IceCube Upgrade Population Planning

A comprehensive set of tasks and the projected time for each to successfully complete the IceCube Upgrade is detailed on the project schedule. This forms the basis for developing the South Pole population plan each season. This document gives a high level overview of the logistics systems that move people to the South Pole and the assumptions the IceCube Upgrade project uses to produce a population plan each season that can supported with available project and USAP resources.

Background: Then and Now

During IceCube-Gen1 (~2003-2010), C-17 aircraft provided regular heavy airlift support between Christchurch and McMurdo during the entire Austral summer. Each season there were generally around 250 New York Air National Guard (NYANG) LC-130 missions between McMurdo Station and the South Pole carrying passengers and cargo. Some seasons saw well over 300 missions to move needed construction materials. The station worked around the clock and every department ran at least two shifts. The peak population during the years of Gen1, South Pole Telescope construction and South Pole Station Modernization reached roughly 260 people, with substantial population overflow for the Dome/Elevated Station available at "Summer Camp", an assemblage of Korean War era Jamesway Quonset style tents.

The USAP logistics system has undergone significant changes since the days of Gen1. During the Austral summer season, a heavy airlift gap period now exists between mid-November and the end of January. During this airlift gap, no C-17 missions are flown. New York Air National Guard LC130's become the primary link to New Zealand during this period. The LC130's smaller size and longer travel times, as compared to the C-17, limits both the number of passenger per trip and the total number of trips, resulting in less capacity to move people. Generally, the South Pole will also see fewer missions during the gap as the LC-130s service the north/south intercontinental airlift requirements. LC-130 missions from McMurdo to Pole during a summer season now range between 80 and 90 missions. Aside from overflow housing (18 beds), all berthing at South Pole is located within the elevated station which has a design capacity of 150.

Assumptions:

- Station opens November 1 and closes February 15 with the preferred window for grantee operations being roughly November 12 – February 1
    - The contractor has extensive work during the first two weeks of the season to open the station after the long polar winter. Support requests at this time are more difficult to accommodate, particularly those that involve heavy equipment.

- South Pole Station bedspace is tight and has to be shared between supporting contractors, grantees, visitors, and the NSF. Total station population during the summer season is 150, with temporary surge capability to 168

- In USAP terminology, a billet represents a full-time equivalent. Billets may be split between two or even three people. In order to accomplish this, the outgoing personnel must be scheduled to leave before or upon the arrival of the inbound personnel

    - With the heavy airlift gap, limited seats are available for redeployment travel – as much as possible, keep sharing of billets to a minimum and plan for extremely limited change-over during the flight gap period

- At the beginning and end of the summer season, a large number of participants travel through McMurdo to/from USAP sites
    - To minimize the impact on McMurdo housing and passenger services, ramp up and draw down South Pole staff incrementally
    - Phased season opening and closing movements in November and Jan/Feb respectively are preferred over plans that concentrate personnel changes to a few closely spaced flights

- Throughout the South Pole field season, the population profile should be as flat and low as possible which requires keen attention on the timing of activities during the schedule building process
    - Slowly building crew size and then tapering it at the end of the season reduces the possibility of passenger flight manifest bottlenecks and eases the burden on station operations staff
    - Leveling activities across the season reduces population spikes and accommodates flight period restrictions
    - Hiring highly skilled team members and cross-training staff reduces skill related staffing gaps and fills overall requirements with a more compact field team

- Task related deployments (as opposed to Level of Effort - LOE) should be staffed according to the full-time equivalent hours in the schedule.
    - An FTE for a standard South Pole field season is 500 hours. This does not include travel time to and from McMurdo/Christchurch

- The majority of project staff will travel south in November and north in January/February