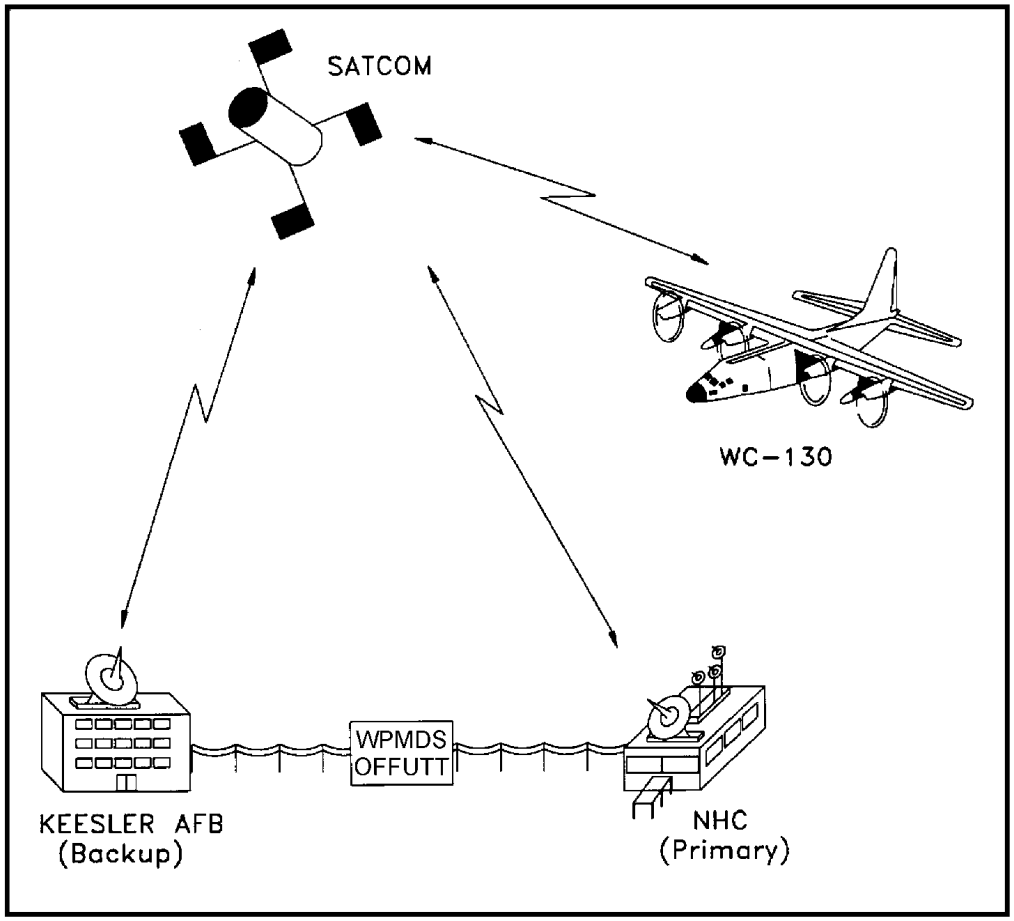

Figure 5-11. Schematic of Aircraft-To-Satellite Data Link for AFRC WC-130 Aircraft

Note: An Internet link from Keesler AFB to NHC provides the capability for all observation types to be passed directly to NHC without going through Offutt Air Force Base.

5.9.4. Backup CARCAH Procedures. Satellite ground stations, which are used to receive and process data from AFRC reconnaissance aircraft, are installed at CARCAH (located within NHC) and the 53 WRS (located at Keesler Air Force Base). The 53 WRS ground station has a similar configuration and communications capability as the satellite ground station installed a CARCAH, except that the CARCAH ground station has additional capability to stream data using serial RS-232 communications to NHC local servers. The ground station at the 53 WRS can fully transmit data using SATCOM and land line to the CARCAH ground station. Both ground stations can send data to AFWA's Weather Product Management and Distribution System (WPMDS)—WPMDS then relays all AFRC/53 WRS reconnaissance data to the NWS Gateway for world-wide distribution. In the event that backup procedures are required due to severe communications failures, severe weather conditions, or other extreme events affecting NHC, some or all CARCAH responsibilities will be transferred to the 53 WRS, ensuring reconnaissance service is uninterrupted.

5.9.4.1. Satellite Antenna Communications Failure at NHC. If an outage is expected to be temporary, 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. No procedure is currently implemented for sending the aircraft data directly to local servers at HPC or CPHC (NHC's COOP backup site); consequently, all data or observations will need to be accessed from the WPMDS or obtained from the NWS Gateway.

For long-term outages, CARCAH will send personnel to the backup site. They will monitor the aircraft data and ensure they are transmitted to the WPMDS, NWS servers, and external users from that location.

