

SPUC Recommendations 2007

To facilitate the processing of the SPUC recommendations this year, we separated the recommendations into short- and long-term categories. Short-term recommendations are those that we feel should be handled in the next one- two years, whereas long-term recommendations are provided for multiyear planning purposes.

Power

- Short Term
 - We applaud everyone concerned with power at the Pole for the inclusiveness and superb communication amongst all stakeholders with regards to power planning at the Pole in the present and near future. The SPUC supports the continued efforts to ensure that all users work together to make best use of the power resources available.
- RPSC status
 - Power in FY08 austral summer proved both stable and reliable as no unplanned power outages were experienced.
 - RPSC developed a power plant load-shedding and energy management plan that includes prioritization of science loads.
- Long Term
 - The SPUC believes that the unique properties of the polar plateau will continue to attract additional science projects of all kinds. While the SPUC obviously can't predict what those projects will be, we can predict that they will want power. We thus encourage and support efforts at long range planning to increase the available power for all groups at the Pole. We don't want to specify what form this power will take since it could include anything from increased conservation to generators or even solar and wind power, but we do know that the present limits on power at the Pole will place strong constraints on all future science.
- RPSC status
 - RPSC worked with the NSF and Meridian Energy of New Zealand to install anemometers for a feasibility study of wind turbines as alternative power at South Pole.

IT

- Short Term
 - The SPUC is most concerned by how the current satellite system is vulnerable to a single point failure in the TDRS F1 system (or F3, once it is online). We recommend reviewing existing plans for handling a failure of TDRS F1 with a view toward how quickly bandwidth could be restored and then communicating those plans to the science community.

- RPSC status
 - The NSF has recognized and taken action to mitigate the consequences associated with the possible failure of TDRS-F1. The NSF has prioritized the SPTR-2 project for completion in the coming FY08/FY09 austral summer. Construction commenced in FY08 austral summer with the goal to be operational in Jan-Feb 2009 - in time to carry data for the next austral winter.
 - Because of the extremely aggressive SPTR-2 schedule, the NSF has authorized and funded a backup plan (called Super SPTR-1) should any element of the SPTR-2 project fail to complete as planned next austral summer. Super SPTR-1 will increase the current SPTR-1 bandwidth and allow the existing SPTR equipment to carry the projected larger science load for FY09. SPTR-1 equipment is not electronically compatible with TDSR F3/4/5/6/7 satellites.
 - Until the new SPTR-2 ground station is completed and commissioned in Jan/Feb 2009, there is essentially no capability to recover F1 bandwidth if the satellite fails prematurely. The satellite is statistically expected to fail in 2010. The MARISAT system is capable of a small upgrade that would enable it to carry approximately 7.5% of the current volume or less than 6% of the Super SPTR-1 volume on a daily basis. It would take 90-120 days to perform this upgrade after funding was received.
 - Teams from RPSC, NASA, SPAWAR and LJT have completed the ground station design and have procured 75% of the equipment and materials for the new ground station as of 1 Jun 08. The new ground station will have a dedicated platform, a full motion fast tracking antenna, a radome, and new Ku & S-Band electronics housed in an on-platform equipment shelter. The ground station schedule has the following mile stones: 1) CONUS system integration test to start last week in Sep 08; 2) construction/assembly of the platform, antenna, radome and equipment shelter completed by end of 3rd week in Dec 2008; 3) satellite system electronics installed by end of Dec2008; 4) ground station commissioning completed by end of Jan 2009; and 5) operational burn-in completed by station close - 15 Feb 2009.
 - Once the new SPTR-2 ground station has been commissioned, the transition from F1 to F3/4/5/6/7 would likely be less than a week. The electronic equipment can switch from F1 to F3/4/5/6/7 in just minutes. The longer transition is due to the need to schedule time on the TDRS-F3/4/5/6/7 fleet. The NSF must compete with other government users for TDRS-F3/4/5/6/7 satellite time through a formal scheduling process. Early studies from NASA indicate that the NSF should be able to secure 2 hours a day of access. The typical 2 hour day will involve an average of 4.8 connections to three different TDRS satellites.

- Long Term
 - While plans are in place for a long term transition to TDRS F3, the SPUC again suggests a continued investigation of alternative systems (presumably other satellites, but not necessarily) both for increased bandwidth, but also for long term preparedness in case of an unexpected failure.
 - The SPUC further recommends that a road map for communications upgrades be developed that leads to improved TCP/IP networking (potentially 24/7 broadband), and redundancy in bulk data transfer for the next 10 years.
- RPSC status
 - The SPTR-2 system is being designed and procured with fast tracking Ka-Band capability to be able to take advantage of a series of future store and forward satellites being planned several years out by a Canadian consortium. The fast tracking Ka-Band capability also enables a possibility to utilize the limited backhaul capability of the Iridium fleet. The Ka-Band electronics themselves have not been procured as they would be specific to the target satellite system. The SPTR-2 Equipment Shelter and ground station have been designed to have the capability to house and service new satellite missions.

