Civil Air Patrol

Winter Flight Operations

Risk Assessment

ONE CIVIL AIR PATROL, EXCELLING IN SERVICE TO OUR NATION AND OUR MEMBERS!

For Discussion

- Risk Assessment
  - If CAP conducts “cold weather” flight operations, then *is there* increased risk of engine failure or personnel losses (post-crash hypothermia)
  - Risk management process / risk controlling authority
  - Data and conclusions
- Potential Risk Controls
  - Identification
  - Operational impacts
- Recommendations

CAP Risk Management Process

ID Hazards

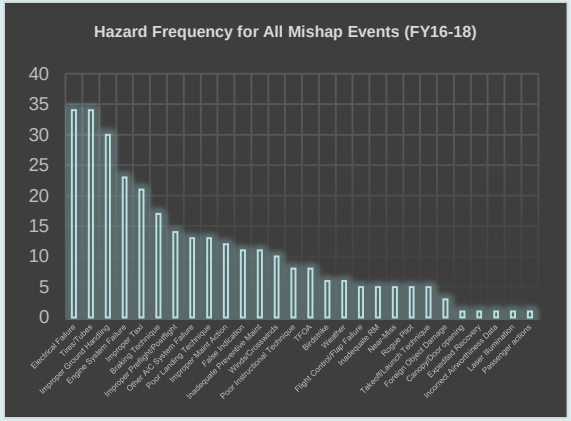
- SIRS data
- Mishap Analysis Tool
- Operational analysis

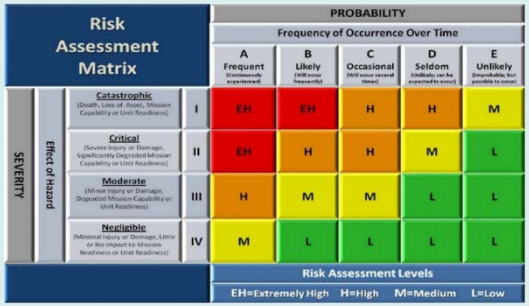
Assess Risk

- Probability
- Severity
- Risk categories (by level)
- Rank order (HRI)

Develop Controls

- Appropriate RCA
- Regulatory
- RA&R
- Training





Appropriate RCA

70-1/Supps **SOPs**

No-Go RA&R Trng

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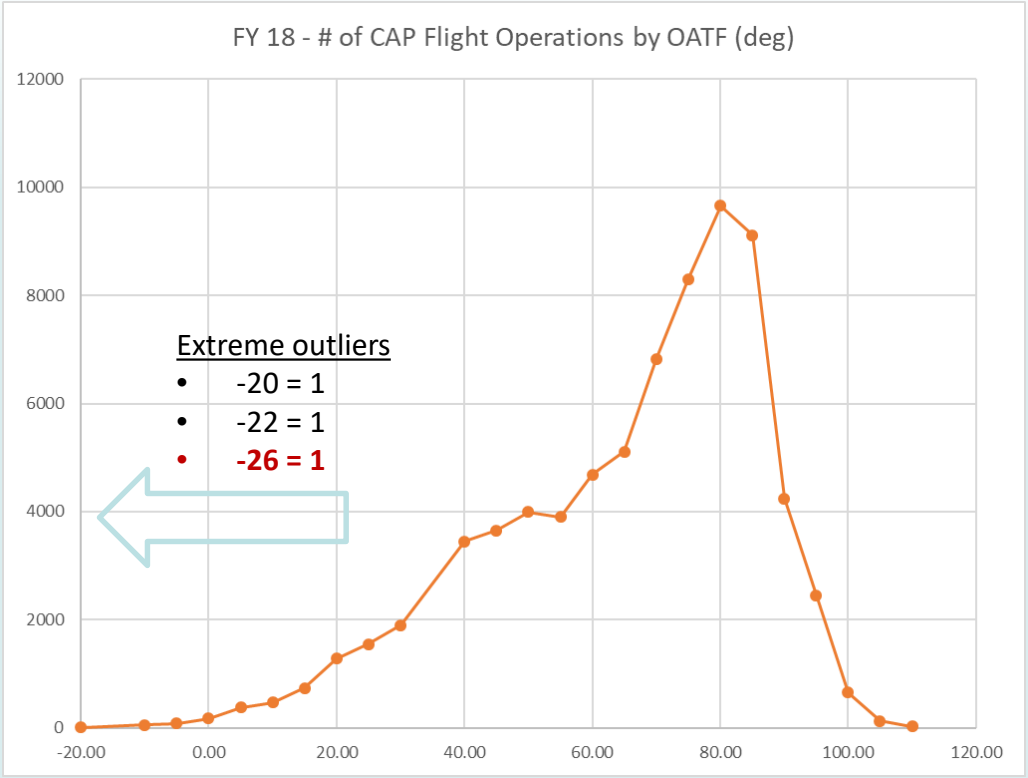
Risk Controlling Authority (RCA)

