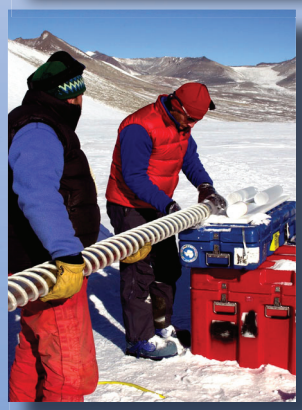

Raytheon

Polar Services

After Operations Report

Contract Year Six - April 1, 2005 thru March 31, 2006

United States Antarctic Program

UNITED STATES ANTARCTIC PROGRAM

National Science Foundation
Contract OPP 0000373

After Operations Report

Contract Year Six – April 1, 2005 thru March 31, 2006

Raytheon

Polar Services

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[redacted]RPSC Program Manager

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EXECUTIVE SUMMARY

Raytheon Polar Services Company's (RPSC) sixth year of contract performance commenced with an extremely successful Partnering Workshop with the NSF/PRSS. This was the fourth formal partnering to be held between the NSF and RPSC.

Following the Partnering Workshop, the Deployment Specialists Group (DSG) successfully managed the SPAWAR-sponsored Annual Planning Conference (APC) in Charleston, South Carolina in May. This project was a huge endeavor that required coordination between many user agencies to ensure all participating USAP attendees were accommodated, conference rooms and support equipment were available, and participants were provided the required support. The event continues to be an outstanding success.

In addition to supporting the Partnering Workshop and the APC, the DSG assisted the NSF with the ANDRILL Conference in Denver in April, providing hotel property reviews and contracts, airline ticketing and hotel reservations, audio/visual support, food and beverage selections and contracts, shuttle arrangements, name tags and other administrative support, and expense report submittal to over 160 participants. They also supported several other conferences, including SPUC, Norwegian-U.S. Traverse of East Antarctica in Norway, AOMG, ASC, Sea Ice, the Meteorite Working Group, the Scientific Committee on Antarctic Research (SCAR) Meeting in Munich, Germany, and IPICS II in Brussels.

Another major DSG accomplishment was the efficient continental deployment ticketing of USAP participants. Ticketing more than 14 days in advance saved an estimated $2 million over ticketing within 14 days. Due in part to the development of unique luggage tags and the DSG's relationship with the airlines, the TSA, and gateway city airports, the USAP mishandled luggage rate was only 2.33%, well below the industry average of 7%.

The DSG was also instrumental in completing two R6σ projects. The first was the creation of a Travel Authorization database, which replaced the extremely laborious paper system inherited from the previous USAP support contractor. American Express, a subcontractor to the DSG, assisted with design and implementation at no cost to the Program. Additional enhancements were made in-house, including efficiencies in reporting and in auditing and electronic storage of over-per-diem letters. The estimated cost savings exceeds $10K per year. The second R6σ project enhances ECW gear distribution at the Clothing Distribution Center (CDC) in Christchurch. The DSG worked with IT and drove the Personnel Tracking System (PTS) changes that made it possible, adding a date/time stamp to the clothing screen, revamping the import process, and redesigning the CDC reports. The result is a database that automatically imports data from PTS and produces accurate clothing issue forms and jacket labels.

Continuing on with the Headquarters group, RPSC Medical, despite the loss of the Medical Director effective January 3, 2006, successfully completed the year by providing medical packets to 3088 candidates and clearing 2456 for deployment. This reflects an increase of 4.4% and 1.2%, respectively, from KY05. Due primarily to significant advances in telemedicine year-after-year, the USAP experienced only five medical evacuations (MEDEVACs) this year: two RPSC employees, one Navy person, and two non-USAP personnel. None of the MEDEVACs could have been prevented by medical screening.

Environmental, Health and Safety (EH&S) saw significant changes over the last twelve months. They reorganized in a way that gives them greater flexibility on the Ice and allows them to provide better support to the NSF and

other RPSC departments. Through effective hiring, they have significantly increased the experience level of their staff. This has resulted in quicker and better environmental reviews and allowed them to be more responsive to NSF requests. They reviewed all RPSC safety polices and procedures, updated them to reflect changes in OSHA regulation, and made them site- or station-specific. Perhaps their most important change has been to upgrade RPSC's safety education program, which has resulted in a higher level of safety awareness throughout the Program and fewer injuries. In fact, RPSC experienced 48% fewer injuries in 2005 versus 2004.

Spill reduction has also benefited from increased awareness. The overall spill rating index declined by approximately 13% this year, from 7.83 in KY05 to 6.78 in KY06. If the WINFLY sea ice spill were factored out, the decline increases to 15%. This is a significant decrease, clearly indicating improving trends in RPSC's efforts to reduce overall spill impact. Additionally, the current annual index is 15% below the long term index of 7.96.

Human Resources (HR) saw significant management changes in KY06. The HR Director left in April and was not replaced until August. In the interim, the Recruiting and Diversity Manager assumed the acting Director role, with the entire HR staff contributing to ensure that the transition was transparent to the NSF and that no services were interrupted.

Communications continued to improve the quality and increase the quantity of their services. During the course of the KY06 austral summer, Communications published seventeen issues of the *Antarctic Sun* and posted them to the USAP portal, www.usap.gov. On average, RPSC saw 2,000 visits per day to the web version, 10% from foreign countries. We received e-mails daily from around the world, demonstrating a wide international interest in the USAP. Every issue of the *Sun* met its deadline. In addition, Communications published eight issues of the *P.S. News*, our internal employee newsletter. They added over 800 new photos to the USAP Digital Photo Library, ending KY06 with over 2,300 photos. The Photo Library averages 500 web visits a day and provides photos for a variety of uses around the world. The quality and range of photos continues to increase, enhancing the library's value as a remarkable publicity and educational outreach tool for the Program.

Peformance Assurance/Quality Assurance (PA/QA) successfully led the continued ISO 9001:2000 registration at four RPSC locations. Contributing to this effort, PA/QA facilitated the management review process, coordinated RPSC Management Quality Council oversight, revised the Corrective Action and Preventive Action Response System (CAPARS) procedure and database, and retrained all directors and division points of contact in its use.

In May of KY06, and with the approval of the NSF, RPSC created the Project Management Office (PMO) and hired a Manager. Supervision of the PMO is a part-time task; the same Manager is the fulltime SPSM Project Manager. The PMO Manager set up a PMO Implementation Team to establish and integrate Enterprise-wide project management procedures and standards through all RPSC divisions. The team is comprised of matrixed planning and control managers from each of the primary operations divisions (Science Support, IT, FEMC and Sta-

tion Operations) and a fulltime Project Controls Manager who is responsible for coordinating Integrated Master Schedule (IMS) activities and estimating costs. During KY06, the PMO established oversight procedures for 30 projects and an estimating process for all proposed future projects. We began to standardize project management processes and procedures (an ongoing endeavor). We standardized planning and cost estimating, instituted scheduled project reviews and standardized reporting requirements, and trained current and future project managers. Meeting procedures and formats for agendas, attendance rosters, and meeting minutes, including action assignments, are now standardized. Templates for standard project planning worksheets have also been introduced.

KY06 has been a year of change for the Christchurch office. The deactivation of two U.S. military units shifted tasking to RPSNZ, along with a greater responsibility for USAP functions. In response, we appointed a Ramp Manager and implemented a "Continuity Book" to ensure our support is equivalent to that which Detachment 13 and Airlift Military Command (AMC) Flight Operations provided to military units in the past. Overall, the change has been positive, enhancing our working relationship with transient military personnel. For the second year, in order to avoid VAT costs, we worked with the Christchurch shipping agent to load cargo onto the Russian icebreaker, I/B *Krasin*, which was under contract to the NSF. Southbound cargo was loaded onto the *Krasin* in Pusan, South Korea. To avoid VAT charges on the northbound voyage, a consignment of cargo was loaded on the *Krasin* in McMurdo, destined for the U.S. Embassy in South Korea.

The McMurdo Area Directorate continued to provide excellent support and services to the USAP during KY06. With no other options available, we located the sea ice runway on last year's icebreaker channel and turning basin. Ice conditions prevented us from building a crosswind runway, which further complicated the airfield's design because we still needed to meet the FAA's Terminal Instruction Procedures (TERPS) for safe approaches and departures. Despite the complications, we completed the runway on schedule for the first Mainbody flight on October 4, 2005.

The Directorate was also instrumental in the completion of two major projects: the South Pole Traverse Proof-of-Concept and the Microwave Landing System. Both were successful and both will have lasting positive effects on Program support capabilities and flexibility.