Buildings

ARO

- Short Term
 - The SPUC is concerned by how the current ARO building is almost fully occupied and there is no available space for future clean air science. We recommend reviewing existing plans for handling growing science needs that require future access to the clean air sector (CAS). We further recommend investigating a possible campaign science building that could be erected onto a platform with skis. This building could be dragged out to the vicinity of ARO for power and access to the CAS and provide much needed space for short duration summer science projects. Small structures like this can be easily purchased from companies such as Enviro Buildings stateside and then shipped to Pole for final assembly on a short timeline. Placing more projects into the ARO will only adversely affect the science community currently operating in the building.
 - The SPUC is concerned about the drifting snow around the ARO and lack of a plan to address this. We recommend a short term 2-3 year plan is developed to address the snow load around the building. As a result of the building being located in the CAS, special considerations to if/how the snow is managed on the upwind side of the building must be addressed.

- RPSC status
 - Snow maintenance is planned for ARO in the short term, until an adequate plan is developed for raising ARO, or moving it to a new location.
- Long Term
 - Preliminary plans have been discussed to alleviate some of the space constraints of the ARO that would also benefit overall sector management. Two diverging plans have evolved. One plan is to raise the ARO in its current location and then concurrently build a remote clean air building further into the clean air sector (CAS). This remote structure would serve as a satellite building to the ARO and house the true clean air instrumentation. The CAS boundary would then move to the location of the satellite building and thus leave the ARO no longer within the CAS. The second option is to move the ARO further into the CAS and with it move the actual apex of the CAS to the new location of the ARO. This option would keep the ARO within the CAS. The SPUC recommends more work be done to determine the feasibility of each of these plans both logistically and scientifically. Over the long term one of these two options must be chosen to ensure the continued success for the science community.
- RPSC status
 - Many options are under discussion besides the ones presented here. Moving the Cusp space sciences to a remote building along the 340 line on the west side of the skiway has also been mentioned, which would help alleviate the building and “land” space issues in and around ARO. A South Pole Space Sciences workshop was held last year at ERAU in Florida which addressed much of this.
 - A South Pole Strategic Management Plan has been submitted to the NSF that includes a Materials and Facility Disposition Plan
 - A Facility Status Report is being developed that includes ARO as a high priority. It listed several options including decommissioning ARO, constructing another facility, or raising the building in place.

Balloon Inflation Facility (BIF)

- Short Term
 - The SPUC is very concerned by how the current BIF facility is now in a low area directly downwind of the newly built cryogenics facility. This is a major drifting concern. The large doors on BIF need to be opened multiple times daily and the drifting issues have been compounded exponentially with the construction of the cryogenics facility immediately adjacent and on top of a one-story berm of snow. The SPUC strongly recommends that the BIF is redesigned and a new structure erected in its place as soon as possible on the same elevation

as the cryogenics facility. The BIF facility is co-shared between NOAA and the South Pole Meteorology department's balloon operation which is directly used to support flight operations. South Pole Met is not the only critical mission compromised as NOAA is also poised for potential loss of scientific data regarding the Antarctic ozone hole (something they are mandated by Congress to monitor).

- RPSC status
 - Snow maintenance for the BIF is planned for the near term.
- Long Term
 - With the construction of the cryogenics facility as stated above any long term plans for the BIF building have been immediately made into mission critical short term concerns. The SPUC recommends that the BIF is addressed as soon as logistically possible.
 - Furthermore, the SPUC recommends that when a new structure (such as a new BIF) is brought online a long term strategy for snow loads/drifts should be developed so that the building does not become a lost investment after ten years of neglect.
- RPSC status
 - RPSC is developing a New Project Proposal for a replacement BIF to submit to the NSF for approval and funding.

