McMurdo Area Users' Committee (MAUC) Meeting Minutes

July 15, 2003

Raytheon Polar Services Company

These proceedings were compiled and produced by
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ANNUAL MEETING, 15 JULY 2003
McMURDO AUDITORIUM
Raytheon Polar Services Company, Centennial, Colorado

7:00 - 7:30 **CONTINENTAL BREAKFAST**

7:30 – 8:15 **OPENING**

- Welcome and Introduction of Attendees (10 min) — T. Scambos C. La Bombard
- Overview of Agenda (5 min) — T. Scambos C. La Bombard
- RPSC Welcome and Remarks (10 min) — RPSC /S. Dunbar

8:15 – 10:30 **LAST YEAR ACTIVITIES AND UPCOMING PLANS**

- Review of Last Year's Issues (20 min) — T. Scambos/N. Dunbar
- Outbrief discussion (20 min) — C. LaBombard
- RPSC Outlook for Coming Season (20 min) — S. Dunbar / K Salveson
- Science Field Support Status Report (15 min) — K. Salveson
- South Pole Traverse Status Report (15 min) and Upcoming Activities at South Pole — J. Wright

BREAK (15 min)

10:45 – 12:30 **IT/ COMMUNICATION**

- McMurdo Bandwidth Update (20min) — M Wisch
- Online/CD Classes (40 min) — MAUC
- Internet Security (20 min) — T. Howard
- Discussion and Communication Wrap-up

BREAK FOR LUNCH (1 hr)

1:30 – 2:30 **RPSC INFORMATION FOR GRANTEES**

- Status and Current State of POLARICE (15 min ppt) — S. Holbrook
- Grantee Discussion Regarding POLAR ICE (15min) — MAUC
- Iridium and Wireless Web Status Report (10 min) — Perry/Hamlin
- Web Site Update (10 min) — M. Buckley
- Alternative Energy (10min) — TBD

BREAK (15 min)

2:45– 3:30 **FACILITIES, LABORATORY AND MISCELLANEOUS**

- Crary Library, Capital Equipment and Aquarium(15 min) — R. Score
- Sample Shipments (10 min) — M. Davis
- Deployment and Travel Update Q and A (10)min — L. Dormand

3:30 –4:30 **EXECUTIVE SESSION**

- Wrap-up Action Items
- Review and Approval of Membership MAUC Committee Business
- Set Next Meeting Date and Ad Hoc Date

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ACTIONS JULY 15, 2003

ACTION ITEM 1: STEVE DUNBAR WILL ANALYZE AND SUBMIT A REPORT ON THE LONG RANGE-PLANNING FOR MCMURDO.

ACTION ITEM 2: THE COMMITTEE WILL FOLLOW-UP WITH THEIR RESPONSES REGARDING THE CAMP UPGRADES.

ACTION ITEM 3: RPSC WILL WORK ON ISSUES REGARDING MIGRATING TRAINING COURSES TO A WEB BASE. CONSIDERATIONS WILL BE GIVEN TO COSTS AND WHETHER IT CAN BE HANDLED WITH CURRENT RESOURCES AND ADDITIONAL FUNDING. S. DUNBAR THOUGHT THE HIGH ALTITUDE COURSE MIGHT WORK AND WILL DISCUSS THIS ACTION WITH EH&S AS WELL AS THE POSSIBILITY OF INCLUDING THE GARBAGE SCHOOL COURSE.

ACTION ITEM 4: STEVE DUNBAR SAID THAT HE WILL TALK TO MR. HOLBROOK , HIS TEAM AND THE WORK CENTER SUPERVISORS REGARDING AN EASIER WAY OF ENTERING THE DATA INTO POLAR ICE AND WILL CONTACT THE COMMITTEE BEFORE IMPROVEMENTS ARE IMPLEMENTED.

ACTION ITEM 5: STEVE DUNBAR STATED THAT RPSC WOULD BE SURVEYING COMPANIES TO SEE WHAT ALTERNATIVE ENERGY SOURCES ARE AVAILABLE.

ACTION ITEM 6: STEVE ALEXANDER WILL PROVIDE A CRARY LABORATORY CAPITAL EQUIPMENT INVENTORY LIST TO THE SCIENCE COMMUNITY BY DECEMBER 2003 TO CATEGORIZE AND PRIORITIZE FOR REPLACEMENT AND UPGRADES.

ACTION ITEM 7: STEVE DUNBAR WILL PROVIDE A COPY OF THE AQUARIUM LONG-RANGE PLAN TO THE COMMITTEE.

OPENING

Welcome and Introductions of Attendees
Scambos opened the meeting with welcoming remarks. The committee introduced themselves and their affiliated institutions.

Overview of Agenda

RPSC Welcome and Remarks
Steve Dunbar, Director, Science Support
Thank you to everyone for coming and participating in these meetings. It has been an effort to tighten up these meetings making them a more valuable problem solving session.

RPSC has evolved into a very challenging environment with large projects, which will be impacting how we do business. The projects include: Beardmore Camp, the West Antarctic Coring Camp, the 10-meter telescope and Project ICE CUBE. There has also been an emphasis on more expensive science in the laboratories. RPSC's support is spreading out to more and more field camps as well. Our work on alternative energy has made good progress. The Science Support Center has proven to be an incredible improvement facility in terms of safety.

The evolution of the Planning Group has been a great improvement this year. RPSC is now squeezing more science into each season. RPSC can now give more information to the NSF and a more detailed preparation analysis for each group, which has helped the NSF with their workload.

Scambos wanted to know about the outlook for flights and major activities for next year. Breshnahan stated that the LC130 will increase the availability of flights, this will progress fairly rapidly over the next three years now that the major support for the South Pole construction is completed. There will be support flights for ICE CUBE coming this season. Sutherland commented that Iceberg B15 is in place and not moving and that the other one is gone. C19 fast ice from C 15 north to Dryglaski anchor ice is becoming extensive and having trouble with seawater intake. The Polar Star and Polar Sea will be coming down and they are considering bringing in a tanker to refuel before the large one comes down.

Scambos wanted to know what contingencies needed to be in place in order to have a second tanker. Bresnahan commented that the situation with the tanker last season had a great impact. There was a dramatic increase in cost - $60,000 per day.

LAST YEAR ACTIVITIES AND UPCOMING PLANS

Review of Last Year's Issues
The important topics from last year were the Internet bandwidth, the improvements in the Websites, the Crary library, field camps and RPSC providing special science equipment that can be used by the whole science community. The use and continuation of Antarctic Journals is helpful. The ad hoc meetings in McMurdo have proven to be a good tool for providing input on these topics. The Committee will submit recommendations to RPSC and will identify new topics for this year to be acted on. A poll was conducted within the science community regarding a revised version of the Antarctic Journal. There was both strong support as well as negative comments. Some considerations to take into account are how long it took to publish, its contributions and if it considered all science groups. The consensus of the science community was to not have it around any longer. It was felt that some things considered to be important could get lost.

Outbrief Discussion
LaBombard commented on the implementation of the Planning Team last year. RPSC was able to get more in-depth in the outbriefs. The majority of the issues were specific to each group. There were general comments about improvements. The question of confidentiality during the outbrief process was addressed. The grantees want the outbriefs to capture more of what they are thinking, yet maintain confidentiality, which was discussed with S. Dunbar. He does not have a problem with publishing them, but some participants do have problems making comments that will be seen by the public.