Although vessel operations required us to schedule the fuel tanker and cargo vessel for arrival earlier than normal, ice conditions and problems with the icebreaker's propulsion system caused delays. Fuel management became a critical issue because of these delays, especially regarding AN-8. The Directorate shuffled priorities until the fuel arrived without affecting operations at McMurdo or the South Pole. In fact, we supported an extended season at Pole that included a record 377 flights.

The South Pole Traverse Proof-of-Concept team completed an historic overland trip in its fourth and final year, successfully finishing its mission to travel from McMurdo to the South Pole and back in one season. The team worked in an extreme environment, adapted to unforeseen terrain challenges, and maintained a perfect safety and environmental record over the entire four seasons. We left a 1,000-mile marked trail between McMurdo and South Pole, across 300 miles of previously unexplored territory on the Polar Plateau, and proved that a repeatable overland traverse using heavy cargo tractors is feasible. We delivered more than 218,000 pounds of cargo (tractors, trailers, implements and spare parts) to South Pole – the equivalent of 11 LC-130 flights.

In KY06, the South Pole Area Directorate continued to oversee construction related to the South Pole Station Modernization (SPSM) project. They worked seamlessly with the NSF to support ongoing science projects and major science initiatives, such as the IceCube neutrino observatory and South Pole Telescope. RPSC's

performance in support of IceCube was recognized by the University of Wisconsin in March with an award for being a "reliable and indispensable partner in the successful initiation of construction of the IceCube Neutrino Observatory." Good weather and outstanding planning enabled the South Pole to receive an additional 1.3 million pounds over the planned cargo/fuel delivery for the season, with flights continuing through February 21, 2006.

Palmer Station began KY06 with an ambitious winter schedule. Summer science teams remained on station into April, and we supported preliminary work on the PRIMO project (B-390-P) from April to May. R/V *Laurence M. Gould* (*LMG*) cruises LMG05-05 (May) and LMG05-06 (June) supported station-based research for B-036-P (Sidell). The station also supported several fishing outings and other on-site research during this period. Also of note, station personnel gave USAP presentations to 4,525 visitors from tour ships and other national programs, and tours of Palmer Station to 1,925 of those visitors. Significant educational outreach and goodwill result from these visits. Feedback from visitors is overwhelmingly positive, with many remarking how proud they are to have their tax dollars fund the USAP.

In KY06, Logistics reduced costs by over $862K and eliminated obsolete materials from all three stations, while continuing to make safety the number one priority. Logistics delivered 41 million pounds of cargo this season. A number of changes and improvements accounted for this massive movement of material, including the airlift metric that changed from mission accomplishment to weight of cargo delivered. Consequently, aircrews began to load aircraft closer to the maximum aircraft cabin load (ACL), resulting in an additional 192,000 pounds of cargo delivered to South Pole.

We saved $100K this season by redeploying all four USAP helicopters on a single C-17 flight. The original plan called for two flights, but we worked with PHI to dismantle the helicopters into more manageable proportions, thus requiring only one flight.

Also noteworthy, during the fourth year of the McMurdo Retrograde Project (designed to reduce excess and obsolete inventories at McMurdo) the Logistics Retro Team processed 751,000 pounds of material. This brought the running total for the project to 4.2 million pounds, more than half a million pounds ahead of schedule. Whereas most of our efforts were focused on inside storage areas, we also cleared approximately 75,000 outside-area square feet of excess and/or obsolete items.

Despite its challenges, KY06 was tremendously successful for Science Support, as evidenced by the overwhelmingly positive feedback we have received from supported grantees.

Although the Science Support Director left the Program with very short notice, we were able to immediately backfill the position with the former Director of PA/QA, thus enabling Science Support to successfully support 172 science events, eight artist and writers (W-events), and numerous technical (T-events), Raytheon (R-events), and visitor (V-events). The three stations (McMurdo, South Pole, Palmer) supported 125 station-based science events, nine T-events that required heavy science support, and the W-events. The Marine Science Department supported 43 vessel-based science events and four Peninsula field camps.

The initial schedule for the WAIS Divide drilling project was severely impacted by early season weather delays that created backlogs in the cargo plan, affected residency in McMurdo, and resulted in other Program-wide impacts. However, the Field Support Manager and the Project Manager for WAIS Divide worked seamlessly with the NSF Representative, the New York Air National Guard (NYANG), and affected grantees to recover the schedule, completing all milestones and objectives without a recordable injury.

Another accomplishment receiving recognition from the NSF was the Cargo Planning Weekly Report. In late September, after the Air Operation Planning Summary had already been published using mission count as the performance metric, the Executive Management Board changed the metric from "number of missions" to the "weight of cargo, fuel, and passengers moved to South Pole and deep field camps." Science Support quickly worked with Logistics to develop a weekly cargo tracking and variance report that reflected the change and helped us keep track of our progress. Overall, our efforts contributed to an outstanding season and efficient use of LC-130s.

Information Technology/Communications (IT/Comms) continued to work collaboratively in KY06 to improve its processes and procedures. We focused on improving IT support to the NSF and the scientific community. Innovative solutions abounded this year as IT/Comms successfully met all customer expectations and continued its historically outstanding support to the science community.

Of particular note, Information Security (InfoSec) continued to provide outstanding operational support and innovative technical solutions to the USAP. Specifically, the group worked collaboratively with the NSF's InfoSec Division and with other RPSC divisions, resulting in InfoSec's significant contribution to the NSF's "A" score on the President's Management Agenda Scorecard.

Another important highlight of the year was the approval for www.usap.gov to go live. After several years of design and review, the new USAP Internet site debuted in September 2005. The USAP now has a dedicated web presence, clearly-branded and operated as an NSF/OPP site. More important, the site is the foundation upon which legacy station websites will be brought under a central "portal" web environment.

POLAR ICE was enhanced this year based on grantee feedback. Enhancements include a SIP year-to-year copy feature that saves grantees time in completing their seasonal planning documents, improved validation to ensure document accuracy, and the removal of the problematic itinerary model from the SIP, among others. Grantees have responded very favorably to the changes.

IT's Network Engineering Group led the engineering efforts for the McMurdo WAN Bandwidth project. The benefits included increasing IP bandwidth from 921 Kbps to 3 Mbps, converting the Air Force Technical Application Center (AFTAC) and Wells Fargo to VPN connection, finding an alternative layer 2 VPN solution for NASA (with savings of $40K), converting PBX voice traffic to VoIP, saving long-distance costs, and optimizing voice packet payload size, reducing per call bandwidth requirement from 24K per call to 16K per call, and increasing total call capacity from 24 calls to 32 (a 33% increase).

Polar Services IT engineers [redacted] and [redacted] were selected by Raytheon for the 2005 CIO Excellence Team Award for their work on the Iridium Multi-Channel System. This team developed the first-ever capability to provide 24x7x365 e-mail/data communications for the Amundsen-Scott South Pole Station. Continuous daily communications has been a goal of the NSF for more than 20 years. [redacted] made that goal a reality with a cost- effective and innovative Iridium solution.

Although the past Director of Facilities, Engineering, Maintenance, and Construction (FEMC) left the Program early in the contract year, he was replaced quickly and FEMC was able to accomplish its goals during KY06. FEMC employees worked through the bitter winter (under artificial lighting at an ambient temperature of -60°F and a wind chill of -100°F) to construct the new Long Duration Balloon (LDB) facility, begin a major upgrade to the Power and Water Plants, and initiate a long-term management plan for energy conservation. They also completed many small projects, continued to maintain facilities well past their prime, and

worked to create a safe environment for themselves and for the community.

A significant accomplishment this year was 100% conditional occupancy of the South Pole Elevated Station. RPSC also received conditional occupancy for the Dark Sector Laboratory (DSL), the Emergency Fueling Module (EFM), and the Vehicle Fueling Module (VFM). FEMC completed all Priority 1 punch list items identified by the design team for the Elevated Sation and finished South Pole Telescope (SPT) construction on schedule.

At Palmer Station, FEMC completed the new International Monitoring System (IMS) facility to replace the old T-5 science building, on schedule and within budget.

We are very happy to report that RPSC completed a sixth successful summer science season, for which we received many accolades from the scientists and grantees we supported. Our overall GPRA customer satisfaction score was

Although pleased with this rating, we are aware of the numerous remaining opportunities to improve performance in key areas throughout the Program. Several issues surfaced this season. Some of the key issues and corrective actions taken are highlighted below.

Issue: Implementing major new policies and programs without first establishing adequate communication between EH&S and other RPSC divisions, and between EH&S and the NSF, can lead to confusion. It can also lead to resistance, therefore to increased problems with implementation. This is especially true of programs and policies that significantly impact how people do their work. Many departments were unable to comply with new requirements this season because of equipment, process, and staffing constraints.