MAPO

- Short Term
 - The users of the MAPO building have expressed concern that continued snow maintenance and HVAC repairs be undertaken to make the MAPO building a usable facility in the near term. The SPUC supports continued maintenance efforts to make this structural investment at the Pole usable for as long as feasible.
- RPSC status
 - Snow maintenance for MAPO is planned for the near term.
- Long Term
 - A great realization at the SPUC meeting was that it is possible to consider the MAPO building as two separate parts, the main building and the old DASI tower. This realization resolved some possible conflicts between the current and possible future users of this facility, since if raising the building becomes necessary the two portions could be raised on different timescales.
 - Separately, dark sector users have noted the need for winter snowmobile storage space somewhere in the dark sector. Given the need for small scale movements of materials and personnel between the various dark sector buildings and the main station during the winter, the SPUC recommends that some suitable space be found.
- RPSC status
 - RPSC has begun development with the NSF for outlying building strategy initiated with a NSF white paper on MAPO. RPSC provided input to this white paper by outlining current operational challenges

for maintaining MAPO, plus provided coordination between the grantees and the NSF for out-year science strategies.

- A South Pole Strategic Management Plan has been submitted to the NSF that includes a Materials and Facility Disposition Plan
- A Facility Status Report has been developed that includes MAPO as a high priority. It listed several options including decommissioning MAPO, constructing another facility, or raising the building in place.

EMI

- Short Term
 - The SPUC recommends tasking SPAWAR and SCOARA to work together to evaluate and monitor the current EMI/RFI environment at the Pole. Both groups have begun on this task and we encourage them to continue and coordinate their efforts
- RPSC status
 - SPAWAR visited South Pole in February 2008 to perform an EMI assessment, with results expected during the boreal summer. The EMI working group, consisting of SCOARA and SPUC members, is actively engaged in resolving issues as they arise.
- Long Term
 - The long term EMI/RFI environment at the South Pole is one of the things that have caused the scientific community at the Pole a great deal of the concern over the past year. We're pleased to see the language inserted in the most recent NSF call for proposals, noting this issue and requiring proposers to comment on the impacts of their proposed experiments.
 - The members of the SPUC are also aware of numerous groups planning RFI/EMI sensitive proposals over the next few years, ranging from cosmic ray detectors to cosmic microwave background experiments. While we obviously can't comment on the proposals themselves, the SPUC would like to propose that the NSF and RPSC work toward providing, in addition to a dark sector, a radio-quiet sector. We realize that a fully radio quiet sector is impossibility, but we would like to encourage the minimum use of radios, and the operating of transmitters at the lowest possible power levels consistent with reliable communications, use of transmitters that produce clean, narrow signals without harmonics or sidebands. In short, we would like to encourage a culture of being radio-quiet, and SCOARA has already proposed to aid in monitoring the EM spectrum (complementing the work that SPAWAR already accomplishes), recording how the EM spectrum is being used, as to: frequencies, times, power-levels, types of emissions, etc.

- RPSC status
 - South Pole Station supports an EMI quiet environment during the austral winter.
 - RFI/EMI equipment purchased at the request of SCOARA will be used to detect locally generated interference in the Dark Sector.

Cryogenics

- Last year the supply of cryogenics at the Pole was tremendously successful, thus the SPUC recommends that we repeat the experience by reusing the same procedures (as has already been recommended by Al Baker).
- RPSC status
 - Cryogenic support for current FY08 was planned similar to FY07. South Pole Station closed with approximately 27,900 liters of useable liquid helium in three 1K gallon Westinghouse dewars and two USAP-owned large transport dewars (one 3K gallon and one 4.8K gallon).

Clothing

- In response to a direct request at the SPUC meeting for a recommendation regarding the stocking of clothing at the CDC, the SPUC makes the following recommendation: While we understand the desire on the part of RPSC to reduce the variety of clothing stocked at the CDC, the SPUC feels that the variety of workplaces, body shapes, and experience levels represented at the Pole (especially when winterovers are considered as well) is best served by having a wide variety of ECW styles available at the CDC. Given the impact on health and safety it seems unwise to restrict the choice of ECW options to ones that may not work for all participants.
- Additionally, while the SPUC is careful not to interfere in purely internal operations, we do note the opening within the clothing distribution system for improved efficiencies that would benefit all concerned. In particular, one could imagine participants selecting their clothing choices via a web based system before deployment which would minimize the unnecessary exchanges at the window in Christchurch and speed the checkout process. Similarly, the clothing check-in process could be computerized leading to better inventory and status control (as well as feeding back into next year's web based form for the participant).
- RPSC status
 - The NSF is actively pursuing cost-cutting measures, and is working to reduce some of the legacy support levels in the Office of Polar Programs. For example, all personnel in the Arctic program must supply their own ECW gear, and the NSF is looking into the feasibility of doing the same in the Antarctic program. At the moment, clothing issue will remain largely unchanged, with small differences for next year including all participants providing their own sunglasses, water bottle, extra socks (two pair will be provided), and long underwear (only one pair will be provided). We can expect more changes in the future.