- National – Extremely High or High Risk (HRIs 1-8)
- Region/Wing – Medium or Low Risk (HRIs 9-20)

Severity	Probability				
	Frequent ~1 mo 1/10000 hours	Likely ~6 mo 1/50000 hours	Occasional ~1 yr 1/100000 hours	Seldom ~5 yrs 1/500000 hours	Unlikely ~10 yrs 1/1000000 hours
Catastrophic death or loss	1 Extremely High	2 Extremely High	4 High	8 High	12 Medium
Critical severe damage, injury, or immed. pilot action to avoid	3 Extremely High	5 High	6 High	10 Medium	15 Low
Moderate minor damage, injury, or safety mission abort	7 High	9 Medium	11 Medium	14 Low	17 Low
Negligible minimal injury or damage, continue mission w/ min. risk	13 Medium	16 Low	18 Low	19 Low	20 Low

Flight Operations & OATF

- **Approximately 4.5% of FY18 flight operations conducted ≤20°F**
- **Cold weather ops underrepresented in FY18 due to CR**
- **Conservative estimate for FY14-18 is >20,000 sorties at ≤20°F**



Relevant CAP Mishap Data

- Zero confirmed weather/temp related engine failures (hot or cold)
- Mishap FY18-10766 – Connecting rod failure; went through block
  - Two aircraft, same day, same mission, same wx – one failure
  - Common Risk Controls
    - Engine block heater, covered with blanket
    - Brought to operating temp before take-off; green band throughout flight
  - Cause of cylinder failure not confirmed
    - “Without factory engine teardown, exact cause will never be known.”
- Hazard = Cold weather Ops?
  - Risks?

Risk Assessment = Medium

Aircrew		Materiel & Maintenance		Operations	
HRI	*Hazard*	*HRI*	*Hazard*	*HRI*	*Hazard*
2	Inadequate RM (11)	**3**	Electrical sys fail (39)	**4**	NMAC (5)
2	Willful violation (8)	**3**	Engine sys fail (33)	9	Birdstrike (14)
3	Landing technique (47)	6	Flight control fail (6)	9	Actions of Others (13)
3	Pre-/Post-flight (29)	7	Improper maint (32)	9	Winds/Crosswinds (12)
3	CP/IP actions (21)	7	Other system fail (31)	9	Weather (7)
5	Takeoff technique (7)	7	False indication (17)	10	Cold Weather (1)
7	Ground handling (35)	9	Inadequate PM (12)		
7	Improper taxi (26)				

By process & attributes, mitigation of cold weather equipment hazard falls to Region/Wing