Response: We conducted an end-of-season survey with all supervisors for feedback on both the negative and positive aspects of safety program implementation during KY06. In addition, we held several meetings with the NSF and with RPSC Division Managers. The information we gleaned from these efforts will help us chart a smoother course when introducing future changes. Early planning and early communication are the keys to success.

Issue: The trans-shipment of genetically-modified organisms (GMOs) through New Zealand became an issue.

Response: As directed by the NSF, RPSC worked with Science Support personnel to clarify grantee requirements for trans-shipping these items. Following discussions with N.Z. Ministry of Agriculture and Forestry (MAF) staff, we convened a series of teleconferences with NSF representatives to clarify N.Z. biosecurity regulations and procedures. As a result, GMO trans-shipment procedures will be incorporated into the next version of POLAR ICE.

Issue: Christchurch Operations found that the personnel projections supplied by the NYANG were not accurate. This season there was a 22% under-projection, which resulted in our inability to provide airport hotel rooms during peak times.

Response: Ultimately, we were able to secure accommodation, though not at the hotel of choice.

Issue: A tracked vehicle punctured a hose at the sea ice runway, causing a 2,200 gallon fuel spill. A Fuel Department operator discovered the spill during a routine hose inspection and notified the Fire Department.

Response: We doubled the amount of flags marking the fuel hose. We blocked the old ice runway road with numerous flags (the fuel hose crossed the old road), preventing anyone from driving on it.

Issue: In the new South Pole Power Plant, exhaust heat exchangers on multiple units needed replacement. This is an item outside of normal maintenance.

Response: We are still investigating the cause of the failures and working with the manufacturer on solutions. Currently, the Power Plant has two

functional exhaust heat exchangers. We are pursuing the purchase of additional spares.

Issue: The failure of a bypass switch at Palmer Station allowed salt water to enter fresh water storage tanks.

Response: We provided bottled drinking water and activated the backup RO system while the storage tanks were drained and refilled. We repaired and tested the faulty switch and are investigating alarm systems and redundant bypasses for future installation.

Issue: The Navy halted support of Port Hueneme Terminal Operations because of a perceived non-payment of overdue invoices. RPSC set up a plan to resolve these outstanding invoices and was making progress when the Navy decided there was no progress and denied access to its facilities. This occurred just before the resupply vessel arrived to discharge McMurdo retrograde.

Response: Because RPSC has no authority to direct Federal agencies, we asked the NSF to intervene. The NSF arranged for the Navy to repeal the stop-support order in time for the vessel to discharge its cargo as planned. The NSF contracted a retired Navy comptroller to resolve the invoice issue, with the assistance of RPSC. We worked with the Navy, the NSF, and the comptroller on the final financial settlement.

Issue: RPSC incurred additional charter vessel costs because of delays involving the M/V *American Tern*'s documentation. An investigation found that containers were moved to the wharf without proper documentation and placed on the vessel without being manifested.

Response: RPSC immediately addressed this issue and put safeguards in place to prevent future delays. Improvements are in the works to allow RPSC to obtain the stow-plan software used by the vessel so RPSC personnel can begin working on the stow-plan before the vessel arrives. As part of this effort to make vessel loading more efficient, we worked with the ship's crew and presented a stow-plan for hazardous cargo as soon as the vessel arrived in McMurdo. We presented the remainder of the stow-plan shortly after the last container was loaded.

Issue: During the KY06 SIP review, grantee support costs exceeded the budget by approximately $750K.

Response: After much discussion with the NSF, we implemented a cost estimating process that includes discussing project support with PIs. We tested this process during the 2005 proposal review. Generating cost estimates at the proposal stage, and giving PIs clear guidelines to follow while completing their SIPs, provides the NSF with a predictable and achievable target for grantee support costs.

Issue: Although RPSC was directed by PACDIV to exclude engineered foundations from the design, day tank settling and leaning caused stress to the pipes.

Response: We evaluated all new day tank installations. Corrective action included ensuring proper ground preparation procedures and foundation design for all day tanks.

Issue: Design team inspections of the South Pole Elevated Station found issue with leading edge beveled soffit construction. RPSC made several modifications from the original design, but did not formally document them. This illustrates a breakdown in documenting significant changes completely.

Response: The design team recommended additional modifications after reviewing the project details. Our project team implemented the recommendations.

Issue: Ambient temperatures under the new Power Plant arch rose above freezing during the summer. Melting snow dripped down the sides of the Power Plant and then refroze, damaging the building's finishing covers.

Response: We submitted a proposal to correct this problem as part of the Ventilated Thimble proposal, since new thimbles will introduce yet another heat source under the arch. Our proposal

suggests a ventilation system with electric fans run by thermostat, in addition to the already approved exhaust blanketing. We plan to install the system in the summer of FY07 if we receive approval. (This project moved from the SPSM budget to an independent project, as monitoring arch temperatures will be a critical characteristic for comprehensive building management and protection.)

Initiatives such as the creation of the Project Management Office and Program-wide Integrated Master Schedules will significantly advance science support planning and internal communication and integration. The successful South Pole Traverse Proof-of-Concept and the Microwave Landing System will considerably improve on-continent material movement. The McMurdo Retrograde project will continue to reduce the overall materials storage "footprint" on the station. Although they got off to a shaky start, improvements in our accident/injury reduction program have had a positive effect on reducing overall injuries, thereby increasing the productivity of USAP participants as well as creating significant cost savings.

We will continue to use R6σ as the means to promote a culture that solves problems in a systematic manner and makes decisions based upon quantifiable analysis. Implementation of our initiatives to increase employee skill level and workforce diversity through improved recruiting and hiring processes continue to pay dividends. Maintaining our efforts to improve communication and collaboration with the NSF on strategic issues, e.g., Partnering Workshops, Quarterly VTCs and weekly telecons, will result in vastly improved NSF-RPSC communications and provide enormous benefit to the Program.

As we enter Contract Year Seven, we look forward to continued improvement. We have made great strides since the start of our contract and are eager to meet and overcome any and all challenges that remain ahead. We are enthusiastic about our continually improving relationship with the NSF and our enhanced contract performance and remain committed to making **Customer Success Our Mission**.

MAJOR PROGRAM ACCOMPLISHMENTS

General Management

RPSC Management Best Practices – KY06

- We instituted a weekly NSF-RPSC telecon where key issues and actions are discussed. This has helped more clearly define the work assigned to RPSC by the NSF and better define NSF responsibilities. The formal, action-items tracking system implemented as part of the weekly telecon focuses resources on priority items and provides an excellent overview of departmental tasking on an ongoing basis.
- We changed concepts for the Quarterly VTC. Expectations are now addressed for the next 90 days and then reviewed at the end of that period. Action Items are formally tracked and reviewed regularly.

Communications

- We added a new section to the USAP digital photo library for historical photos and populated it with over 800 historical photos from the IGY era.
- We organized over 100 volunteer presentations about the USAP, reaching more than 9,000 people, from senior citizens to preschool children.
- The *Antarctic Sun* staff in McMurdo accommodated a last-minute NSF request to accompany and photograph the Congressional delegation for four days.

DSG

- The DSG met or exceeded participants' expectations for deployment. We began KY06 with a metric of 18 points for timely ticketing of participants for continental movements, the highest point allocation within the USAP for a single metric.
- We organized the USAP Annual Planning Conference in North Charleston, South Carolina.
- Our Population Management Group met all reporting requirements during the season, seven days a week, including holidays.

EH&S

- We conducted a thorough review of past injures and introduced an aggressive training program requiring that all employees, including Supervisors, be trained before reporting to their assigned duties. This has led to a significant reduction in the overall injury rate.
- The Environmental Department addressed 18 contaminated sites during KY06 and closed four of them. We recovered an estimated 6,290 pounds of debris.
- We implemented the Safety Health Incident Event Logging Data (SHIELD) program.

Finance

- We installed and began using the Business Objects Budget and Finance Software, allowing RPSC and the NSF to develop multi-year budgets, integrate data from multiple contractors, and enhance reporting capability.
- RPSC now focuses all changes or updates to the APP through the Finance Department.

Human Resources

- Working with the Chief of Operations, we developed an RPSC "people plan" that focuses on employee development, meeting management, ethics training, and communication protocols. We have initiated the plan by hiring a Senior Training and Development Specialist.

- In response to employee feedback, we simplified the contract employee rehire process.