5.9.4.2. 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 and send them to local NHC servers. 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 the Internet disruptions occur at AFWA, no data can be sent to the AWN, NWS servers, and external users until service is restored.

5.9.4.3. NHC Emergency Backup Plan. In the event NHC activates the HPC or CPHC COOP backup plan, designated CARCAH personnel will deploy to the backup site to operate the 53 WRS ground station. The reconnaissance data will be obtained at the HPC COOP site either through the WPMDS or the NWS Gateway.

APPENDIX I

TELEPHONE LISTING

AGENCY	LOCATION	TELEPHONE
Department of Commerce		
NHC Director Atlantic Forecast Operations Pacific Forecast Operations Admin Admin Fax TAFB Lead Forecaster	Miami, FL	 COM 305-229-4402 COM 305-229-4415 COM 305-229-4417 COM 305-229-4470 FAX 305-553-1901 COM 305-229-4425
CPHC Director Forecaster and Warning Desk Admin Operations Satellite Coordinator	Honolulu, HI	 COM 808-973-5272 COM 808-973-5284 COM 808-973-5270 FAX 808-973-5281 COM 808-973-5285
NOAA Aircraft Operations Center	MacDill AFB, FL	COM 813-828-3310
NCEP/NCO Senior Duty Met (Data QC)	Camp Springs, MD	COM 301-763-8298
Hydrometeorological Prediction Center (NCEP/HPC)	Camp Springs, MD	COM 301-763-8201
NESDIS Satellite Analysis Branch	Camp Springs, MD	COM 301-763-8444
WFO Guam	Tiyan, Guam	COM 671-472-0950/1/2
NDBC - Operations Branch	Stennis Space Center, MS	COM 228-688-7720
NWS Hydrometeorological Services Core (Headquarters)	Silver Spring, MD	COM 301-713-1858, ext. 108 FAX 301-713-1520
Interdepartmental		
OFCM	Silver Spring, MD	COM 301-427-2002 DSN 851-1460
Department of Defense		
JTWC (Typhoon Duty Officer)	Pearl Harbor, HI	COM 808-474-2320
53rd Weather Reconnaissance Squadron (WRS) Supervisor of Flights Chief ARWO Alternate CARCAH	53 WRS 817 H Street, Suite 201 Keesler AFB, MS 39534-2453	DSN 597-2409 COM 228-377-2409 DSN 597-3207 COM 228-377-3207 DSN 597-9060 COM 228-377-9060
CARCAH OLA, 53d WRS	Miami, FL	COM 305-229-4474 DSN 434-3420
Keesler AFB Command Post	Keesler AFB, MS	COM 228-377-4181/4330 DSN 597-4181/4330
AFWA	Offutt AFB, NE	COM 402-294-2586 DSN 271-2586
FACSFAC VACAPES OAC	Oceana, VA	COM 804-433-1233 DSN 433-1233
FACSFAC Roosevelt Roads	Roosevelt Roads, PR	COM 787-865-7007 DSN 831-7007/5202/5203
17 OWS/WXJ (Satellite Analyst)	Pearl Harbor, HI	COM 787-865-7007 DSN 471-3533
601 AOC/CODW	Tyndall AFB, FL	COM 850-283-5119 DSN 523-5119
NAVLANTMETOCCEN	Norfolk, VA	COM 757-444-7583/7750 DSN 564-7583/7750
Fleet Numerical Meteorology & Oceanography Center (FNMOC) (Alternate JTWC)	Monterey, CA	COM 831-656-4325 DSN 878-4325

Department of Transportation/Federal Aviation Administration					
Air Route Traffic Control Center (ARTCC)					
ARTCC	**Facility ID**	**Primary Operations Contact Point**	**Secondary Operations Contact Point (24 hour number)**	**Operations Fax Number**	**Center Weather Service Unit (CWSU)**
ANCHORAGE	ZAN	907-269-1103 (OMIC)	907-269-1108 (TMC)	907-269-1343	907-269-1145
BOSTON	ZBW	603-879-6663 (TMC)	603-879-6655 (OMIC)	603-879-6461	603-879-6698
HOUSTON	ZHU	281-230-5563 (Missions)	281-230-5560 (OMIC)	281-230-5561	281-230-5676
JACKSONVILLE	ZJX	904-549-1542 (Missions)	904-549-1537 (OMIC)	904-549-1843	904-549-1840 or 904-549-1839
LOS ANGELES	ZLA	661-265-8287 (Missions)	661-265-8205 (OMIC)	661-265-8277	661-265-8258
MIAMI	ZMA	305-716-1589 (Missions)	305-716-1588 (OMIC)	305-716-1511 or 305-716-1577	305-716-1635
NEW YORK	ZNY	631-468-1427 (Missions)	631-468-1080 (STMC)	631-468-4224	631-468-1082
OAKLAND	ZOA	510-745-3332 (Missions)	510-745-3331 (OMIC)	510-745-3339	510-745-3425
SEATTLE	ZSE	253-351-3523 (Missions)	253-351-3520 (OMIC)	253-351-3594 or 253-351-3538	253-351-3741
WASHINGTON	ZDC	703-771-3473 (Missions)	703-771-3470 (OMIC)	703-771-3444	703-771-3480
HONOLULU HCF	ZHN	808-840-6204 (TMC)	808-840-6201 (Front Line Manager)	808-840-6210	N/A
SAN JUAN CERAP	ZSU	787-253-8665 (Front Line Manager)	787-253-8664 (Front Line Manager)	787-253-8650	N/A
GUAM CERAP	ZUA	671-473-1210 (Front Line Manager)	671-473-1270 (Missions)	671-473-1217	N/A

