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

Hazard Frequency for All Mishap Events (FY16-18)

ONE CIVIL AIR PATROL, EXCELling in service to our nation and our members!
# Risk Controlling Authority (RCA)

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

<table>
<thead>
<tr>
<th>Severity</th>
<th>Frequent (~1 mo, 1/10000 hours)</th>
<th>Likely (~6 mo, 1/50000 hours)</th>
<th>Occasional (~1 yr, 1/100000 hours)</th>
<th>Seldom (~5 yrs, 1/500000 hours)</th>
<th>Unlikely (~10 yrs, 1/10000000 hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catastrophic (death or loss)</td>
<td>Extremely High</td>
<td>Extremely High</td>
<td>High</td>
<td>High</td>
<td>Medium</td>
</tr>
<tr>
<td>Critical (severe damage, injury, or immed. pilot action to avoid)</td>
<td>Extremely High</td>
<td>High</td>
<td>High</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td>Moderate (minor damage, injury, or safety mission abort)</td>
<td>High</td>
<td>Medium</td>
<td>Medium</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Negligible (minimal injury or damage, continue mission w/ min. risk)</td>
<td>Medium</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
</tbody>
</table>

**Note:**
- **HRIs 1-8** indicate Extremely High or High Risk levels.
- **HRIs 9-20** indicate Medium or Low Risk levels.
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

Extreme outliers:
- -20 = 1
- -22 = 1
- -26 = 1
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?
<table>
<thead>
<tr>
<th>HRI</th>
<th>Aircrew Hazard</th>
<th>HRI</th>
<th>Materiel &amp; Maintenance Hazard</th>
<th>HRI</th>
<th>Operations Hazard</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Inadequate RM (11)</td>
<td>3</td>
<td>Electrical sys fail (39)</td>
<td>4</td>
<td>NMAC (5)</td>
</tr>
<tr>
<td>2</td>
<td>Willful violation (8)</td>
<td>3</td>
<td>Engine sys fail (33)</td>
<td>9</td>
<td>Birdstrike (14)</td>
</tr>
<tr>
<td>3</td>
<td>Landing technique (47)</td>
<td>6</td>
<td>Flight control fail (6)</td>
<td>9</td>
<td>Actions of Others (13)</td>
</tr>
<tr>
<td>3</td>
<td>Pre-/Post-flight (29)</td>
<td>7</td>
<td>Improper maint (32)</td>
<td>9</td>
<td>Winds/Crosswinds (12)</td>
</tr>
<tr>
<td>3</td>
<td>CP/IP actions (21)</td>
<td>7</td>
<td>Other system fail (31)</td>
<td>9</td>
<td>Weather (7)</td>
</tr>
<tr>
<td>5</td>
<td>Takeoff technique (7)</td>
<td>7</td>
<td>False indication (17)</td>
<td>10</td>
<td>Cold Weather (1)</td>
</tr>
<tr>
<td>7</td>
<td>Ground handling (35)</td>
<td>9</td>
<td>Inadequate PM (12)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Improper taxi (26)</td>
<td></td>
<td></td>
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</tbody>
</table>

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

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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
Pre-flight Risk Assessment

- 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

<table>
<thead>
<tr>
<th>Color</th>
<th>20°F</th>
<th>0°F</th>
<th>-20°F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dk Blue</td>
<td>35</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Md Blue</td>
<td>20</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Lt Blue</td>
<td>10</td>
<td>0</td>
<td>0</td>
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</table>
Operational Impact of Elevated Release Authority

FY 18 - # of CAP Flight Operations by OATF (deg)

<table>
<thead>
<tr>
<th>OATF Limit</th>
<th>20°</th>
<th>10°</th>
<th>0°</th>
<th>-10°</th>
<th>-20°</th>
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</thead>
<tbody>
<tr>
<td>NHQ Approvals</td>
<td>3167</td>
<td>1149</td>
<td>307</td>
<td>52</td>
<td>3</td>
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</tbody>
</table>
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