Medical

- This year 895 candidates (35.6% of all dental PQs) received "2-D" dental clearance, nearly double last year's quantity, saving $17K in subcontract chart reviews.
- Our staff coordinated three successful MEDEVACs, one at Palmer and two from McMurdo. All required international cooperation.
- We re-bid five subcontracts and renewed the other nine. We worked with Procurement to renegotiate the bid for Medical Laboratory Testing. The lower costs we negotiated will save nearly $35K for FY06 and over $100K for the three years of the contract.

PA/QA

- The Quality Technician completed training as a Qualified Building Inspector, allowing him to fill a need for additional quality control on construction projects and help with facility condition assessment programs.

Operations

Area Directorate – Christchurch

- We successfully assumed the tasking formerly provided by two deactivated military units, Detachment 13 and AMC Flight Operations.
- We coordinated the effort to ensure the *Krasin* did not have to pay the New Zealand VAT, saving approximately $700K.

Area Directorate – McMurdo

- The South Pole Traverse Proof-of-Concept Project completed its mission, executing an historic, never-before accomplished in any form round-trip surface traverse from McMurdo to the South Pole and back, all in one season.
- We effected a dramatic culture change at the VMF this season, removed tons of unusable material, eliminated equipment downtime, and promptly addressed customer needs.
- We successfully flight-tested and FAA-certified the Microwave Landing System (MLS-01) in December 2005.

Area Directorate – South Pole

- We completed work required to obtain conditional occupancy of the remaining wings of the new Elevated Station, the Emergency Fueling Module, the Vehicle Fueling Module, and the Dark Sector Laboratory (DSL).
- Our support for the IceCube and IceTop projects allowed them to complete eight string deployments and twelve tank stations.
- We completed construction associated with the BICEP telescope, allowing the project to begin observations on schedule.
- We developed and successfully executed the LHe plan for astrophysics support.
- We completed raising the Bio-Med arch in preparation for construction of the Logistics Facility.
- We participated in several science related video teleconferences, such as Space 2005 and Beyond Einstein.

Area Directorate – Palmer

- When the *LMG* was unable to reach Palmer Station in March, passengers onboard and on station were left without a means of transport. Moving them with USAP resources would have seriously impacted planned vessel science. We arranged their transport with tour operators, allowing the *LMG* and planned science to remain on schedule.

FEMC

- We completed the new LDB facility in time for the balloon launch, under very tight time constraints and difficult working conditions. This is a significant achievement.
- We completed the VORCORE balloon launch site on a very tight schedule, despite extreme weather conditions, darkness, and storm damage.
- We responded quickly and used ingenuity to repair the overhead door for bay #3 in Bldg. 143.
- We addressed approximately 220 work orders directly related to safety.
- We modified the Arrival Heights laboratory to conform to new safety regulations, even though science requirements limited our available options. We designed and installed an innovative fix for the fall-protection requirement.
- We finished a three-year effort to validate core information related to all FEMC-installed and maintained equipment in McMurdo. We used this information to update our 10-year life cycle equipment replacement plan. This forecast now defines all commodity replacement costs, associated labor Level of Effort (LOE), and annual budget requirements to install equipment for all three stations over the next 10 years.
- We donated enormous resources to help wipe out a month of delays at the WAIS Divide to get it back on schedule. The maintenance shops provided all support necessary to complete their work on schedule despite these delays.
- With the help of Fleet Operations personnel and equipment, we prepared the MOGAS tank site for a subcontract crew to install an Ortla berm liner. With our support, the crew completed this job ahead of schedule.
- We installed stronger gratings on two bridges at SSC so vehicles can drive right into the building, greatly reducing the time it takes to move material and equipment.
- We completed all South Pole Telescope (SPT) summer construction on schedule.
- As SPSM continues, we continue to meet project milestones aligned with both NSF and science community objectives. All science operations are now conducted in the new station, eliminating any need to maintain the old Dome facilities.
- South Pole personnel used the IMS across all divisions to meet strategic goals. This was especially helpful in coordinating work between the Science Support, Construction, and Operations Divisions.
- We successfully installed the BICEP telescope in a facility still under construction (DSL) through detailed planning and constant communication with the grantees.

IT/Comms

- Our InfoSec Awareness Program achieved 100% compliance of all deploying personnel, 97.5% of all RPSC employees and 99.7% of all grantees. This directly contributed to the NSF receiving an “A” score on the Presidents Management Agenda Scorecard.
- We completed 100% of the funded activities listed in the FY05 InfoSec Work Plan. Completion of Work Plan projects complies with FISMA reporting requirements and Office of Inspector General (OIG) requirements.
- The web portal www.usap.gov went live in September 2005. This official NSF-branded website serves as the USAP “flagship” and hub for the USAP web environment.
- We arranged for shared TV feeds between McMurdo and Scott Base, using existing satellites and fiber with minimal ($3K) costs. Shared channels increases entertainment and informational television feeds at McMurdo, creates a potential for future

channels, and shares life-safety weather information and up-to-date flight schedules.

- We created a McMurdo Airfield Advisory Web Application for the McMurdo intranet. The website provides immediate updates on changing airfield conditions.
- We developed the MCM eFoot Plan Update page for the McMurdo intranet. This interactive website updates trail conditions and routes and allows users to file foot plans. This reduces the manual process at the Firehouse and increases user compliance with recreational travel and safety requirements.
- We enhanced POLAR ICE based on grantee feedback. Enhancements include a SIP year-to-year copy feature that saves grantees time in completing their seasonal planning documents, improved validation to ensure document accuracy, and the removal of the problematic itinerary model from the SIP, among others.
- Our engineering team developed the first-ever capability to provide 24x7 e-mail/data communications for the Amundsen-Scott South Pole Station. Continuous daily communications has been a goal of the NSF for more than 20 years. During the austral summer, the Iridium Multi-Channel System peaked at transporting more than 48% of the daily e-mail into and out of the South Pole Station – carrying more than 2,100 e-mails per day.
- IceCube requirements increased for network and telecommunication services to the seasonal drill campsite. We used wireless LAN (WLAN) technology to transport all required communications between the new drill camp structures and the South Pole network. We designed rapidly deployable WLAN facilities to provide network connectivity, telephone service, and public address “All-Call” paging.
- We worked closely with EH&S to define, develop, and refine the SHIELD program. This web-based application houses information about health, safety, and environmental events including spills, unsafe conditions, near misses, and injuries.
- We successfully rolled out Microsoft SharePoint Services, a collaboration and information management system, at Denver HQ.
- We implemented a VPN to provide secure access to internal RPSC network assets for appropriate external users, including the NSF, grantees, and external USAP organizations.
- The McMurdo WAN Bandwidth Improvement project increased available bandwidth for station communications from 1.544 Mbps to 3 Mbps, and converted voice traffic from multiplexed analog to IP. Benefits of the project included replacing outdated and old equipment, fully managing WAN traffic, and establishing the infrastructure to enable IP telephony at McMurdo.
- The Science Support, Systems and Vessels team had an excellent season in KY06, supporting 177 events. At the Crary Science & Engineering Center (CSEC), we supported 93 science events, six artist and writer events, and over 500 participants.
- SSSV supported 125 Geographic Information System (GIS) projects this season. Terascan Operations acquired more than 1,000 satellite images this year. We met all Service Level Agreement provisions.
- Technical Operations metrics data recorded over 99% customer satisfaction for all work orders performed by the Help Desk.
- We continued to successfully implement the Enterprise Network Operations Center (NOC) in conjunction with the Raytheon Systems Management Center (SMC). The NOC uses automated processes and enhanced tools to provide 24x7x365 network and system monitoring.
- We initiated several security enhancements to protect against various Internet attacks. We enhanced desktop and server anti-virus

protection with McAfee® ePolicy Orchestrator®. We installed Microsoft SMS for patch management, and introduced increased spam protection and firewall improvements.

- We continued expanding the wireless network operations in support of science projects at McMurdo. Science groups expect enhanced coverage for 802.11 and phone support at remote locations. We implemented 22 wireless clouds, using 900MHz backbone links to enhance network support.
- The Systems group installed anti-spam "greylisting" rules at the edge of the USAP e-mail system. Spam e-mail decreased from 12.5% of USAP e-mail to 3.0%.
- We researched, selected, and installed Microsoft SMS at Denver HQ, providing the ability to run numerous reports on hardware and software inventory, current patch levels, and system components. It introduced labor cost savings and increased security by providing Systems Operations the ability to push critical updates and upgrades.
- We implemented a new mail list server that provides the USAP community with subscriber-based notification capabilities. Four lists encompass Enterprise, McMurdo, Pole, and Palmer programs. Subscribers receive items of interest, such as notifications of planned (and unplanned) outages.

