

Marble Point Area Study for Aviation Support

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1. OVERVIEW

NPP placed an Automated Weather Observing Station (AWOS) at Marble Point to evaluate the Wilson Piedmont Glacier area as a possible alternate landing site for skied aircraft arriving at McMurdo Station. When William's Field is forecasted to have weather conditions that could impact flight operations, alternate landing locations could provide a means to improve efficiency and safety.

2. BACKGROUND

All McMurdo airfields are located in a complex weather producing region. Three separate air masses with various temperature and/or moisture content are resident within 50 miles of McMurdo and are routinely moving into or mixing over the airfields. Terrain presents both obstructions and funneling components. Altogether these variations within a confined space make aviation restrictive weather uncertain, quick to change, and requires rapid response.

Responses to rapidly deteriorating weather in the region are limited. The norm for most global locations is the provision of an alternative landing site that exists outside of the primary airfields weather pattern. For large aircraft as the C-17, Airbus, and 757, enough fuel can be loaded to allow a return to New Zealand. For the Lockheed Hercules (C130 models) the distance is too great and a vast distance exists for point of safe return. Ski equipped LC130's has the capability to land at other skiway locations but reduces the effectiveness and efficiency of delivering cargo and/or personnel. In the discussion to improve both safety and efficiency NPP conducted a sampling of the weather at Marble Point.

3. CRITERIA

Air operations have four major categories to capture flying conditions in weather elements. These have to do with three factors:

1. What the pilot is trained to
2. What the aircraft is capable of

3. What the airfield has for navigational aids

For a pilot with basic knowledge and/or aircraft with limited navigational capabilities or a landing site with limited to no navigational aids, the only safe flying is referred to as Visual Flight Rules (VFR). These rules mandate the pilots have visual contact with Visual Meteorological Conditions (VMC) no less than 1,500foot cloud ceilings, and visibility no less than 3miles. This allows ample visual contact to be made for a safe landing. This was the threshold used for Marble Point to assure maximum availability.

A higher category not used in this study is Super VFR. This pushes the limits up to 3,000' and 5 miles for extreme remote locations which is occasionally apply to some situations in McMurdo.

The third category is Instrument Flight Rules (IFR). This applies to only pilots that have proper training and are operating an aircraft with equipment that match the approved IFR approaches of that airfield. This capability lowers the landing Instrument Meteorological Conditions (IMC) to less than 1,500' cloud ceilings and visibility less than 3miles. The lowest limit is set by which approach/runway and the equipment that is available to support/assist the landing in a restrictive visual condition.

The last category is "below minimum conditions". This is when the weather falls below what the airfield navigation aids can support for a safe landing.

The most supported navigation aids in McMurdo have the lowest limit at 200foot cloud ceilings and $\frac{3}{4}$ mile visibility. All runways/skiways at the McMurdo airfields can normally support 300' and 1mile therefore 300 and 1 was used for this study for McMurdo's lower limit.

Note: VFR and IFR refer to the rules for each of those

categories for flight. While VMC and IMC are the conditions in which a pilot and aircraft are rated to fly can do so.

4. DISCUSSION

Marble Point was selected due to its proximity to Wilson Piedmont and capability to support the automated weather station (FMQ-19). The sampling was conducted between 6 December 2018 and 8 February 2019. To be an effective alternative landing area Marble Point would have to measure at least most of the time different weather than McMurdo to prove it is not within the same pattern, and prefer better weather than McMurdo. This study looks at the periods when McMurdo was forecasted or observed to be less than <1,500' and 3miles (IMC) and cataloged Marble Point conditions during those periods.

The weather pattern for this evaluation saw several storms develop off Terra Nova Bay that impacted the Marble Point area. These events occurred with a higher frequency this year than the norm and caused a greater number of days with low cloud cover below 1,500'. Although these leeside low events are not unusual the upper level pattern was dominating during this short sampling period.

During this study period 18 weather events were observed at McMurdo, 6 of which lasted 6 hours or greater. One of these events lasted 65 hours from 1800L 1 February to 1000L 4 February. During this expanse of time, visibility would flux above 3 miles but returned to 2 miles or less until the storm subsided on 4 February. Marble Point saw 26 weather events with most lasting less than 6 hours. Of the 26 events 5 lasted more than 6 hours and one period of 52 hours saw ceilings below 1,500' from 22 – 24 January 2019.

To compare McMurdo and Marble Point during this study we observed that out of all the weather events at each location only 3 had overlapped poor weather each of those lasting for only a single hour period each. It was also observed that only 2 events had subsequent hours of poor weather at both locations but the events were staggered, clearing at one location before occurring at the other.

There were 25 flights during this study period that were impacted by poor conditions forecasted or observed. This required the flights to either

cancel or load more fuel for the return to McMurdo. Of the 25 flights 21 of them could have benefited from an alternate landing site in the Marble Point area. Six of those flights could have eliminated or reduced the need to hold extra fuel with an alternate site available. Of the cancelled flights, 15 could have used reduced minimums for take-off as Marble Point was in Visual Meteorological Conditions (VMC > or = 1,500' Ceiling and horizontal visibility > or = 3 miles). Of the 25 flights impacted only 4 would not have been helped by having an alternate at Marble Point.

6. SUMMARY

While this study didn't capture a full season (Oct – Feb), it was observed that at least 21 flights could have benefited in some form by having an alternate landing site in the Marble Point area. The two locations, McMurdo and Marble Point fall into two distinct differing weather patterns. One the most notable differences between the locations is that Marble Point is free of the topographical funneling that severely impacts McMurdo. This offers offset weather situations between the two sites. Even when major storms move through the area the two locations are far enough apart that the time sequence allows a gap offset by hours providing a major assuring safety value and possible efficiency gain to the program.