Air Traffic Control System Command Center (ATCSCC)	
MANAGER, ATCSCC	COM 540-422-4004
PRIMARY OPERATIONS CONTACT POINT INTERNATIONAL OPERATIONS POSITION	COM 540-422-4158 FAX 540-422-4196
SECONDARY OPERATIONS CONTACT POINT NATIONAL OPERATIONS MANAGER (NOM)	COM 540-422-4100/4101/4102 800-333-4286 (Military Use Only) FAX 540-422-4196
CENTRAL ALTITUDE RESERVATION FUNCTION (CARF)	COM 540-422-4211/4212 FAX 540-422-4291
US NOTAM Office	COM 540-422-4260/4261 FAX 540-422-4983

TMC – Traffic Management Coordinator
OMIC - Operations Manager in Charge
STMC – Supervisor Traffic Management Coordinator

Comment [sjt1]: Changes to table already incorporated, so changes not visible via track changes (14 Mar 2012 – Lynn Fitchpatrick/FAA/CTR)

Transport Canada (ANS Regulatory Authority)	
Civil Aviation Contingency Operations (CACO) Office	COM (Toll-free from Canada) 1-877-992-6853 FAX (Toll-free from Canada) 1-866-993-7768
NAV CANADA (ANS Provider)	
National Operations Centre (NOC)	
Admin Hours	0600-2200 (local Eastern time)
NOC (24 Hours) (ATCSCC of Canada)	COM 613-563-5626 COM 613-563-5667 COM (Toll-free from Canada) 1-866-561-9053 COM (Toll-free from U.S.A.) 1-866-651-9056 FAX 613-563-3481
International NOTAM Office (Canada)	COM 613-248-4000 FAX 613-248-4001
Altitude Reservation Units (ARU)	
ARU West (Edmonton ACC) (responsible for Vancouver, Edmonton and Winnipeg FIRs)	COM 780-890-4739 FAX 780-890-4738
ARU East (Gander ACC) (responsible for Toronto, Montreal, Moncton and Gander FIRs)	COM 709-651-5243 FAX 709-651-5288

Area Control Centers (ACC)

ACC	Facility ID	Primary Operations Contact Point (Shift Manager)	Secondary Operations Contact Point	Fax Number
TORONTO	ZYZ	905-676-4509	905-676-4562	905-612-5613
MONTREAL	ZUL	514-633-3365	514-633-2871	514-633-3371
MONCTON	ZOM	506-867-7173	506-381-4684	506-867-7180
WINNIPEG	ZWG	204-983-8338	204-983-8483	204-984-0030
EDMONTON	ZEG	780-890-8397	780-890-8323	780-890-8011
GANDER	ZQX	709-651-5207	709-651-5223	709-651-5234
VANCOUVER	ZVR	604-598-4500	604-598-4850	604-586-4502

APPENDIX L

Comment [sjt1]: After changes made, worksheet will also be reduced to fit on one page

Field Code Changed

MISSION COORDINATION SHEET

~~(for use by NOAA WP-3 and 53rd WRS aircrews)~~

1. **Aircraft Call Sign:** _____
2. **TCPOD Number:** _____
3. **Departure & Planned Recovery Airfields:** _____

   _____
4. **Route of Flight:** _____

   _____
5. **Storm Center Coordinates:** _____
6. **Radius of Operation from Center Coordinates:** _____

Note: This area excludes the terminal areas (Class D Airspace) and any other airspace within 50 NM of the CONUS shoreline until radio contact is established with ATC.

7. **Expected ~~Delay~~ Entry & Exit Times for~~in~~ Operating Area~~Storm::~~** _____

   _____ _____
8. **Requested Operating Area ~~Block~~ Altitude/Block:** _____

   _____ _____
9. **Aircraft SATCOM #:** _____
10. **HF ~~Selcal~~ SELCAL (if applicable):** _____

    _____ ___

11. ~~Requested~~ NORAD Transponder Code: _____

~~11.~~12. POC Contact Information:

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