

NAVY/MARINE CORPS HELICOPTER TAIL WIND TAKEOFF EVENTS

This short paper was initiated following a class A MV-22B mishap in Morocco that occurred during a tail wind take-off. All reportable tail wind events (Class A/B/C/D and Hazards) were included in the extracted data. The charts and tables that follow will show the Type/Model/Series of involved aircraft, the event location, event severity, relative wind, pilot at the controls flight hours and pilot at the controls causal factors. All data was extracted from the Web Enabled Safety System (WESS). Event dates span from 1 January 1980 to 24 July 2012.

Mishaps and hazards involving a tail wind take-off are rarely reported in naval aviation. Since 1 January 1980, there have only been twenty reported events. Figure 1 below shows the frequency of tail wind events.

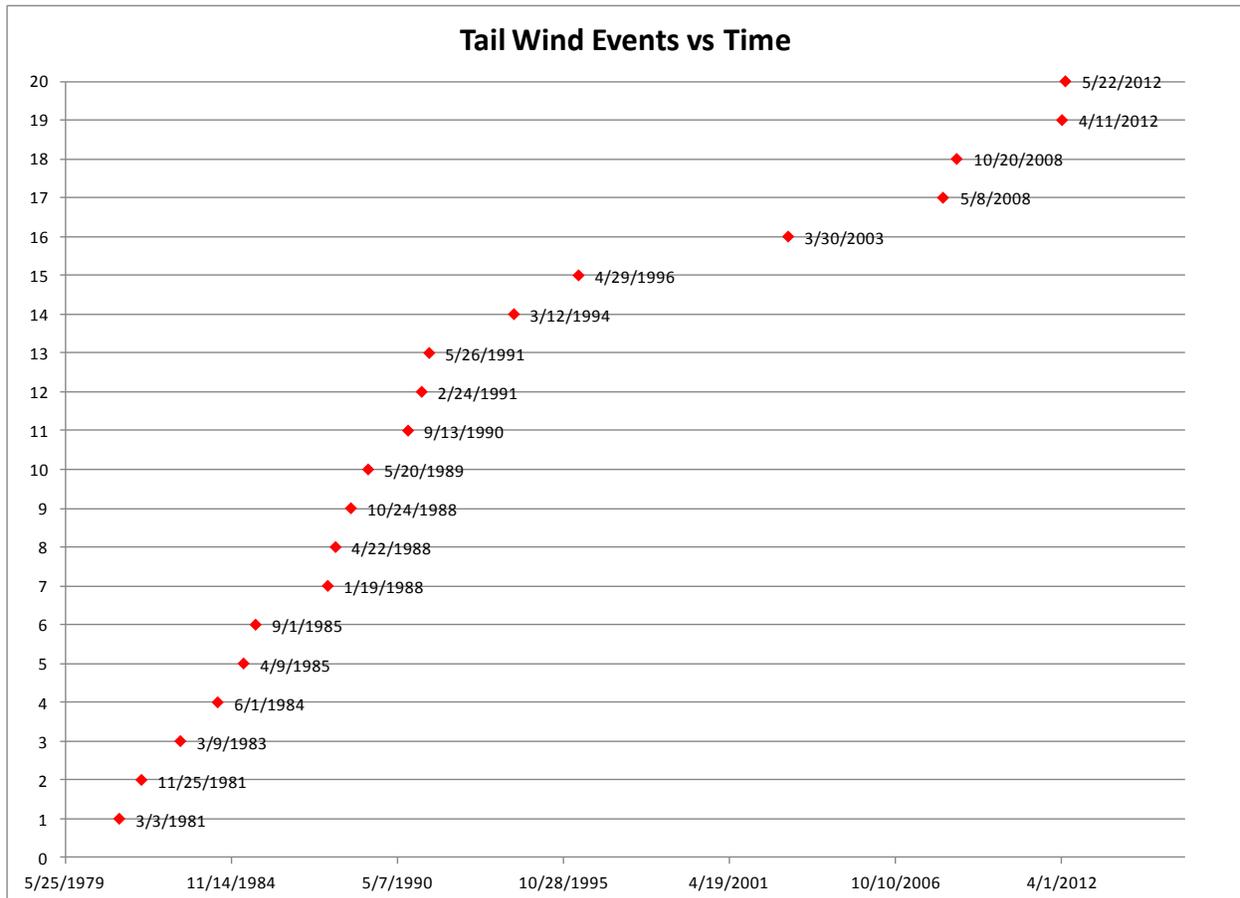


Fig 1: Tail Wind Event Frequency

It can be seen from figure 1 that the frequency of tail wind take-off events has decreased since 20 May 1989. The decreased slope of the line after that date indicates a

decreased frequency. A summary of the twenty events is displayed in figure 2.