Logistics

- We loaded the resupply vessel seven days early to support the *Krasin*'s early redeployment.
- We located excess Government MLS units, coordinated their delivery to Port Hueneme from several locations, and shipped them to McMurdo.
- We helped the NSF change the focus for airlift achievement from "missions completed" to "cargo delivered." As a result of aircrews loading aircraft closer to authorized ACLs, South Pole received an additional 192K pounds of payload for the same cost.
- We located enough driftable cargo to fill the 52 missions flown to South Pole during the early part of the season, resulting in an additional 260 pallets of cargo delivered.
- Following delivery of Palmer Station waste, we loaded the *LMG* with 110,510 pounds of cargo bound for Punta Arenas, saving over $100K in commercial shipping costs.
- At Port Hueneme, we packed sea containers by project code and work center to facilitate container handling, storage, and unloading.
- We developed a way to package wood debris that met the needs of the LC-130 aircrews, resulting in two million pounds of wood waste removed from the South Pole.
- The McMurdo Retrograde Team removed 751,000 pounds of material from the station, bringing the total pounds removed to 4.2 million pounds, 0.6 million ahead of schedule.
- ATO hosted the Airlift Conference primarily as a teleconference, saving substantial travel costs and labor hours.

PMO

- We coordinated the development and implementation of an IMS for all Palmer Station and McMurdo Station projects.
- We played a key role in the R6σ project that led to the development and implementation of the NSF/RPSC Action Tracking system in Microsoft SharePoint.
- We implemented a standardized project WBS structure.
- We initiated a P3e/c interface collaboration effort with RTSC's Live Training program to secure already-developed technologies to aid the USAP.
- We initiated a collaborative effort with RTSC's mission assurance and performance

excellence team to enhance the level of support and quality of product delivery to the USAP.

Science Support

- We successfully established a field camp at WAIS Divide, erecting the steel arch facility, deploying an improved generation of more mobile camp structures and heavy equipment, and supporting planned science projects in parallel with a major construction project.
- We collaborated with other divisions to publish a weekly USAP cargo tracking report for South Pole and deep field science camps to track on-continent airlift performance.
- We stabilized the supply of LHe at the South Pole, accurately linking demand and supply, and we effectively communicated the LHe plan to all stakeholders. Using new technologies and improved processes, we reduced costs and increased the flexibility and supply of LHe at South Pole.
- The Planning Group continued to develop a closer partnership with grantees and with the NSF's Polar Research Support and Antarctic Sciences Sections to create a more efficient process to evaluate, fund, and support proposed and existing science events.
- At Palmer, we replaced all two-stroke outboard engines with four-stroke engines to enhanced safety, improved operability, reduce environmental impacts, and reduce operation and maintenance costs.
- We transitioned science at South Pole from Sky Lab to the B-2 wing of the Elevated Station and began the transition at Palmer from T-5 to the new TerraLab, all with minimal impact to science.
- Marine Science Support worked with EH&S to develop a thorough and concise safety orientation for Marine Science contract employees. The new orientation focuses on safety hazards in a marine environment and avoids issues that do not pertain to vessel operations.

SPSM

- We achieved conditional occupancy of Wings A4, B3, and B4 of the new Elevated Station, meeting major project milestones and advancing toward project completion.
- We achieved conditional occupancy of the Dark Sector Laboratory (DSL) and installed the BICEP Telescope.
- We achieved conditional occupancy of the Emergency Fueling Module (EFM) and the Vehicle Fueling Module (VFM), allowing full use of the Emergency Power Plant.
- We raised the old Bio-Med arch, making it possible to begin construction on the New Cargo Facility in KY07.
- We moved all science to the new Elevated Station, removing any need to maintain the old station.
- We completely enclosed the Cryogen Facility, allowing us to complete interior finishes during the winter.

RECOGNITIONS

NSF/OPP RECOGNITION

Communications

- From [redacted] to [redacted] regarding the addition of historical photos to the USAP Photo Library, October 13, 2005:

  "Very nice [redacted] This will prove to be a very useful and easy to find source for images, particularly as related to IGY and IPY. Thanks!"

- From [redacted] to [redacted] regarding the addition of historical photos to the USAP Photo Library, October 14, 2005:

  "Yes indeed. Nice work, Elaine."

- From [redacted] to [redacted] (lead *Sun* journalist) regarding the *Antarctic Sun*, December 26, 2005:

  "Just wanted to let you know that we all (me, Al and Erick) really liked your pieces on the IGY that were in the *Sun* yesterday! Nice work! We all learned a lot!"

- From Pat Smith to [redacted] regarding the *Antarctic Sun*, November 2, 2005:

  "You might pass on the *Sun* staff that I've picked up some citation to some of their stories … on a space news web site I frequent…. They have a broader audience than they might realize. Keep up the good stories."

- From George Blaisdell to [redacted] regarding the *Antarctic Sun*, February 8, 2006:

  "I do wish to tell you that, in my view, the *Sun* has been a far superior publication this year…. I have found the *Sun* staff to be easy to work with, understanding of the role and limitations of the *Sun* as a government publication, and open to ideas and sensitivities."

DSG

- From Susanne LaFratta to [redacted] and [redacted] egarding [redacted] tre mendous assistance to the NYANG, September 14, 2005:

  "Thanks, [redacted] .. [redacted] is exactly right, well done as usual."

- [redacted] comment, September 14, 2005:

  "Well done as usual. Thanks."

Area Directorate – McMurdo

- From George Blaisdell to [redacted] regarding [redacted] serving as translator for the *Krasin*, January 26, 2006:

  "I wish to express the impressions of this year's NSF Representatives of the performance of [redacted] As you know, we requested assistance from [redacted] in providing general and technical translation services between USAP and the masters and crew of the icebreaker *Krasin*. This was not something that had been planned in the preseason, and certainly was not something that [redacted] was aware of before arriving on the ice.

  [redacted] has done a stellar job of providing an avenue of accurate, detailed and often sensitive (nuanced) communication with the Captain and crew of the *Krasin*. As you know, USAP's annual resupply is absolutely vital to the continuation of any meaningful Antarctic program in McMurdo and South Pole, and also for the New Zealander's Scott Base [redacted] ability to provide rapid and complex translation is very impressive and has been invaluable in bringing resupply efforts to the brink of completion. But, it is [redacted] great attitude and willingness to expend even his own personal time and effort on behalf of the USAP that is most impressive.

  I have greatly enjoyed and benefited from [redacted] diligence. It has been, and will continue to be a pleasure to work with [redacted] I would select him for my 'A-team' in any endeavor for which I need the best co-workers.

> I also wish to thank you profusely for the flexibility and latitude you have provided to NSF and [redacted] in this matter. I'm sure that it has complicated your job and the operation of your department. I greatly appreciate your understanding, patience, and workarounds associated with NSF's co-opting of George Aukon."

- From Erick Chiang to [redacted] regarding [redacted] serving as translator for the *Krasin*, January 27, 2006:

> "I wholeheartedly endorse [redacted] compliments regarding [redacted] His contribution has been invaluable, starting from his voluntary and serendipitous offer to help when the *Krasin* first arrived on scene."

- From Al Sutherland regarding [redacted] erving as translator for the *Krasin*, January 27, 2006:

> "Perhaps deserving of an APC award?"

- From Erick Chiang to [redacted] regarding the support and assistance provided to the *Krasin* by RPSC, January 30, 2006:

> "A nice 'atta boy' to your various ops groups in McMurdo. Certainly something to note in your next VTC."

- From George Blaisdell to [redacted] regarding RPSC support, February 14, 2006:

> "Excellent work, troops! Please pass on to your team members this acknowledgement. Your groups works are noticed, appreciated, and vital. Thanks for being team players."

- From Dave Bresnahan to [redacted] regarding [redacted] contribution to the Christchurch Fuels Workshop, November 7, 2005:

> "Lou Sanson [ANZ] passed on that [redacted] contribution to the meeting was outstanding. Appreciate [redacted] willingness to participate in the Program."

- From [redacted] to [redacted] relaying Dave Bresnahan's compliments to Jordan regarding the Scott Base DV tour, November 20, 2005:

> "Dave B. stopped by twice this afternoon to tell me what a great job you did touring the Scott base DVs through the Power and Water Plants. He said you covered all the topics and intimately knew the subject matter.
>
> Thank you for doing a great job on such short notice."

- From Mike Scheuermann to [redacted] regarding successful FAA certification of the MLS system at McMurdo, December 19, 2005:

> "It's rhetorical, but I'll say it anyway – 'This would not have been possible without your truly outstanding, above-the-call-of-duty efforts.' You were subjected to cruel and unusual travel, long hours, and trying conditions.
>
> And you uttered not a peep of complaint. What a trooper!"