Priscu wanted to know how RPSC processes the outbriefs. What is done with them and can they be used for reports to get an overview of the program? Karentz stated that 99 percent of the groups were happy with their support. There were no complaints from the Palmer Station group. Each RPSC work center evaluates each outbrief through a database. They look at the progress RPSC is making and actions taken and contact each group. Leger commented that all these action items go to the NSF. The bulk of complaints were the bandwidth availability and making Macs more server friendly.

N. Dunbar said that it was her understanding that the outbriefs were to be used in order to understand the needs of all groups. This information is valuable in guiding the Committee. The BFC equipment was a common theme throughout the outbriefs. In an effort to complete the planning cycle, the emphasis was to see a correlation of the needs of the grantees so RPSC can plan for the next season.

RPSC Outlook for Coming Season
The quality of field equipment was questioned, and as a result the budget for BFC was increased. S. Dunbar will discuss the base inventory needs with the NSF . RPSC would like to maintain that base with a separate pot of money and categorize the needs for each group. In the long term, the BFC needs to be able to build a life-cycle replacement for equipment. RPSC's materials budget covers all SIP requests and it is difficult to decide who to buy for and who can do without. RPSC has submitted a budget request to the NSF for a substantial increase for a base inventory. RPSC needs clearer input on more detailed needs regarding non-project specific and project specific items. Last year RPSC was more than a million dollars over budget. The BFC budget has increased 75 percent this year, but there are more requests than money. Consumables requests get bigger every year.

As more LC130's become available and more projects go out into the field, budgeting resources becomes more of a challenge. The NSF was able to take under runs last year to make it happen. RPSC analyzes their budgets on a monthly basis. There was an inquiry about any surprises in housing, cargo or field camps. However there aren't any overriding trends in housing or in the Dry Valleys camp. There was a 140 percent increase in requests for fishing holes needing to be drilled, with only one drill available. These groups are being focused on as RPSC gears up for support.

Hanson questioned how we would deal with the breakdown of one critical piece of equipment if it was the only one available and there were other projects that needed it for the season. The drill and helos would be the losses that would have a critical impact. It was pointed out that another critical loss would be the power plant. It comes down to how best to use our critical resources.

Scambos suggested that since the South Pole has had so much attention, it is now time to look at the critical needs at McMurdo. Bresnahan thought it would be valuable to meet and discuss critical points that need to be considered, like the power plant and drilling equipment. He would like to see the McMurdo infrastructure focus on long-range-planning for improvements.

ACTION ITEM 1: STEVE DUNBAR WILL ANALYZE AND SUBMIT A REPORT ON THE LONG RANGE-PLANNING FOR MCMURDO.

Science Field Support Status Report
Kirk Salveson, Manager, Science Field Support
Salveson stated that the focus in Field Support has been on future planning. Items purchased include: three new Weatherhaven tents with Sunbrella UV resistant fabric; one small (4-person) Artic Chief tent (lightweight and easy to set up in the field); three Rac-tents (lightweight with fire-resistant interior and UV resistant exterior - easy to set up , intended to replace the Jamesway); medium-duty sleds for science traversing and a GPR unit for the 2003-04 traverse. Also acquired were 29 snowmobiles with front racks and saddlebags and new Siglun and Zybowski sleds. Last year RPSC developed a Conestoga shelter used by Onset D which can be towed by snowmobile for light traversing.

Salveson commented that RPSC has had great reviews regarding the Scandic's. Scambos commented that there were problems with the springs, that they are not as good as the Alpine 2. The MEC supported twice as many requests for renewable energy components than from two years ago. The Hybrid Power Sled is a more dependable power source. It has 1.3kw photovoltaic panels, a 1.0 wind generator, a 4.0kw inverter (peak), at 900 watts (sustained) and a 4.0 standby generator. The advantage is that they will be able to do more year-round work. This is the first year RPSC has been able to maintain wind power on Mt. Erebus both in summer and during the winter. The budget was for $40,000 and another $100,000 was just obtained from the NSF.

Our vehicle improvement in 2002-03 consists of a rollout of 17 Piston Bulley snow machines and six Mattrack equipped Ford Pick-ups at a cost of $1.8 million. There were some difficulties with radiators and tracks icing up. RPSC was seeing more wear with the tracks than expected. Problems and issues are still being worked out with the manufacturer. It was suggested to keep a few Piston Bulleys out where they are most used in deep field to lessen wear, however there would not be a mechanic in the field for vehicle maintenance.

RPSC has had problems with Tuckers. Salveson visited the Tucker manufacturer and saw that they have solved a lot of the problems we used to see and that we may consider a purchase since its towing capacity is over 10,000 lbs., which is much better than the Piston Bulley.

A medical cache plan has been developed and supplies will be deployed to the field this season. RPSC FSTP personnel have attended an advanced rope rescue course this year. There have been improvements in the Hurdy Gurdys and the Dry Valley fuel containment should reduce spills. RPSC has purchased more substantial first-aid kits, which will be issued to each field group. New tents are being tested as possible replacements for the Mountain tent and Endurance tent. There is a scanner system for the BFC food room and additional GPS units have been purchased. Future purchases include additional Rac-tents, Polarhavens, sleds, tracked trailers, a Caterpillar 939 loader for deep field camps and renewable energy equipment with new budget (FY03-future). RPSC will continue replacing snowmobiles as funding allows, and acquire more Iridium voice and data capability in the field.

Priscu wanted to know if there is an accident response plan. He was assured that there are spill, search, rescue and fire plans to be in place by the end of this season. In regard to the helicopter accident last year, it was felt that the rescue went well, but the spill response was not as integrated as it should have been. There have not been adequate medical supplies in the field in the past, but this year they will have them at Lake Bonney, Lake Hoare and Lake Fryxell. There will be more equipment available where needed. There will also be a Wilderness First Aid responder available. A database in McMurdo will be maintained to see where the support will be most needed. Bresnahan commented that there is a need to know whom has had this training and who is available in the Dry

Valleys and McMurdo, where to locate them and who can respond as soon as possible to any given emergency. Scambos inquired about whether there was a review of helicopter safety and spill concerns. S. Dunbar stated there is an investigation board and manufacture representative report, but he has not seen it yet. RPSC will act on it once it is released. There is confidence that the equipment, helmets and seatbelts were sufficient. The results of this report will define how RPSC will be conducting sling loads from now on. PHI must work within the regulations of the FAA to determine the helicopter use. RPSC will have to consider how the NSF, PHI and the FAA interpret these rules. Bresnahan commented that there would be two reports, one report to be released and one that is not. The formal, internal reviews have been done by the manufacturer to see what changes in operating procedures and what corrective actions need to be taken.

South Pole Traverse and Upcoming Activities at the South Pole
John Wright

The purpose was to execute a Proof of Concept traverse and establish a route from McMurdo to the South Pole identified in the George Blaisdell (CRREL) and Dave Bresnahan (NSF) Traverse Analysis paper. It is supported entirely from McMurdo. RPSC needed to evaluate the feasibility of creating a regular McMurdo to South Pole route, evaluate equipment for future traverse work, expand USAP traverse capability and expand USAP intra-continental cargo delivery capability. During the summer of 2002 RPSC planned for FY03 on-ice activities and support requirements, developed an FY03 Annual Program Plan, recruited field season staff and provided training. Support equipment was procured which included: LGP D-8, 6 snowmobiles, ground penetrating radar equipment, crevasse hazard mitigation equipment as well as identified future equipment requirements and design.