Potential Risk Controls

Region or Wing Level

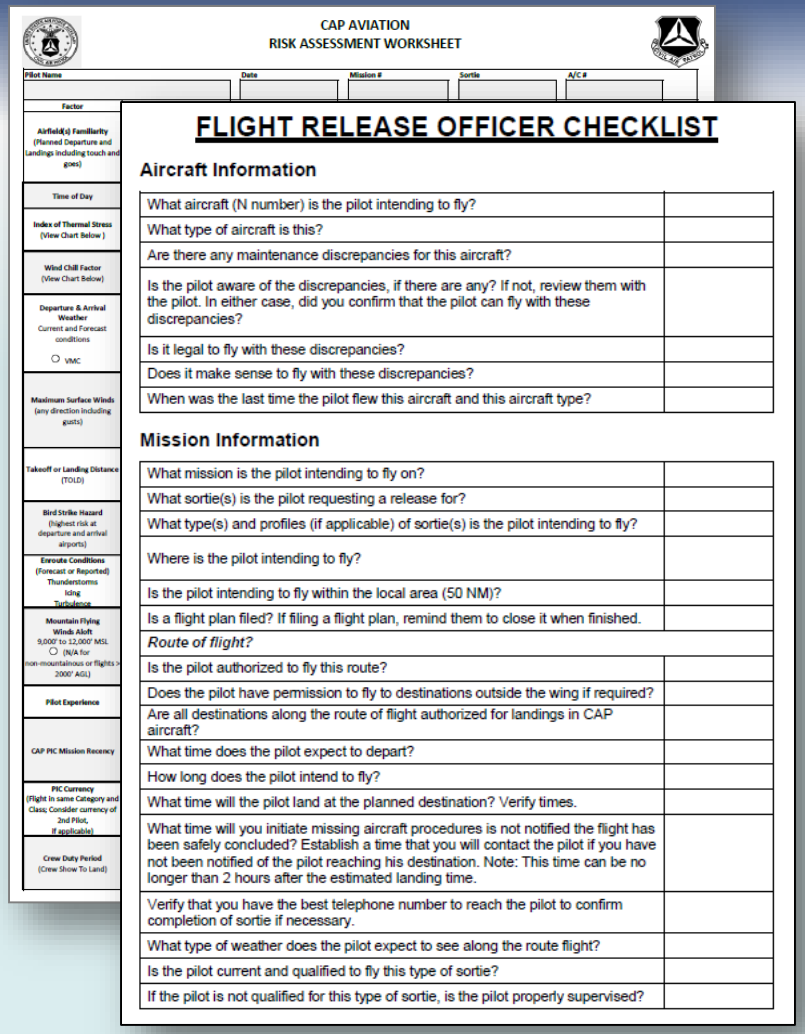
National Level

Region and Wing Supplements

- Example: North Dakota Cold Weather Flying Procedures
  - Annual Cold Weather Flying brief
  - Preheat required for non-hangered aircraft <40°F
  - Winterization kits to be used iaw POH for each aircraft
    - Oil cooler plate install and remove seasonally by A&P
    - Pilot responsible for installing/removing kit based on OAT
    - ND/LGM must be notified on problems exist with kit
  - Flying limitations
    - 0-10°F: Power-off limited to 1500/15
    - <0°F: at discretion of IC if air support is required
    - >-20°F: No T&G practice
    - <-20°F: ND/DO approval required

Risk Assessment & Release

- Cold is risk assessed as a crew factor on the Risk Assessment Worksheet (RAW)
- Cold Wx risk to equipment is not addressed in the RAW or the FRO Checklist



CAP AVIATION
RISK ASSESSMENT WORKSHEET

Pilot Name | Date | Mission # | Sortie | A/C #

Factor

Airfield(s) Familiarity (Planned Departure and Landings including touch and goes)

Time of Day

Index of Thermal Stress (View Chart Below)

Wind Chill Factor (View Chart Below)

Departure & Arrival Weather Current and Forecast conditions
○ VMC

Maximum Surface Winds (any direction including gusts)

Takeoff or Landing Distance (TOLD)

Bird Strike Hazard (highest risk at departure and arrival airports)

Enroute Conditions (Forecast or Reported) Thunderstorms Icing Turbulence

Mountain Flying Winds Aloft 9,000' to 12,000' MSL
○ (N/A for non-mountainous or flights < 2000' AGL)

Pilot Experience

CAP PIC Mission Recency

PIC Currency (Flight in same Category and Class; Consider currency of 2nd Pilot, if applicable)

Crew Duty Period (Crew Show To Land)