DATE	COMMAND	LOCATION	T/M/S	SEVERITY	REL WIND DIR	REL WIND SPD	BRIEF NARRATIVE
3/3/1981	HMM-165	NORTH PACIFIC	CH046D	A	60	29	ACFT STRUCK SHIP DURING HOVER, CRASHED INTO SEA.1 FATAL/2 RESCUED.
11/25/1981	VXE-6	ANTARCTICA	UH001N	B	250	3	ACFT ROLLED ONTO IT'S SIDE DURING TKOF FROM REMOTE OPEN FLD SITE.
3/9/1983	HT-8	OLF SPENCER	TH057A	B	230	12	MRB STRUCK GROUND ON TAKEOFF AFTER PRACTICE HOVERING AUTOROTATION.
6/1/1984	HMH-465	NORTH PACIFIC	CH053E	A	220	2	ACFT WITH EXTERNAL LOAD DISINTEGRATED INFLIGHT. NO SURVIVORS.
4/9/1985	HC-6	SOUDA	CH046D	H	-	-	VERTREP OPERATIONS WITH A TAILWIND
9/1/1985	HC-11	USS FIFE	HH046A	A	180	10	ACFT LOST ALTITUDE DURING TAKEOFF AND CRASHED INTO SHIP.
1/19/1988	HSL-44	USS SPRUANCE	SH060B	A	-	-	ACFT CRASHED INTO WATER AFTER NIGHT TAKEOFF.
4/22/1988	HC-6	USS MOUNT BAKER	CH046D	B	140	7	ACFT STRUCK PIER CRANE DURING TAKEOFF.
10/24/1988	HC-6	NOT REPORTED	UH046D	H	-	-	VERTREP OPERATIONS WITH A TAILWIND
5/20/1989	HC-5	NOT REPORTED	HH046D	H	-	-	VERTREP OPERATIONS WITH A TAILWIND
9/13/1990	HMH-465	SAUDI ARABIA	CH053E	A	-	-	ACFT CRASHED INTO GROUND DURING TAKEOFF.
2/24/1991	HMM-161	CLASSIFIED	CH046E	B	-	-	AIRCRAFT STRUCK GROUND ON TAKEOFF FROM DESERT LZ.
5/26/1991	HSL-41	COLORADO	SH060B	H	-	-	NOT REPORTED
3/12/1994	HMH-363	BRIDGEPORT	CH053D	A	180	15	ACFT HIT TREES/GROUND FOLLOWING TAKEOFF FROM MOUNTAINOUS LZ.
4/29/1996	HT-18	OLF SANTA ROSA	TH057B	C	-	-	ACFT EXPERIENCED LEFT YAW, LOST ALT AND HIT TAXIWAY DURING AIR TAXI.
3/30/2003	HMLA-169	IRAQ	UH001N	A	180	12	ACFT STRUCK GROUND ON TAKEOFF DURING NVG OPERATIONS.
5/8/2008	HT-18	WHITING	TH057	C	-	-	AIRCRAFT TAIL STINGER CONTACTED TAXIWAY DURING HOVER TAXI
10/20/2008	NAVTESTPILOTSCH	PATUXENT RIVER	OH058C	B	-	-	AIRCRAFT ROLLED OVER. NO INJURIES.
4/11/2012	VMM-261	MOROCCO	MV022B	A	-	-	MV-22B CRASHED DURING DAY VFR DEPARTURE FROM LZ IN MOROCCO. 2 FATAL, 2 INJURED.
5/22/2012	DP COMNAVAIRPAC	NOT REPORTED	MH060S	H	-	-	MH-60S: LOSS OF TAIL ROTOR EFFECTIVENESS (LTE)

Fig 2: Tail Wind Take-off Event Summary

- Note that in twelve of the events the relative wind was not reported.
- The reported wind in the 3/3/1981 event does not represent a tail wind. However the full narrative describes a tail wind take-off.
- Eight events were class A events. There were four class A events between 1980 and 1988, and only four more after 1988.
- Three events involving H-46 aircraft occurred during VERTREP operations.

Figure 3 displays the Type/Model/Series of the involved helicopters. Seven of the twenty events involved an H-46.

T/M/S	# Of EVTS	T/M/S	# Of EVTS
CH046D	3	TH057B	1
UH001N	2	OH058C	1
CH053E	2	UH046D	1
SH060B	2	CH046E	1
HH046A	1	MH060S	1
HH046D	1	TH057	1
CH053D	1	TH057A	1
MV022B	1		

Fig 3: Type/Model/Series of Involved Aircraft

Figure 4 summarizes the flight experience of the pilot at the controls during a tail wind take-off event. Of the twenty events, only fifteen reported model/lifetime total hours, and only eleven reported 7day, 30day and 90 day hours.