The On-Ice period at McMurdo during 2002-03 consisted of examining the recommended Shear Zone route (March 1996); establishing a fixed, temporary field camp; developing passage for heavy equipment through the Shear Zone and returning to decamp at McMurdo.

All goals for Year One were met or exceeded. It was a 100 percent accident free season. Safe and successful methods for detecting and mitigating crevasse hazards were developed. A straight road across the Shear Zone was built and it crossed with the D8R. An additional 100 miles of route across the Ross Ice Shelf was provided. RPSC provided two USAP participants to the French Concordia Traverses and received an excellent report of findings and lessons learned. There were ongoing and aggressive procurements.

During the summer of 2003 RPSC planned for FY04 on-ice activities and support requirements, developed FY04 Annual Program Plan, recruited field season staff and procured support equipment which included tractors, trailers, living and workshop modules.

The On-Ice period at McMurdo during 2003-04 consisted of establishing the route beyond Shear Zone across Ross Ice Shelf, setting up a mobile camp, progressing to the Leverett Glacier, initiating route development and crevasse hazard mitigation in the Leverett Glacier region as far as possible, then returning to McMurdo.

The current status is successful completion of the 2002-03 field season work and the environmental documentation (IEE signed in October 2002). The procurement activity for support equipment is ongoing, the specialty sled fabrication work is in progress and the planning for 2003-04 field season is in progress.

The committee wanted to know if RPSC will continue to use the current sleds, the anticipated transit time and what kind of maintenance the Shear Zone will require. RPSC will be using the data they gathered from the past to calculate the next five-year plan. It is anticipated that each traverse will take 20 days (out and return). The bridge collapses that occur in January should not be a problem since

the crevasses are plugged not bridged. A flagging system that has been documented and out lined is being used and will look like a snow trail that will be roughly groomed to manage drifting. There will be no semi-permanent stations or equipment left along the route except for fuel caches. Everything will be taken back to McMurdo each year.

Scambos suggested that we build a more westerly spur road to take advantage of science in that area. At this point the Proof of Concept is focused on establishing a route to the South Pole. The ITASE science capability needs to be enhanced to make it more robust, NSF is looking into this concept. More satellites will be seen throughout the route. In terms of technical equipment and operations, if RPSC wishes to continue flying LC130's and not use surface transport, it would be relatively straightforward to extend a road up the West Antarctic and onto the plateau. In association with this concept, riding the coattails of this major funding is an advantage. The primary purpose is to allow relief of the LC130's from supporting science in the West Antarctic. The benefits would be tremendous and there has been great work seen through the Shear Zone.

Dietrich asked about the traverse plan for AGO 4. S. Dunbar stated that RPSC is trying to figure out how to best use resources - Twin Otter time should be saved for the traverse. RPSC will be using the traverse for retrieval purposes, etc. It is not going to be used for the South Pole. There is a Twin Otter scheduling problem. In order to help out, Scambos suggested going to AGO 4, re-grooming the runway and pulling out campsites. The biggest concern is the surface. Most everything is business as usual with improvements in planning, spill concerns, changes in hurdy gurdy, and focusing on Dry Valley lake surfaces. Chiang has made it clear that there will be a focus on how we do business. N. Dunbar asked about the fuel concerns. The small fuel spills are becoming less and less tolerable and there needs to be more common sense used. Priscu noted that there were some proposals submitted this year that focus on spill concerns.

The committee questioned what the next focus areas are for RPSC. The large-scale facilities construction will be in the Dry Valleys. Lake Bonney is being considered for the first camp to be upgraded, it will depend on funding.

ACTION ITEM 2: THE COMMITTEE WILL FOLLOW-UP WITH THEIR RESPONSES REGARDING THE CAMP UPGRADES.

IT/COMMUNICATIONS

Several components comprising the committee's write-up for discussion concern bandwidth issues. Last year bandwidth was picked as the one thing from the science community poll and questionnaire that could improve science. Some of these points were: improving monitoring from Ross Island and surrounding areas; making the on-continent time more useful; reducing staff; utilizing promotions from experts; accessing data such as meteorology; improving outreach programs; improving access to off-continent data centers that are available on the Web and exploring new ideas and changes while in the field. The committee would like to see more video conferencing and better communications with their home institution. The committee would also like to make the Crary Library more of an electronic library. It was pointed out that the experience of most of the grantees was that the Internet was always saturated and is difficult to get through, especially e-mail attachments, ftp and data files. The committee desperately needs solicitations and comments from the committee and RPSC to find out what needs to be done to improve this service. The NSF investigated the expansion a few years ago and found that the transmission capacity at Black Island can support at least 6-megabytes or 4 T-1s, but they will have to "re-plumb" the telecom structure at McMurdo. Engineering issues will need to be addressed.

McMurdo Bandwidth
Mike Wisch, Manager, Technical Operations, gave his presentation. Current issues RPSC is facing are extended web/data access times, dropped calls on the analog system and link saturation. The root causes are insufficient bandwidth: the current analog support requires dedicated bandwidth; NASA requires dedicated bandwidth; and increasing volume of Internet activity and new application requirements (POLAR ICE, ORT).

Currently bandwidth is allocated as follows:

- IP traffic - 768K
- 60% of inbound traffic is HTTP
- Telco and other channels - 776K
- Total -1.544MB (T-1)

To approach the bandwidth allocation, we need to define our user traffic priorities, which are:

1. VTC (Medical Video Teleconference Support)
2. FTP (Science Data)
3. SMTP (E-mail)
4. HTTP (Web support)
5. File Sharing (KaZaa, Gnutella, IRC)
6. Dynamic allocation via Packeteer groups
7. Based on group, usage and time of day
8. Acceptable use policy
9. Recreation use vs. program requirements
10. Cache high use web sites
11. News, information, recreation

Short term solutions would be to shutdown inappropriate traffic:

- Personal Web usage (acceptable use policy)
- Limit locations for personal use
  - Shape and prioritize data traffic (Packeteer)
- 157 subnet priority (Denver applications)
- Manage busy hours more closely
  - Manage science traffic
- ftp bandwidth
  - Provide only minor improvements

Medium term solutions:

- Recover unused channels
  - Switched 57 (128K)
  - Evaluate other software options
- Proxy server
  - No significant payback this season
  - Complete by end of season
  - Small gain anticipated
- Additional packet shaping
  - Provide limited gains

Long term solutions:

- Add additional T-1 support
- Shift to VoIP solution for phone system

Solutions for next season:

- Firm allocation for bandwidth to meet program needs and requirements
- User agreement on priorities
- Manage busy hours more closely
- Escalate plans to recover analog voice channels and reallocate to IP data use
- Continue to plan for all IP solution

Traffic comes to a halt during medical video telecoms and this was considerable last year. In terms of reallocating band on the net, the VTC band moved over the to IP side. Medical conducts one VTC a month for a routine check that is used for station business. There is good and bad http traffic. Bowser commented that the only way he can get through his firewall at his home institution is through the http. The Packeteer will be automated (it is manual now) but it will be labor intensive. One of the topics the committee needs to address is recreational and program use restrictions and availability; and then to manage it.. Lowenstein requested percentages of each of these uses to help in analysis and prioritization and determining what the impact would be.