FLIGHT RELEASE OFFICER CHECKLIST

Aircraft Information

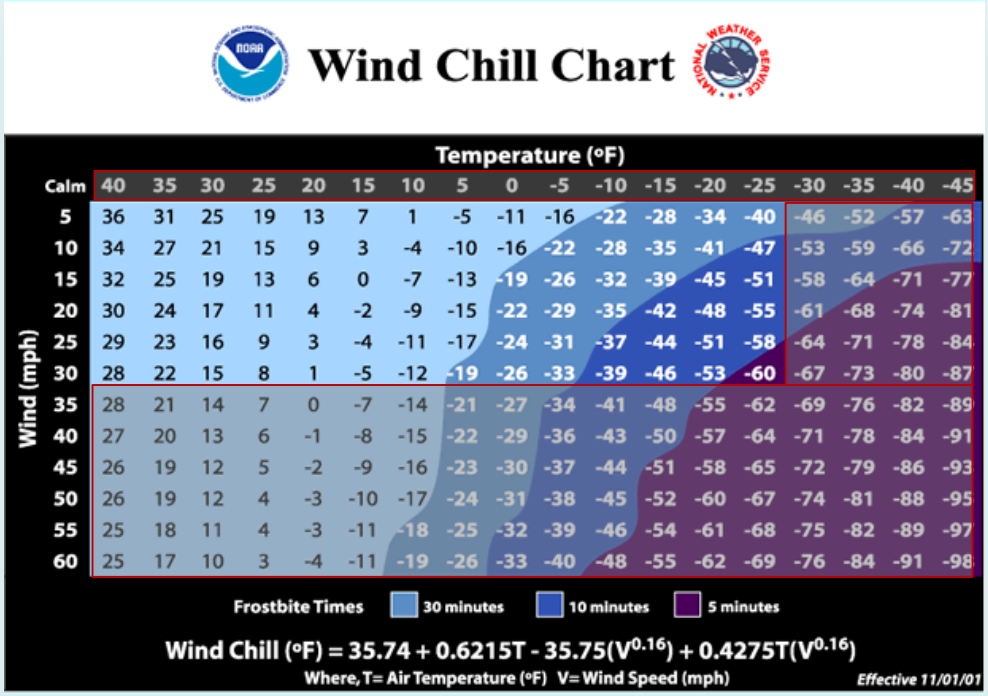
What aircraft (N number) is the pilot intending to fly?	
What type of aircraft is this?	
Are there any maintenance discrepancies for this aircraft?	
Is the pilot aware of the discrepancies, if there are any? If not, review them with the pilot. In either case, did you confirm that the pilot can fly with these discrepancies?	
Is it legal to fly with these discrepancies?	
Does it make sense to fly with these discrepancies?	
When was the last time the pilot flew this aircraft and this aircraft type?	

Mission Information

What mission is the pilot intending to fly on?	
What sortie(s) is the pilot requesting a release for?	
What type(s) and profiles (if applicable) of sortie(s) is the pilot intending to fly?	
Where is the pilot intending to fly?	
Is the pilot intending to fly within the local area (50 NM)?	
Is a flight plan filed? If filing a flight plan, remind them to close it when finished.	
Route of flight?	
Is the pilot authorized to fly this route?	
Does the pilot have permission to fly to destinations outside the wing if required?	
Are all destinations along the route of flight authorized for landings in CAP aircraft?	
What time does the pilot expect to depart?	
How long does the pilot intend to fly?	
What time will the pilot land at the planned destination? Verify times.	
What time will you initiate missing aircraft procedures is not notified the flight has been safely concluded? Establish a time that you will contact the pilot if you have not been notified of the pilot reaching his destination. Note: This time can be no longer than 2 hours after the estimated landing time.	
Verify that you have the best telephone number to reach the pilot to confirm completion of sortie if necessary.	
What type of weather does the pilot expect to see along the route flight?	
Is the pilot current and qualified to fly this type of sortie?	
If the pilot is not qualified for this type of sortie, is the pilot properly supervised?	

Pre-flight Risk Assessment

Wind Chill Factor (View Chart Below)	○ Normal (0 pts)	○ Caution (1 pt)	○ Danger (3 pts)	○ Many Danger Sorties >= 4 Danger Sorties in the same operational period (5 pts)	○ Cancel Zone (60 pts) **CAP/DO or designee approval required**



Wind Chill Chart

Temperature (°F)

Wind (mph)	Calm	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5		36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10		34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15		32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20		30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25		29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30		28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35		28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40		27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45		26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50		26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
55		25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
60		25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98

Frostbite Times: 30 minutes | 10 minutes | 5 minutes

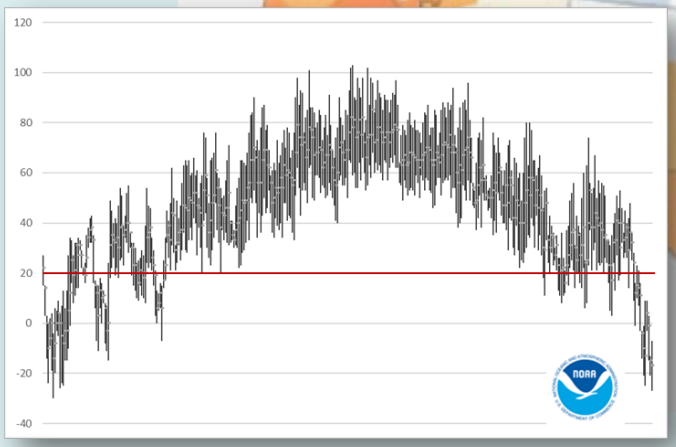
$$\text{Wind Chill (°F)} = 35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})$$