- From Mike Scheuermann to the RPSC MLS team regarding successful FAA certification of the MLS system at McMurdo, December 19, 2005:

> "To the MLS team that brought this SIGNIFICANT milestone to fruition, I want to add my 'Thanks and BZ' to [redacted] e-mail. You were the difference between success and failure. Failure to achieve certification would not have brought the Program to its knees, but it surely would have caused a significant delay in the follow-on testing and when that happens, there's always much more at stake), and that would not have been a good thing. To those of you who gave your blood, sweat, and tears (and sleep), I am truly appreciative - as is OPP. We all know the success of MLS in the USAP will be a 'righteous' event, saving the U.S. taxpayers millions of dollars and 'recycling' valuable technology that was destined for the scrap yard.
>
> You can all feel justifiably good about this one. We're that much closer to complete success. Thanks again."

Area Directorate – South Pole

- From Vladimir Papitashvili to Jerry Marty regarding RPSC's completed installation of the BICEP telescope and shield, December 16, 2005:

  "I am glad to hear we're catching up BICEP's deployment schedule! Congratulations to the construction team!"

- From Jerry Marty to Erick Chiang and Scott Borg regarding RPSC's completed installation of the BICEP telescope and shield, December 16, 2005:

  "Another science milestone. The BICEP telescope and shield are now in place at the DSL (with the Penthouse removed). Job well done by RPSC, [redacted] and his construction crew."

- From Vladimir Papitashvili to [redacted] and [redacted] regarding resolution of electrical "punch list" items, allowing early occupancy of the DSL, November 26, 2005:

  "My congratulations to [redacted] his team, and Xuan Ta for successful completion of the 'punch list' work ... and to all others with the early occupancy of DSL granted to the BICEP project."

- From Vladimir Papitashvili to Sandy Singer regarding quick resolution of electrical "punch list" items, allowing early occupancy of the DSL, November 26, 2005:

  "I am grateful to you for the quick and effective resolution of the DSL's electrical 'punch list' issues, and allowing BICEP's team to occupy the premises on the conditions outlined in your e-mail below."

- From Erick Chiang to [redacted] Jerry Marty, and all South Pole workers regarding work done on SPSM, DSL, and BICEP, January 30, 2006:

  "I want to tell you what I always say to our senators and congressmen, military flag rank visitors, every DV, or just plain ordinary folks who get the opportunity to visit the station or have expressed interest in what the United States does at the South Pole. And that is that the people who are engaged in the work of constructing the new station, those that support that effort, or support the growth of the science do so for more than what they are paid. It is that you all exhibit a different kind of patriotism but with the same kind of sacrifice and pride that comes with representing what our country can do. You have firmly demonstrated what can be accomplished at the most inhospitable place on the planet in support of the ideals embodied in the search for knowledge and science. What is being accomplished today at the South Pole will be the symbol of U.S. presence and science to all the countries who have an interest in the continent for generations to come. You have every right to be proud of all that you have accomplished.

  Thank you all."

Area Directorate – Palmer

- From Erick Chiang to [redacted] regarding RPSC's coo
  Palmer Station MEDEVAC, October 24, 2005:

  "Please convey my thanks to the personnel at Palmer and a [redacted] for the professional coordination of tasks that led to the successful MEDEVAC last week. BAS reports the skiway on the glacier at Palmer was in excellent condition, and that the coordination done by AGUNSA in Chile was first rate."

FEMC

- From Sandy Singer to [redacted] regarding the MOGAS Business Case Analysis, September 30, 2005:

  "I want to compliment you and the team for this fine document! I really like it. It's a perfect example of what I have expected in the past but did not receive. I know that under [redacted] and [redacted] guidance, this type of effort will become standard.

  Thank you all for helping to elevate our professional image in FEMC.

  Good job!"

- From Brian Stone t [redacted] regarding the MOGAS Business Case Analysis prepared by FEMC personnel, October 6, 2005:

  "RPSC is approved to proceed with the award of the subcontract and FY06 work on the MOGAS project at a level of effort not to exceed $390,000. NSF would also like to note that the MOGAS project recovery business case analysis was very thorough and is an excellent example of the type of information and analysis we would like to see in the future. Well done to your folks who prepared it – we were impressed."

- From George Blaisdell to [redacted] regarding planning and design efforts for the Crary Lab, January 20, 2006:

  "I got a tour of the proposed work in Crary to install variable speed fan motors. It looks well thought out and I approve of your proceeding with the project."

IT/Comms

- From Pat Smith to [redacted] regarding the CIO Excellence Award given to [redacted] February 23, 2006:

  "This is great news. [redacted] are certainly deserving of this recognition [redacted] in particular kept working nights and weekends on his own time while I was getting additional funding to help him as he sorted out all the technical hurdles that he ran into. Without [redacted] constant persistence, talent, and 'can-do', I don't think we would have succeeded.

  I would like to add that this has attracted the Comprehensive Test Ban Treaty Organization as a paying patron willing to kick in some funding to help us scale up the speed and implement management controls so that we can manage priority users on such a thin link - they see this as very important so they can turn the auxiliary seismic station at Pole into a primary - Pole is a very important site to them.

  The Pole science community is also very happy with this new capability, as it meets an objective that they have been asking for some time now – the ability to communicate 24/7 between wintering science teams and home institutions as a way to keep experiments operating properly over the austral winter.

  South Pole Station Operations has also commented that this capability has helped austral summer station operations by reducing the turn-around time for important e-mails.

  I'm happy to echo your enthusiasm by adding my ow[redacted]uld like to offer my congratulations to [redacted] nd the team."

- From Erick Chiang to [redacted] and [redacted] regarding the March 16 Washington Post article giving the NSF (and therefore the USAP) an "A" in computer security, March 17, 2006:

  "The attached Washington Post article talks about rating of agencies for their diligence and efforts to protect their computer systems and networks from unwanted intrusions. The headline speaks to those other agencies, and you'll see that very few have made the grade, but among the few that have excelled, NSF is one. Please pass this in particular to [redacted] and his team who have put forward a terrific effort to keep the USAP up to par as part of NSF's net."

- Relevant quote from the article:

  "Some agencies improved. The National Science Foundation and the General Services Administration each saw their scores rise to an A last year from a C-plus in 2004."

Logistics

- From Dave Bresnahan t [redacted] regarding using a teleconference format for the airlift conference, August 4, 2005:

  "Please pass on to all your folks my thanks for the nice job. I am fairly certain we will continue with this format next year. I thought it worked very well."

- From Mike Scheuermann, to [redacted] regarding assistance in transporting MLS components, October 6, 2005:

  "I really appreciate your help in making the transportation happen and in such an efficient

manner. I don't think this could have worked out better."

Science Support

- From Al Sutherland to T[redacted] regarding praise for RPSC Marine Science Support from the chief scientist aboard the *NBP*, Cruise NBP06-01, January 30, 2006:

  "Note the last paragraph of the attached SitRep:

  'In conclusion, we thank Captain Mike Watson and the *NBP* crew as well as our MPC [redacted] and the Raytheon crew for allowing us to get the science done. The atmosphere on the ship is always positive and a true sense of teamwork is omnipresent. This kind of science support at sea is found nowhere else in the world. It is the kind of technical and professional teamwork that all oceanographers dream about. We are confident that we have made some significant scientific findings on this cruise and look forward to our November 2006 expedition.'

  [redacted]

  Thanks to you and your team for making reports like this relatively common.

  [redacted]

  Thanks to you and the onboard team for making this such a great cruise."

- From Erick Chiang to [redacted] (with a wide-ranging CC list to the NSF, RPSC, and the military) regarding the cargo summary tables [redacted] has been updating weekly, February 7, 2006:

  "This has and will continue to be a very useful tool. Great job in keeping it up all season and in a few more weeks we can save the data for posterity.

  From your commentary is appears that WAIS Divide Camp planning and estimating processes deserves some closer scrutiny to learn how our planning can improve next season. That is, there was almost a 28% overage in total material delivered, the majority of which is indicated as having resulted from unanticipated requirements."

- From Erick Chiang to [redacted] regarding the cargo summary tables David Nelson has been updating weekly, February 7, 2006:

  "I would put the cargo summary tables that [redacted] has been updating weekly on the kudos list. I've had nothing but praise on how informative a tool the summary is, and how it has helped shift our viewpoint from counting flights to achieving goals."

- From Brian Stone to [redacted] regarding helo operations, February 10, 2006:

  "I know the season is coming to a close for you. I just wanted to congratulate you on a job very well done. I've heard very positive comments about your work this year, and I sincerely thank you for your service to the Program. I know the recompetition for helo services has things in a state of flux right now, but things will settle down soon enough and we'll get back to business.