Short-term solutions include identifying shape, prioritizing data (Packeteer) and throttling down traffic. The traffic will need to be managed both from the stations and in Denver. There are certain aspects of the operations where immediate attention would be needed while still attending to the lumbering, labor-intensive, ongoing work that is in Denver. It was suggested that RPSC manage ftp traffic by compressing data for the short-term. There would be relief using a simple ftp relay through a central machine which provides a local traffic device which sends it to the states. The next step would be to have a point-to-point relay between McMurdo and Denver.

For medium-term solutions, long-term solutions and solutions for next season, RPSC is going to need to fine tune priorities, manage busy hours, reallocate IP data use, and rewire all the phones. It will be quite a challenge to replace analog phones. We can trade phone calls to manage bandwidth - we wouldn't gain bandwidth, but would gain efficiency. The NASA ground station could be changed to an IP tunnel that would reclaim 128 kilobytes they are now using. It might keep it going for another year. But because of security issues, it may take some time. Scambos inquired about long-term planning and why it costs over one-half million dollars for a DSL line. RPSC has put some funding for this into the FY04 budget. There is a space segment charge - time on the satellite, which runs about $40,000 per month. It is sold in pieces, which maps the transponders, plus the teleport fee, which adds up to $450,000 per year. RPSC runs own equipment and has to pay maintenance fees for maintenance contracts; RPSC pays for the contract with the NASA Ammes circuit; there are miscellaneous charges with NASCAR; and a SPAWARS overhead fee of $50,000, which adds up to $750,000 per year for one T-1. Procurement for new satellite service has to happen within the next 18 months. It was pointed out that we now have a degree of freedom to point to any satellite in the Pacific and shop around for the cheapest service. RPSC just implemented PALSATCOM, which is costing approximately $300,000 per year. The service in the Pacific Ocean costs more.

Online / CD Classes

The subject of having digital versions of training classes in McMurdo was brought up. This was one of the questions in the questionnaire. Any aspect of training that does not require hands-on should be done electronically. The science community needs feedback from RPSC in order to implement this. It was suggested that the classes be available on the Web. As a security precaution and at the point certification, a person would be quizzed to verify that they have taken the course or read the material. It was reinforced that grantees do not what to do it on the ice. RPSC should put together a master list of all the training that is being done, ask what the requirements are for each, find out which ones can be moved to a website, and incorporate a question and answer section. S. Dunbar will take this suggestion under advisement but noted that we have already put our budget together for next year. It was recommended the committee pick out one course that RPSC could pilot as a sample, work out

the costs and present it to the NSF for funding the following year. It was questioned whether a security problem or an ethical policy may prevent this action. The pilot program will prove whether it would work or not.

ACTION ITEM 3: RPSC WILL WORK ON ISSUES REGARDING MIGRATING TRAINING COURSES TO A WEB BASE. CONSIDERATIONS WILL BE GIVEN TO COSTS AND WHETHER IT CAN BE HANDLED WITH CURRENT RESOURCES AND ADDITIONAL FUNDING. S. DUNBAR THOUGHT THE HIGH ALTITUDE COURSE MIGHT WORK AND WILL DISCUSS THIS ACTION WITH EH&S AS WELL AS THE POSSIBILITY OF INCLUDING THE GARBAGE SCHOOL COURSE.

Discussion and Communications Wrap-up
RPSC has tried to route recreational services to the Kiwis. But every time we asked to do this, it has been too costly. Everyone is concerned about this, but wanted to know when they would notice a change. If the science community endorses the need, and their Program Manager endorses the science community, then it becomes a decision at a higher level. It needs to be sold as a business investment. It was suggested that an appropriate time is chosen to use the bandwidth for recreation and set up an on-site Website. This would reinforce the fact that the science community is trying to do better. It would have a psychological effect. It could be managed this way over the next three years where the use will be justifiable. The longer you use the equipment, use a large amount and commit for 10 years, the more the cost does go down. We are anticipating communication upgrades into the surrounding field camps. A justification will be done for out-years. The wiring for the field camps and the Dry Valleys will have to go through McMurdo.

RPSC INFORMATION FOR GRANTEES

Status and Current State of POLAR ICE
Scott Holbrook, Manager, POLAR ICE (Participant On-Line Antarctic Research Information Coordination Environment) "Next-Generation Software for the 7th Continent". This is described as a secure Web-based data collection and dissemination system that captures and administers all relevant support requirements for scientific research in Antarctica via ORWs and SIPs. It was released 1 March 2003 and has had a seven and one-half month iterative development cycle. It showed a record-setting 2003 SIP submission cycle. The ORWs are now incorporated into FastLane proposal submission. A LiveHelp real-time chat interface was developed and was highly utilized by grantees. Their target audiences are the Grantees, RPSC and the NSF.

The Web-based environment provides advantages over the current client-server architecture. We are creating a single point of interaction for grantees, the NSF, and RPSC for each project. POLAR ICE is integrated with existing RPSC data streams. The system architecture is scalable and extensible. This is the first step to an integrated support environment. Future features will include improved performance and interface and integrated planning tools. For more information go to our web site at https://POLARICE.usap.gov.

Grantee Discussion Regarding POLAR ICE
There has been a strengthening of the need for a deadline for SIP submissions. Speed is the focus for the remaining architecture. Populating leg dates for pieces of equipment has been very time consuming for the PI. It was asked if the MEC and BFC have JPEG images of available equipment since sometimes when a grantee is ordering an item that they may not be familiar with it or they call it by a different name. It would be helpful to have a picture to look at. RPSC will be linking the names of items to images. Entering the time periods for having a piece of equipment at different sites during a project study was found to be confusing. It was suggested that equipment be linked with dates and

location. The committee should speak with Deneb Karentz regarding the tie-in of the SIP requests, the funding elements, and what they are looking for in the future. It seems that RPSC needs to further clarify issues regarding requests and the rollover of the ORW into the SIP. Grantees would like to see a cost associated with each item. Other aspects of personal information to populate the database would be body measurements for clothing and ACA permits. At this time there is no way to enter information into POLAR ICE that requests certain chemicals to be mailed to a PI's home institution for specific preparation. Stone commented that this is something that the NSF has been discussing, therefore the PI should discuss this issue with their individual Program Manager.

The NSF is quantifying business rules, how they relate to each other and mapping out rules. They are looking at this as having an enterprising resource for planning with other databases integrated with POLAR ICE. This brings into play the business rules and architecture issues that will have to be considered. We want to be as automated as possible, with integrity and applications that share data. It is not clear yet what path the NSF will follow. Other aspects of the Program will have to catch up. Managing the ORW, integrating the SIP from the previous year, and working on date entries and speed are the starting points.

ACTION ITEM 4: STEVE DUNBAR SAID THAT HE WILL TALK TO MR. HOLBROOK, HIS TEAM AND THE WORK CENTER SUPERVISORS REGARDING AN EASIER WAY OF ENTERING THE DATA INTO POLAR ICE AND WILL CONTACT THE COMMITTEE BEFORE IMPROVEMENTS ARE IMPLEMENTED.