Where, T= Air Temperature (°F) V= Wind Speed (mph)

Effective 11/01/01

- Zones based on NOAA Wind Chill algorithm
- Programming required to change the algorithm
- Wind Chill is undefined when the wind is calm
- “Cancel zone” driven by CAPR 70-1 wind limit
- Paper version ends at -25
- Simplify and replace?

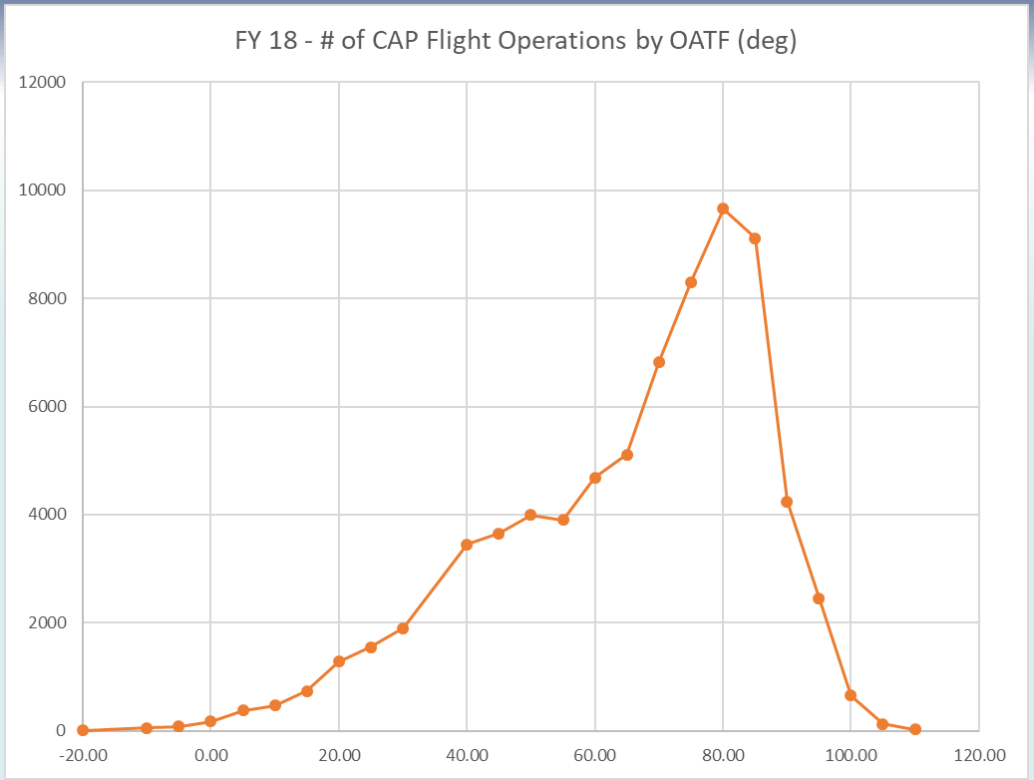
Operational Impact of Restricting Flight below an OAT



Operational Impact in Lost Days

Color	20°F	0°F	-20°F
Dk Blue	35	5	0
Md Blue	20	1	0
Lt Blue	10	0	0

Operational Impact of Elevated Release Authority



OATF Limit	20°	10°	0°	-10°	-20°
NHQ Approvals	3167	1149	307	52	3

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Recommendations

1. Change to Pre-flight Risk Assessment
   - Replace wind chill algorithm with set temp bands
   - Set scores to escalate @ -10°F (Wing) & -20°F (CAP/DO)
   - Implement via change to WMIRS and AIF
2. Provide emphasis on upcoming cold weather operations
   - Critical read file
   - Hot News, eServices News/RSS Feed highlighting:
     - Safety Beacon content
     - Best practices training materials
     - External resources
3. Monitor frequency of operations, approvals, performance