  Thanks again, [redacted] and please do be sure to get some time off after the season. You've certainly earned it."

- From Brian Stone to [redacted] regarding Planning Group work in general and specifically an ICDS schedule analysis, May 10, 2005:

  [redacted] keep up the good work. This is exactly [redacted]d of heads-up info we need here at NSF to sort this stuff out early on.

  [redacted] I'm really happy with the products the planning group is putting out these days. You're doing great."

- From Brian Stone to [redacted] (Planning Group Manager), [redacted] and [redacted] regarding [redacted] work on planning DRILL, September 27, 2005:

  [redacted] comments – [redacted] been doing a great job on ANDRILL."

- [redacted] comments (from memo dated [redacted] 2005):

  [redacted] stopped by my office to comment on the fine [redacted] work has been doing in taking the lead on ANDRILL. He commented on the nicely detailed schedule as well as her presence and professionalism in running the review meetings.

  It is great to see this type of performance and receive such positive feedback.

  [redacted] thanks for continuing to set a high standard by example – as the Kiwis say, 'Good on ya!'"

- From [redacted] and others involved in the successful completion of the WAIS Divide reconnaissance, November 8, 2005:

  "Yippee! Thanks to all for helping to move this along! Now let's hope the photos come out and the weather starts to improve."

- From [redacted] regarding the first successful WAIS Divide cargo put-in flight, November 16, 2005:

  That's great! Please thank everyone for their hard work and dedication! I can't wait to come visit the camp in a few weeks. I should arrive in McMurdo around Dec. 12."

- From [redacted] to the Planning Group, relaying Brian Stone's compliments regarding the Buckets project, November 21, 2005:

  "I spoke with Brian briefly about the Buckets that I sent earlier, and he wanted me to pass kudos along to the group. He thinks that it's great work, 'top notch stuff' were his words. He thinks the whole format is very cool and is going to show it to Erick.

  He also really like how we've categorized things, especially the $$$$. I told him that wa [redacted] idea initially and that we picked [redacted] brain for good cost ranges.

  All in all, it sounds like he's really pleased with the product."

- From [redacted] to Andy Young, relaying compliments from members of the British and New Zealand Antarctic Programs (conveyed by Dave Bresnahan), regarding their visit to Dry Valley camps, November 22, 2005:

  "Dave B. stopped in my office to say he visited some Dry Valleys yesterday with members of the British and N.Z. Antarctic Programs. Both the Brits and the Kiwis were most impressed with the environmental stewardship displayed at our camps, and specifically mentioned Rae Spain by name.

  The British said the way we manage the camps should be a model for other countries to follow.

  Please pass Dave's and my thanks on to Rae and all the other people who played a part in USAP getting such a favorable review."

- From [redacted] to Andy Young regarding Science Support staff, December 30, 2005:

  "Just wanted to let you know that [redacted] was a real asset out at the WAIS Divide camp. She was clearly in her element out in the field and was always volunteering to help out with any task. Of course I was only there for two days but she jumped right in and helped me get settled when I arrived (helping me set up my tent) and showing me around the camp. She took me on several tours by skidoo out to see the drilling and arch construction and was an active helper around the camp. When it came time to load up the ice core on pallets for retro back to McMurdo she pitched right in and helped out. It will be great if she can spend more time out at a variety of field camps. I predict, if she stays with the Program for a while that she will become a regular out in the field. By the way, it is quite impressive the background and level of education of the RPSC staff that I have me [redacted] told me all about her work in the Andes of Peru for her Masters thesis. I don't know if you are responsible for the hiring but I am quite impressed with all of your staff."

NSF/GRANTEE RECOGNITION

DSG

- From Terry Hannaford (A-333-S) to [redacted] egarding her weekend assistance with IceCube deployments, November 24, 2005:

  "Thank you so much for your help today. I really appreciate you taking time from your holiday weekend to assist Project IceCube participants. I hope to meet you some day soon to tell you in person how impressed I am."

IT/Comms

- From Holley Zadeh, B-424-M, regarding POLAR ICE:

  "All the stories I heard about the SIP were scary, so I was really pleasantly surprised at how easily I was able to complete it. You guys must have made mucho improvements over the years. Thanks so much…! Your support was fantastic."

- From Terry Deshler, A-131-M, regarding IT support:

  "The computer support in Crary is unbelievable. It's the best computer support in the world, helping to get stuff ready and set up and the system knowledge. They don't have that kind of support in a university, not at the magnitude they get in McMurdo."

- From Darreyn Schneider, Ice Cube Project Manager, several comments regarding development of the Iridium e-mail solution for South Pole:

  "You were after a word on how the Iridium e-mail link is going. It's working very well. Too well - I don't get a break from e-mail."

  "I'm very happy with it. We are going through a schedule change due to the small flight delay early in the week, and the quick turn around in e-mails 24/7 resulted in a noticeable improvement in productivity compared to previous seasons for similar activities."

  "I'm trying to have all IceCube people use the RPSC e-mail system for e-mail, and use our e-mail system for experiment control related activities only. The 24/7 e-mail has been a big selling point for this."

- From Yvette McCulley, B-012-M, regarding VTCs:

  "I am a [redacted] orking in Antarctica for one month [redacted] has been working very closely with me and my school to create a technology pathway to video conference with my school. Today was the da[redacted] he conference and it all happened due to [redacted] patience, persistence, and knowledge about technology. The conference was a huge success. Hats Off to [redacted] and the IT staff at McMurdo. You are appreciated and thanked for a job well done. … We are already planning "bigger and better" ways to motivate students toward science inquiry."

- From Stefanie Konfal, G-079-M, regarding GIS support:

  "I wanted to extend my gratitude to you for the much appreciated help I have been receiving from [redacted] Just yesterday, she spent over two hours with me going over various ArcGIS issues. I can not stress enough how incredibly wonderful it is to go to someone with questions and have them answered. I know that sounds simple, but as I'm sure you know, the more advanced procedures in Arc can be somewhat elusive. Having access to [redacted] someone who is well-versed in the capabilities of Arc … is absolutely invaluable. [redacted] is a joy to work with and a tremendous resource for our group. I wanted to express my appreciation for her time and efforts."

- From Ann Hawthorne, W-224-M, regarding support to an Artist &Writer:

  "The subject line [W-224 Saved By IT] may be a slight overstatement, but not by much. A significant part of my tasking in completing the work of W-224 this season is shooting digitally. To that end I am armed with expensive, elaborate, complex gear. Over the past week I ran into problems with my digital camera that I could not solve and that threatened to literally end that portion of the work. Consultation with Nikon was not productive. Enter the wunderkinds of [redacted] I mentioned my frustration over this apparent

dead-end rather casually to them. They responded as though given a mission. Within hours they had researched my camera, my problem and possible solutions. With all thanks and credit to them, as of yesterday afternoon I am back in business. I must tell you, I am stunned and delighted. What I thought was impossible – indeed, I had been so advised – was for them a seemingly routine maneuver. I – and the project – owe them significantly. For now all I can do to repay them is to be certain that their good work above and beyond the norm is recognized. Would you be certain that my highest praise and gratitude to [redacted]is passed along to whoever should know."

Logistics

- From Andrew Lange (BICEP) to [redacted]regarding the BICEP Cargo Schedule, September 15, 2006:

  "Thanks very much for getting back to me so quickly, and for being so helpful on the phone just now. The information you gave me on shipping dates is extremely valuable to us."

Science Support

- From Dr. Patrick Neale (B-203-N), Chief Scientist on the NBP05-08 cruise, regarding RPSC's helicopter resupply of the ship, as noted in his SitRep of November 16, 2005:

  "Overall, scientific operations have been going well considering the early spring conditions. Several days of more benign weather this week aided in alleviating problems with maintaining flowing water incubators. Another critical factor in success has been good coordination in operations between RPSC, ECO and science groups. Special recognition this week goes to *NBP* and MCM based personnel for logistic support in the rapid turn-around helicopter delivery of supplies upon arrival of air shipment in MCM."

- From Ron Kiene (B-048-P) regarding unplanned helo resupply to the *NBP*, November 17, 2005:

  "I want to thank all of you who were involved in expediting the delivery of my isotope package to the *NBP* on the recent helo drop. I have been informed that everything was delivered safe and sound. That news was a great relief to me. That isotope, which is something we synthesize in my laboratory, is absolutely essential to our project and it would have been a major disaster for the research had this package not gotten through. I know that a lot of things had to fall into place for this to happen the way that it did, and I want you to know that I and my colleagues on the ship appreciate what you did."