Iridium and Wireless Web Status Report
Jim Hamlin, Functional Engineers Group
The preliminary requirements for multiple runways are being reviewed. This is replacing the mobile runways. The Dry Valleys are under review for providing an Ethernet to Taylor Valley which will give us an rj connection for Lake Hoare and Lake Bonney. There is still testing to be done. Documents are being reviewed. There is a timeline for critical activities in the Dry Valleys design. RPSC needs to buy microwave equipment but it is still up in the air right now. There are some ambitious things to it given the schedule. RPSC does not know what they are going to be able to do this year. It's a big set up and the remainder can be deployed the following year. Tasking is still in the critical design phase, therefore nothing has been purchased yet. RPSC will be providing the same support as last year. Priscu said the McMurdo LTER has been discussing an mmri proposal to send data year-round back to McMurdo to package and send back to the United States. Hanson asked if there is a possibility of multiple eam members keeping in touch with each other. This would improve efficiency during the staging process. Hamlin stated that RPSC is looking at having wireless in McMurdo. Hanson suggested using Instant Messaging in the field. RPSC is looking at keeping it simple as well as looking at all options. S. Dunbar said that this is dependent upon funding. Smith said there is only funding for the current scope. Feedback is needed from the community. Investing would be to put emphasis on Dry Valleys.

Web-site Update
Mark Buckley, Multimedia Manager
RPSC will investigate how to make available the on-line training for the science community. There will be a collaborative site developed for ongoing dialogue and a vision portal. The NSF has encouraged RPSC to create a strong web presence. RPSC has ancillary sites that are not meshed. **The amount of requests for access are growing, therefore, there is a need to create an environment that can plug into all these ancillary sites. The first goal is to prioritize and build management issues with our limited resources.

Phase 1 is a face-lift creating the usap.gov site. The content will not be changing. The Raytheon site will be within the usap.gov site. While creating this RPSC will need to comply with security

accessibility and guidelines. In the usap.gov site RPSC is laying a baseline for a dynamic database and will need to ensure that the content is updated and current. The plan is to go live in August, but it will not have an impact on the environment.

Phase 2 is soliciting and talking with the science community and users program-wide for a list of end-user priorities and recommendations to present to the NSF for the FY04 budget. RPSC will be attempting to apply the principles of the nsf.gov on the Internet as well as those on the stations for they will be under the same umbrella. RPSC wants to the mirror the web sites for all stations and in Denver. The NSF will be able to access these sites on a regular basis. There will be some information that is live. Once RPSC is satisfied with the testing of the mirroring, they will discuss efforts, limited funding and continued requirements with the NSF.

Scambos commented that one of the issues is the separation of Raytheon and Grantee access. This was one of the reasons why this issue was put on the action list last year. Information such as mailing addresses need to be on the web site. He would like to see a search function and a break-out of participant and public information that will be password protected.

Morse suggested that aircraft information be available on the web site also. Other possible items will be discussed during the executive session.

Alternative Energy
RPSC is responding to the growing SIP requests for increased energy and is considering using alternative sources. Work centers are evaluating the engineering and costs for long-term use. Scambos commented that he would like to see 10 to 100 watts available continuously and Morse would like to see the solar panels framed to keep them from blowing away.

ACTION ITEM 5: STEVE DUNBAR STATED THAT RPSC WOULD BE SURVEYING COMPANIES TO SEE WHAT ALTERNATIVE ENERGY SOURCES ARE AVAILABLE.

FACILITIES, LABORATORY AND MISCELLANEOUS

Crary Library
Cara Sucher, Sr. Assistant Supervisor, Laboratory Operations
The sentiment from the science community was that the Crary Library is useful as is. They want to add a few books and expand Internet-based search services. The South Pole, Palmer and McMurdo Stations combine the electronic subscriptions. The Internet has made it easier to get a wider variety of subscriptions and abstracts for journals, which can be obtained through the NSF and RPSC sites. Several subscriptions that are continent-wide and available to the science community were listed. Palmer Station scientists received it very well. However the subscriptions are very costly therefore RPSC won't be getting any more. The current inventory will be maintained. Suggestions for future journals from were solicited from the committee.

Crary Capital Equipment
Robbie Score, Laboratory Manager
Crary staff is prioritizing items for repair and replacement. RPSC is soliciting the Science Community for a list of their preferences for replacement and upgrades in the Crary Lab. Alexander stated that they would be categorizing the inventory for value, rollover and life cycle and when equipment should be replaced. The inventory list of the entire lab is in excess of $4 million.

RPSC needs to discuss the base inventory requirements with the NSF to see exactly what should be in the Crary Lab. The NSF is compiling a long-range inventory list, which includes what is specific for a

project, what is stock inventory, and what items can be used by several groups. They will determine the final list based on the input from the Science Community. The life cycle replacement plan is for basic equipment and there are some items that should be "standard" in the Crary Lab.

ACTION ITEM 6: STEVE ALEXANDER WILL PROVIDE A CRARY LABORATORY CAPITAL EQUIPMENT INVENTORY LIST TO THE SCIENCE COMMUNITY BY DECEMBER 2003 TO CATEGORIZE AND PRIORITIZE FOR REPLACEMENT AND UPGRADES.

Aquarium

Scambos inquired about any aquarium plumbing updates. Alexander assured the committee that the sewage system is a separate system and would not run through the new plant. Scambos wanted an overview of the new science building and how it is integrating into the BFC. S. Dunbar said that the current building is being "rung out". There have been issues with the heating and solvent balances but that is improving. In terms of Phase Two, moving science and BFC cargo will not be happening this year. This will roll into the long-range plan. The BFC will be demolished this year but we are several years out before there will be construction.

ACTION ITEM 7: STEVE DUNBAR WILL PROVIDE A COPY OF THE AQUARIUM LONG-RANGE PLAN TO THE COMMITTEE.

Sample Shipments
Michael Davis, Manager, Cargo

All vessel samples arrived safely, two Comair samples were damaged, and that 51 science samples had been damaged last year during transit to their final destinations and wanted the committee to know what actions ATO is taking to amend the problem.

- A Quality Assurance System is now in place, which includes the Crary Lab to make sure that the scientists are involved in packing and getting the samples to their final destination.
- All e-mails must be "receipted".
- Manager, Cargo will now be in Pt. Hueneme for cargo offload to ensure that no damage has occurred during shipment.
- After a meeting with NICL boxes were found to be lacking in blue ice packs for samples. NICL's rules-of-thumb will be in place and samples will be double packed in blue ice. NICL puts their samples into a warehouse for a two-day cold soaking. The sample is not opened. RPSC is looking into the availability of doing that as well.
- New -20° blue ice packs have been ordered.
- Eight data loggers will be in each box and grantees will have access to the read-outs. The grantee will put them in the boxes if in the field. These data loggers must be sent back to RPSC.
- RPSC is ordering new insulated containers with an R factor of 40, which will maintain 5 - 7 days of frozen integrity. These containers cost $200 - $500 each and must be sent back to us.
- RPSC has been conducting tests at McMurdo in order to gather packing recommendations.
- RPSC will be required to be present while packing samples. Someone will check and verify that it arrived in good condition.

Scambos wanted to have a packing and shipping course available on-line so grantees could learn updates and the proper way to pack and ship samples. Priscu suggested that we follow NICL's lead for shipping samples. NICL downloads data and the scientist does not get the download until the data logger is returned. He asked for blue ice temperature data, which Steve A. will provide for him.

Bowser wanted to know if they hand-carry samples that do not need to be frozen, will they be depending on RPSC for proper handling instructions. Davis said that RPSC would advise, but that it would be the responsibility of the carrier (who would have to sign a waiver) to ensure sample integrity.

FYI: Airlines are now X-raying every sample.