MEASURE	7DAY	30DAY	90DAY	MODLIFE	TOTLIFE
MEDIAN	5.0	9.0	28.5	396.5	1190.0
AVERAGE	5.1	14.6	31.1	548.0	1196.5

Fig 4: Pilot Flight Experience in Tail Wind Take-off Events

It can be seen that the average pilot had a lot less flight experience in model when compared to total flight time, perhaps indicating a pilot transition from another aircraft. It may also indicate time away from the aircraft while serving in instructor/training command duty. This may suggest that transition from another aircraft may be a factor in tail wind take-off events.

INVOLVED FACTORS

Figure 5 lists the "What" factors associated with the pilot at the controls during tail wind events.

"WHAT" FACTORS	COUNT
MISUSE OF COLLECTIVE/CYCLIC	5
FAILED TO TAKE SPECIFIC NECESSARY ACTION	3
FAILURE TO BACKUP PLT/COPLT/ACCDR/HAC/PIC/FLT LEAD/WINGMAN/E	3
NO/INADEQUATE AIRCREW MISSION BRIEF	3
IMPROPER TRANSITION TO FORWARD FLIGHT	3
DELAYED APPROPRIATE ACTION	2
MISJUDGED SPEED/TAXIED TOO FAST FOR CONDITIONS	2
FAILED TO TAKE CONTROL IN TIME TO PREVENT MISHAP	2
FAILURE TO GIVE EFFECTIVE INSTRUCTIONS	2
OTHER	2
DYNAMIC ROLLOVER	2
FAILED TO TAKE SPECIFIC NECESSARY ACTION	2
EXCEEDED MAXIMUM DESIGN SPEED FOR MANEUVER (NATOPS/SOP)	1
OVERSTRESSED LANDG GEAR DUE TO SKID/EXCESS SPEED,SINK RATE/O	1
FAILED TO USE/INCORRECT USE OF SOPS/NATOPS/TECHNIQUES IN IMC	1
FAILED TO PROPERLY BRIEF	1
INADEQUATE MISSION PLANNING	1
IN MISSION OR MANEUVER	1

Fig 5: Pilot at the Controls "What" Factors

Figure 6 lists the "Why" factors associated with the pilot at the controls.

"WHY" FACTORS	COUNT
CHANNELIZED ATTENTION; FIXATION	5
POOR DECISION	4
COMPLACENCY, OTHER	4
OTHER	3
POOR JUDGEMENT	3
FAILURE TO CONSIDER OR EMPLOY AVAILABLE/ADEQUATE RISK CONTROLS	3
FATIGUE, OTHER	2
MISPLACED MOTIVATION	2
SPATIAL DISORIENTATION, UNRECOGNIZED; MISORIENTATION	2
BETWEEN PILOT & COPILOT	2
OVER CONFIDENT	2
ADJUSTMENT ERROR	1
COGNITIVE SATURATION	1
DISTRACTION EXTERNAL	1
FEAR/ANXIETY/APPREHENSION	1
NECESSARY INFORMATION HAD NOT BEEN PROVIDED	1
OVER CONTROL	1
RECEIVED BUT NOT READ/REVIEWED/IMPLEMENTED	1
RUSHED DECISION	1
SENT/RECEIVED BUT IN ERROR	1
FAILURE OF CREW LEADERSHIP	1
MISPERCEPTION OF CHANGING ENVIRONMENT	1

Fig 6: Pilot at the Controls "Why" Factors

Please note the Naval Safety Center stopped using "What/Why" factors in October of 2010 and transitioned to the Human Factors Analysis and Classification System (HFACS). The 11 April 2012 MV-22B mishap and the 5/22/2012 MH-60S hazard were entered into WESS using HFACS. The HFACS for those mishaps were changed for the purpose of this study to reflect the "What/Why" factor system and are included in figures 5 and 6.

Although take-offs in helicopters may be accomplished with a considerable amount of tail wind, pilots must be vigilant of the different techniques involved with a tail wind. The tail wind will require increased power. A turn during take-off will require more collective and even more power to compensate for the changing rotor thrust. If the helicopter is out of ground effect it will also require more power. Additionally, ground

run distance will be increased and altitude gain and indicated airspeed will be delayed.

The "What" factors in figure 5 show that improper control input is the leading factor in tail wind take-off events. Specifically "misuse of collective/cyclic" is number one and "improper transition to forward flight" is tied for number 2. The "Why" factors show that channelized attention/complacency and poor communications/back-up are also major contributing factors. Other factors such as high gross weight, high take-off altitude and poor visibility generally are not listed as major factors.