Deployment and Travel Update
Lynn Dormand, Manager, DSG

RPSC has not had any major changes since last year. A question and answer sheet was passed around to the committee. It was pointed out that the DSG tries to be available at all times for questions through access to e-mail, the 800 number and DSG Manager's cell phone. If anyone has special equipment that is hand-carried, they need to notify DSG so the necessary paperwork can be prepared. Some excess baggage and special equipment may be too big. Scambos pointed out that he has had problems with American Airlines with weight limits and handling hand-carry items. RPSC calls the airline ahead of time with notification that these items will be coming through. DSG also notifies the airlines with a manifest every day as well as items marked for special handling. However, not every airport at every stop is aware of this information. The committee was reminded that the ticket jacket has an emergency number if there are problems and to have the airline look at their "record locator" for verification and clearance. RPSC is trying to encourage people to ship as much as they can as cargo, but it was noted that cargo is put on the plane at the discretion of the pilot and may not get on the plane.

Other points that were reviewed:

1. All tickets for USAP Participants will be issued from and returned to the same city, unless otherwise approved by the DSG Manager or the NSF Program Manager.
2. Personal travel is not considered when purchasing a ticket with government funds.
3. The FAR states that a government contractor must use a U.S. Flag carrier, except in certain instances listed in the government regulations. Consequently, all deployments to New Zealand will be on a U.S. Flag Carrier, except in extraordinary cases when all carriers are booked full and an individual must deploy on that particular date. In this case, alternative carriers will be investigated and used, if practical. RPSC Travel will manage USAP Participants so they can be booked on a U.S. Flag Carrier, by possibly moving the Participant forward or backward of a desired deployment date. In cases where it is not feasible because of programmatic reasons, RPSC will book them expeditiously.
4. NSF agrees that the ticketing policies should be flexible enough to handle most situations. RPSC will diligently attempt to get the lowest reasonable fare for the government; however, RPSC will also strive to meet an individual's programmatic requirements.

Grantees

1. Grantee tickets will be issued from Airport of Departure (AOD) to Christchurch and return. This ticket requires a 14-day advance purchase and is valid for one year. The date deploying from AOD or U.S. Port of Embarkation to New Zealand cannot be changed. If a situation occurs where the date must be changed, the ticket has to be cancelled and re-issued. The additional cost of the ticket may be significant and is the responsibility of the Grantee, unless for approved programmatic reasons. All change requests must be in writing to the Travel Supervisor and approved by the NSF.
2. All tickets for Grantees will be issued from and returned to the same city/AOD, unless otherwise approved by the NSF.
3. Grantees will be ticketed on their requested departure date as reflected on the submitted TRW (Form PA-A-100b). If the U.S. Flag Carriers are fully booked on that particular date, and RPSC cannot move an RPSC employee to another day to accommodate the Grantee, RPSC will request

the Grantee to move either forward or backward to a date where a seat is available. If the Grantee insists on traveling on a date that requires an upgrade, RPSC will accomplish the upgrade. If the Grantee insists on traveling on a fully booked date, RPSC will arrange for an alternate foreign flag carrier if the requirements of the FAR for unavailability of U.S. flag carriers are met.

4. **Winter-over Grantees** will be issued a one-way ticket from their AOD to Christchurch. The Christchurch Travel Office will purchase the return ticket from Christchurch to their AOD.

5. **Grantee/PI ticketing from abroad:** This applies to all Grantees, whether identified in the proposal stage or later. The DSG will **not** issue tickets with originating travel from outside the United States unless specifically approved in advance from the NSF. POLAR ICE has been updated to provide identification of international ticketing requirements. The Participant is to provide their own ticketing from their home to their PI's institution stateside. The DSG will provide ticketing from the home institution to the international Gateway City (Christchurch, New Zealand). If, in the opinion of the DSG Manager, or the Travel Supervisor in the absence of the DSG Manager, it is in the best interest of the USAP and the Participant for the DSG to provide ticketing from a U.S. city other than that of the home institution, such ticketing may be approved. The ticket cannot be at a greater cost than it would be from the home institution city.

Redeployment

1. Employees, Grantees and all USAP personnel issued tickets by RPSC may take personal time upon return from Antarctica. Tickets purchased for WINFLY and Summer Participants have an open return date, and are valid for one year from the original departure date. Winter-over Participants will be provided with a one-way ticket back to their AOD.

2. All Participants ticketed by RPSC have the option of redeploying FAA (first available flight), or at a specified date after taking personal time, or they can use the credit towards another ticket within the guidelines of the airline that they were originally ticketed on.

3. The following options are available (at the individual's own cost):

Personal time in New Zealand

- A "side" trip can be made from New Zealand to a vacation destination, then back to New Zealand for redeployment
- Participants may use the credit from the unused portion of their ticket towards personal travel. One option is to purchase a Round the World Ticket. The Christchurch Travel Office can assist with personal travel arrangements. All change fees and added costs will be the responsibility of the Participant.
- Winter-over Participants may apply the credit calculated for their one-way ticket from Christchurch to their AOD towards a ticket for personal travel.
- **Any reroutes of LAX/AOD tickets, or stopovers that are for personal reasons, are at the individuals' own expense.**
- **Four working days are required to process reservations and tickets in the Christchurch Travel Office for other than FAA requests.**

Excess Baggage

1. If an individual is entitled to excess baggage, the Christchurch Travel Office will provide an MCO (excess baggage coupon) for Christchurch-Auckland-Los Angeles-AOD. If the individual elects to take an alternative route, this MCO can be applied to the alternative route. However, any additional excess baggage charges, such as subsequent legs of a stopover or alternative route, are the responsibility of the individual.

2. If it is necessary to upgrade tickets for programmatic reasons to YOX/Business, or First Class, the Christchurch Travel Office will reissue the original tickets. If it is necessary for a

person to travel on a Foreign Flag Carrier, then the original ticket will be returned to the RPSC Travel office in Denver for a refund.

Appendix

Science and Program Advantages of Improved Internet Bandwidth for McMurdo Station, and Other Results of the MAUC 2002/2003 Questionnaire

Prepared by the McMurdo Area Users Committee
July 8, 2003

Contact T. Scambos (teds@icehouse.colorado.edu)
National Snow and Ice Data Center, University of Colorado, Boulder

Executive Summary

At its July, 2002 meeting at Raytheon Polar Services Company (RPSC) headquarters, the McMurdo Area Users' Committee identified increased CONUS-McMurdo Internet bandwidth as its highest priority recommendation to RPSC and the NSF-OPP USAP program. It is our continuing belief that this improvement is the single best thing that can be done at this time to improve science productivity and program efficiency at McMurdo.

Since then, the committee has polled its constituent communities of scientists at a number of venues, seeking further input on the usefulness of such a move. In their responses, the user communities and MAUC have identified the following specific advantages:

- Efficient, improved monitoring and better control of year-round instrumentation from Ross Island, Dry Valleys, and McMurdo Sound study areas; Facilitating new telescience applications that permit year-round research; Making on-continent time more useful, and on-continent staff potentially smaller, by permitting remote participation and better pre-deployment planning; faster transfer of important field science results to US and international colleagues; efficient GPS data transfer northbound and southbound;
- Better support for planning revised field logistics;
- Improved outreach programs, addressing a stated high-priority objective of NSF-OPP;Improved education/academic connectivity;
- Improved access to existing off-continent data centers for research and operational support for data such as satellite imagery, seismic data, and geophysical measurements;
- Better support for specialized videoconferencing applications such as medical, DV videoconferences, etc.
- Better communications with home institutions, colleagues, and journal editors, to allow continued progress on publications, proposals, reviews, and reports while in McMurdo;
- Better access to journals and publications for Crary Library.

The community was also polled about: CD/online training versus McMurdo classroom time (there is broad support for the former); the Crary Library; and the demise of the Antarctic Journal. The responses from the grantee community are summarized in this report.

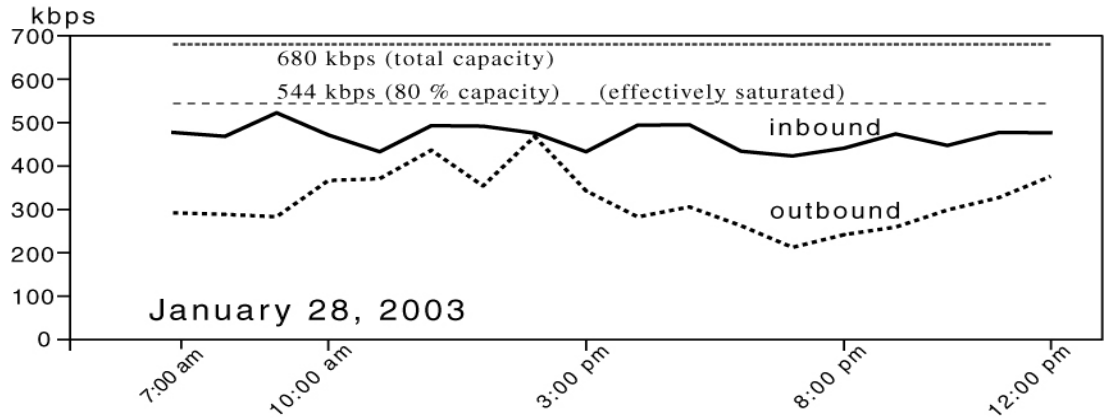
Introduction

The US Antarctic Program (USAP) is by far the most complex and scientifically productive venture on the southern continent. It involves hundreds of scientists from a very broad range of disciplines, and a very active, educated polar support services group. The program can be justifiably proud of its modern infrastructure, including several research buildings, improved transport systems, and its ability to support laboratory-quality research at McMurdo, the South Pole, Dry Valleys, sea ice camps, and deep field camps. There is equal dedication and pride on the part of the participating scientists and

support personnel who spend weeks to months preparing and conducting Antarctic research. But among the infrastructure assets required for an effective modern program is Internet infrastructure. Here, we feel that USAP needs to re-prioritize, and address a growing shortfall in Internet bandwidth availability.

It is no exaggeration to say that the Internet is the most important tool in science today – and in fact, it is the need for rapid, simple science communication and data transfer that prompted NSF to invest heavily in the development of the Internet in the 1980s. The Internet has resulted in a surge in scientific productivity, allowing rapid communication among collaborators, and quick exchanges of data, manuscripts, and proposals. It has also led to a level of access to information that was unimaginable just a few years ago. The Internet is the new home of humanity's knowledge. And knowledge – information and data – is the lifeblood of the scientific endeavor.

Figure 1. Internet use and available bandwidth for McMurdo-CONUS link on a typical summer-season day from 2002/2003. Capacity at present is 768 kbps due to recent upgrades.



Currently, internet connectivity for the USAP program rests almost entirely on a single T1 line connection, served via satellite connection between McMurdo and Denver in the US (in fact, Internet use by the McMurdo grantees and support personnel is limited to half the T1 line). Having any Internet access from the Antarctic was at first a boon, but as science programs on the continent have matured, there is increasing saturation of this link (Figure 1). This places a restriction on the scientists, and it results in a less productive and efficient overall program.

This document outlines several identified benefits to both science and the support program from increasing the bandwidth 'pipe' for USAP. It is our top recommendation. *We strongly encourage NSF and Raytheon to make this a top priority for the benefit of the entire US Antarctic effort.*

Input from the Grantee Community on McMurdo support issues

Since its last meeting in July 2002, the MAUC has gathered input and ideas on recommendations for upgrades to the USAP program at several venues, and provided input to RPSC on their results. Shortly after the meeting, MAUC provided RPSC with a formal write-up of its recommendations, listing Internet bandwidth increases as its highest priority. Other recommendations were also outlined. On November 22, members of the MAUC convened an ad hoc meeting at McMurdo Station with20 other grantees attending, again reviewing and discussing the committee's recommendations. Mr. Patrick Smith of NSF was in attendance and noted the comments made at the meeting.

In response to Mr. Smith's suggestion, and to gather further community support and ideas, MAUC composed a questionnaire based on its top recommendations and circulated this via RPSC to the entire McMurdo grantee community in March 2003. We received 18 responses with extensive written comments, summarized below.

Science and Support Benefits from increased Internet bandwidth

Below, we develop the advantages listed in the Executive Summary with paragraphs derived from the questionnaire responses.

The identified advantages are:

- Improved measurement, better monitoring, and better control of year-round instrumentation from the Ross Island, Dry Valleys, and McMurdo Sound study areas Facilitating new telescience applications that permit year-round research; Making on-continent time more useful, and on-continent staff potentially smaller, by permitting remote participation and better pre-deployment research planning; Faster transfer of important field science results to US and international colleagues; efficient GPS data transfer northbound and southbound;

- Several grantees identified the need for improved telescience and remote, year-round access in association with biological experiments, digital and video monitoring of Dry Valley and Erebus research sites, and increased cost-effectiveness of in situ research. This last point bears some clarification: researchers felt that *their time in McMurdo could be better used if they had access to Internet-based high-bandwidth monitoring of instruments and sites prior to coming to the ice, or after site installation.* Improved teleconnection can facilitate entirely new approaches to conducting science, and new experiments or measurements. While clever application of compression software can help (and is frequently used currently) this application appears to have a very large potential for growth. Although no amount of bandwidth can replace the need for researchers to observe in Antarctica, an expanded Internet capability can shrink the number of person-days required on continent. In some cases, science or instrument experts might 'participate' in field data gathering, analysis, or instrument troubleshooting from a remote CONUS site. This can in turn increase the cost-effectiveness of the USAP program (fewer participants, or less total time). Important field results and data can have an immediate impact on the activities of collaborators off continent. *Rapid transfer of new results from Antarctica can allow science teams to take advantage of what they know as soon as they know it*, making USAP more timely and productive scientifically. The need for quicker transfer was also identified by UNAVCO staff and scientists interested in easier, more efficient transfer of GPS position data, and supporting data like precise orbits, reference site positions to/from CONUS. Other scientists noted that bottlenecks elsewhere in the system (poor modem connections, limited phone links) will soon be removed – and with their removal, research data transfer pressure on the main McMurdo Internet link will become still greater.

- Better support for planning revised field logistics;

- Several deep field groups highlighted this need where detailed field planning is essential. In recent years, field planning has become an increasingly data- and information-intense effort, requiring access to satellite images and publications, and rapid communication with US colleagues. Further, late changes in field timing and location are common. Thus the current need for flexibility in the USAP logistics results in a need for rapid, efficient re-planning support from McMurdo. *By asking the grantee community for short-term flexibility in timing and location of the field programs, USAP places additional needs on the community for rapid, high-volume communication with CONUS.*

- Improved outreach programs, addressing a stated high-priority objective of NSF-OPP; improved education/academic connectivity;

- It was noted by several grantees that one of the best things they can do to entice young students and the public into becoming interested in Antarctic research is to 'invite them along', virtually, with near-real-time pictures, live video, or interactive Internet sessions. Another suggestion was that some scientists might wish to provide a lecture-like presentation from the field, or from McMurdo, engaging students at the undergraduate or graduate level. This would provide much richer, closer outreach content. *Wider Internet bandwidth, capable of supporting greater image, graphics, and video connectivity, would allow scientists greater outreach, and permit greater access to science activity in Antarctica to the K-12 education community, university students, and the taxpaying public.*

- Improved access to existing off-continent data centers for research and operational support, for data such as satellite imagery, seismic records, and historical measurements;

- Several data archives now exist, funded by both NSF and NASA, that are aimed at supporting the physical and biological sciences with rapid, near-real-time access to data such as satellite images, species identification data, weather data, seismic data, astronomical data, ice penetrating radar profiling, and historical geophysical measurements. These data can be important from an operations/support viewpoint as well, providing information about landing sites, icebergs, surface temperatures, and sea ice conditions. Among the sensors and sites used frequently by USAP grantees and support personnel are Radarsat, Landsat, AVHRR, MODIS, the AWS and ice berg image archive at the AMRC/University of Wisconsin, and the Antarctic Glaciological Data Center at NSIDC/University of Colorado. *Greater bandwidth from McMurdo would facilitate better access to near-real-time satellite images, geophysical measurements, and GPS data. It would permit data access for comparison with new field measurements and development of new science ideas spawned by field research. It would promote greater awareness of field or ocean conditions leading to greater safety.*

- Better support for specialized videoconferencing applications, such as medical, DV videoconferences, etc.

- In recent winter-over seasons, critical medical situations have arisen that have required close interaction between stateside medical staff and the medical and support staff on continent. This kind of access makes it possible to handle contingency medical situations without having to place high-level medical facilities at each of the stations. Also, wider bandwidth would broaden the number of decision-makers who could review activities on the continent, and could reduce the number of distinguished visitors (DVs) who need to physically visit each year. *It would increase the safety and efficiency of the USAP program to conduct these activities with a 'wide-pipe' bandwidth solution, such as videoconferencing.*

- Better communications with home institutions, colleagues, and journal editors, to allow continued productivity on publications, proposals, reviews, and reports while in McMurdo;

- Active scientists and graduate students in the grantee community want to take advantage of any available time they have to continue progress on manuscripts. Further, NSF expects contributions on the part of the grantees for reviews of proposals, manuscripts, grant reports etc. Often, grantees find themselves in McMurdo with days of time available for this work, waiting for weather or support infrastructure before going out to the field site. This time can be used to great benefit for the scientists *and* NSF. *It would increase the productivity of the overall USAP program, NSF, and the science publishing community, if these scientists could continue scientific writing, reviewing, and publishing from McMurdo in an efficient manner.* This leads to increased need for Internet bandwidth because of the size and complexity of digital manuscripts, figures, images, etc. that accompany most written documents.

- Better access to electronic journals, search engines, and other publications, making Crary Library more efficient and useful.

- MAUC was asked for input on how to best improve the research value of the Crary Library at its last meeting at RPSC, and this was included in the questionnaire. Most scientists value the Crary Library as a quiet place to work, and to hold lectures, but the Library's holdings are limited. *Subscriptions to online access services by Crary Library would allow it to support research needs from the McMurdo community better.*

How much more bandwidth? How should it be managed?

The consensus estimate from MAUC is that, to preserve the availability of the resource for the next few years, the Internet bandwidth should increase from it's current ~768 kbits/sec by no less than 3-fold. A smaller increase would likely still require such tight management and prioritization that the needs and ideas identified above could not be adequately developed.

A test of video conferencing by one science event showed that this level of interaction consumed approximately 7% of the current bandwidth available from McMurdo. Currently, the near-real-time monitoring of the Erebus summit area consumes a few to several percent of the bandwidth. Given the current saturation of Internet bandwidth, and the likely increases resulting from the needs and new uses listed above, a doubling or tripling of current capacity would be needed to support easy, certain access for one or two video conferences, and/or three or four Erebus-like areas of multi-instrument monitoring, simultaneous with typical daytime background activity. Note that several programs (LTER, Erebus) seek near-continuous remote video monitoring.

If wireless networking for field camps becomes available and widely used, and IP connections use McMurdo as their connection point, then there will be further pressure on the current McMurdo-CONUS link. This connectivity planned for the Dry Valleys in the near future. In addition, if a fiber-optic cable is installed along the traverse route to South Pole (as is being considered), thus providing a ultra-high speed link between South Pole to McMurdo and ultimately to CONUS, the need for higher b/w will be significantly greater than this document's recommendations. Large, year-round data volumes may be expected from the astronomy and physics programs at the pole.

Management of any increase in bandwidth should continue under the same conservation-minded guidelines as at present (and with additional security considerations as necessitated by recent events). The MAUC and the science community at large recognize the need for managing this resource for the benefit of the entire program, and with security for the machines and data resident at McMurdo. Grantees with planned events, such as large data transfers or interactive Internet sessions that will require higher bandwidth, should request this prior to the event. Transfer of science video data outside informed RPSC approval (e.g., mpegs, digital streaming video) should be limited, as well as other bandwidth-intensive uses such as large ftp transfers. Recreational use guidelines should continue.

Other issues

Online and CD/DVD-based training classes

The grantee community was nearly unanimous in its opinion that several of the current training courses at McMurdo could be moved to an on-line or digital disk format (CD or DVD) for review prior to deployment. Specifically mentioned (several times) was the recycling/hazardous waste seminar now required of all McMurdo dwellers. Although there was a strong sentiment that the 'snow school' field safety training could *not* (should not) be moved entirely to an online format, some aspects of the PUSH course might be. Other possible on-line/digital disk courses are MacOps radio communications training, Science Cargo packing and labeling training, helo safety training, altitude safety, the sea-ice refresher course, and the 'driver's license' course.

We note that efficiency is only realized if the creation of the online or disk-based course eliminates the need for the live course in McMurdo or Christchurch.

Crary Library
A strong sentiment was expressed by the grantees that Crary Library is a very useful and appreciated part of McMurdo just as it is. Several scientists proposed increasing the number of on-line subscriptions from Crary, and a few expressed interest in adding to 'rare volumes' and selected grey literature works that are unavailable on the web. Some specific requests:

- Web –based:
- ISI Web of Science
- Science Direct
- Journal subscriptions: Science, Nature, Geophysical Research Letters
- Books:
- Physics of Glaciers
- Principles of Glacier Mechanics
- Fundamentals of Glacier Dynamics
- The Art of Electronics (Horowitz and Hill),

and other reference books and handbooks focused on engineering, with the objective of experiment or instrument troubleshooting.

MAUC notes that it would be prudent to *not* implement the web-based additions until an increased bandwidth is available.

The Antarctic Journal of the U.S.
Sentiment on reviving this journal in some form was bi-polar: some expressed very strong feelings about its usefulness and it's appropriateness for on-line publishing; others were quite brief in their statements dismissing it as a waste of time. Given the divided sentiments among the overall McMurdo community, and the rise of metadata-gathering efforts such as the Global Master Directory, the MAUC is not pursuing its revival.

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