- From Peter Doran (B-211-M) to Polly Penhale regarding prompt RPSC Helicopter Operations support for his Lake Vida project, November 22, 2005:

  "I'll reiterate the thanks to all involved. I was very impressed with the response on the ice. Within about 1.5 hours of Polly's e-mail, Chris Fritsen e-mailed me that helo ops had arranged for him to immediately go out to Lake Vida to do some recon and mark the spot for the camp."

- From Doug MacAyeal (I-190-M) regarding support for his project, November 29 2005:

  "Special mention is owed to [redacted]for his participation in the B15A seismometer data (and equipment) recovery. Not only did he provide his service and expertise as the field safety expert on the mission, but he performed the scientific field work as well (he was trained to do this by I-190 as a means to reduce the number of PAX on the flight and to thus influence the fuel load in a positive way). We remark that[redacted] was forced to carry a very large "stress burden" on this mission, i.e., for both the field safety and the science, that we hope will be a one-time only experience. The mission to B15A was notable due to the fact that good luck came easy. This good luck is very much "attracted" by competent field team members such as[redacted]'

- From Dave Sullivan (A-145-M) to Andy Young regarding support for LDB, December 15, 2005:

  "I would like to bring to your attention the outstanding support provided by the RPSC staff at the LDB site during our marathon effort to launch the CREAM II instrument. In particular I would like to mention the performance o[redacted]ran approximately twenty Pibals for us. This was an enormous effort considering we were on-site for almost 24hrs; each Pibal was

run on the hour with the gap closing to 30mins apart close to launch. Once again [redacted] provided the very high level of support that she has become renowned and appreciated. [redacted] and [redacted] (his last name escapes me) for keeping us well fed and watered during the long hours. Last but not least the Fleet Ops crew for their efforts in getting us to the pad and through the launch."

- From Jim Yeck (A-333-S) to [redacted] regarding station support for December 26, 2005:

  "I am heading back to Madison after four weeks working on IceCube at the South Pole. My work at the pole gave me an appreciation of the many challenges within IceCube and more generally at the South Pole Station.

  I want you to know that I am very pleased with the station support for IceCube. The IceCube personnel on station recognize that IceCube benefits from the work of every part of your organization and we appreciate the constructive manner in which each individual Raytheon employee delivers the support we need. The quantity and quality of this support is not taken for granted by my colleagues in IceCube.

  Good luck with all of your projects this summer. Your summer home and work place continues to be an increasingly busy place."

- From Francis Halzen (A-333-S) to [redacted] regarding [redacted] comments about station support for IceCube, December 27, 2005:

  [redacted] knows, in my talks I sometimes show a provocative slide with only 3 words: Logistics is easy. This makes two points. We now know that it is indeed easier to put a neutrino detector 1 mile under ice than one mile under water. The second point is that we have the excellent support from you that Jim is talking about.

  Thanks."

- From Jack DiTullio, Chief Scientist aboard NBP06-01, to NSF and RPSC regarding the support grantees received on the cruise, January 26, 2006 (final paragraph from SitRep):

  "In conclusion, we thank Captain Mike Watson and the *NBP* crew as well as our MPC [redacted] and the Raytheon crew for allowing us to get the science done. The atmosphere on the ship is always positive and a true sense of teamwork is omnipresent. This kind of science support at sea is found nowhere else in the world. It is the kind of technical and professional teamwork that all oceanographers dream about. We are confident that we have made some significant scientific findings on this cruise and look forward to our November 2006 expedition."

- From the University of Wisconsin, a framed award for RPSC regarding support for IceCube, March 2006:

  IceCube
  Neutrino Observatory
  Recognizes
  Raytheon Polar Services Company
  As a reliable and indispensable partner in the
  Successful initiation of construction of the
  IceCube Neutrino Observatory.
  March 2006
  From the University of Wisconsin Madison

- From John Kovac of Cal Tech to [redacted] regarding Cryogenics and LHe support at South Pole, April 4, 2006:

  "Thanks again for the good news – looks like we are on track! Congratulations on pulling off a successful winter resupply on a very tight schedule. Since station closing, all reports we've had from LHe users at Pole are that the efforts over the past month to get the cryo facilities finished and coldheads working, the transports weighed, and to maintain uninterrupted deliveries to QUAD and BICEP have been heroic. They are greatly appreciated by the science community!

  Initial data from the QUAD and BICEP telescopes, along with new results from ACBAR, were shown last week at a major cosmology conference in Irvine. They created quite a buzz of excitement and anticipation. One physicist – a leading competitor in the field – remarked that

> ‘the three strongest experiments we've heard about are all from the South Pole.’
>
> Helium = data. Thanks for keeping it flowing.”

- From Miles McPhee of MaudNESS (O-325-N) to [redacted] regarding science support aboard the *NBP*, August 23, 2005:

> “Thanks [redacted] yes it is exciting and challenging. I can hardly say enough about the Raytheon folks. Their collective attitude that if there is a problem, let's fix it NOW, is genuinely appreciated by me and the rest of the science party. Mike Watson has done an exemplary job, not only handling the ship, but he is really interested in what we are doing and looking for ways to help. Finally, the moonpool operation is working as well or better than anyone expected – that's a huge bonus.”

- From Miles McPhee of MaudNESS (O-325-N) to Marine Science Support regarding support aboard the *NBP*:

> “MaudNESS required several novel ways of deploying oceanographic equipment from the *NBP*. Both the [redacted] and RPSC parties responded to the challenges in very positive ways – basically with an attitude that we will help you get the job done as best we can. Made for a very positive experience all the way around.”

- From Joaquim Goes (B-206-N) to Marine Science Support regarding support of the Marine Metrics Survey:

> “The employees from RPSC working with us on the ship were very helpful, professional and supportive in all respects. They always radiated a positive constructive and supportive work attitude even in the most adverse conditions. They worked very well together as a group and with us, had a good hand in improvising to try to find whatever solution necessary for emerging problems, necessary changes in schedules on a relative short notice or new science procedures (often invented only few hours before).”

- From Ron Kiene (B-203-N) to Marine Science Support regarding support of the Marine Metrics Survey:

> “Despite the difficult circumstances we had to operate under at times at this time of the year, we could complete all of our science goals. This wouldn’t have been possible without the support of Capt. Mike and his crew and all the Raytheon Techs on board who were always accommodating and patient despite the constant demands that we put on them.”

- From Joann Stock (G-071-N) to Marine Science Support regarding support of the Marine Metrics Survey:

> “The support received from the RPSC staff was excellent. This cruise supplied many new challenges and they were met with enthusiastic attitudes.”

OTHER AGENCY RECOGNITION

DSG

- From Colonel Max Della Pia, NYANG 109th Air Wing, to [redacted] regarding deployment assistance, September 16, 2005:

  "I can't thank you enough for your assistance and support. The operational implications of not having a single carrier, for the entire route, can be significant. You're a life-saver. Thank you!"

- From Major Judith Maloney, NYANG 109th Air Wing, to [redacted] regarding deployment assistance, September 17, 2005:

  "I can't thank you enough for all the assistance you have given the Wing. I know you are dedicated to ODF but you have really pulled us out of the fire. I hope you don't tire of us and maybe we could enter into discussion with you at the end of DEC or beginning of Jan to assist us with our attempt to obtain a GSA awarded contract for 06/07."

Area Directorate – McMurdo

- From the C-17 Mission Commander in Christchurch to the AEG Commander in McMurdo, regarding airfield support for the C-17 airlift, October 25, 2005:

  "Please pass on to [redacted] and his team our thanks for an outstanding effort. Those folks are true professionals and make it all seem so easy! That's what makes this job so fun!"

- From the Maintenance Supervisor for the NYANG 109th Air Wing to [redacted] regarding airfield support, and in particular AEG support, November 4, 2005:

  "My short tour of duty is about to come to an end. I just wanted to take this time to thank you for all your help these last 4 weeks and to let you know that we (109th) appreciate all the help that you and your folks have done for us. Fleet Ops did a great job last week and last night digging us out and are always there when we need them. Now for your AGE Shop, I can never say enough about [redacted] and his Crew. I've been working with these guys [redacted] now for many years and all these guys (including the new folks to) have been GREAT. No one knows better than I do that the AGE guys/gals are what makes it all happen out here. Please pass on to all your folks that we truly couldn't do it without them. Have a great rest of the season, see you all next year and we look forward to training some of your folks back at Schenectady next summer.

  Thanks.

  A special, special thanks to [redacted] for her help on building our AGE Status/MEL list."

- From Lou Sanson, of Antarctica New Zealand, to Erick Chiang regarding [redacted] contributions to the Christchurch Fuels Workshop, November 7, 2005:

  "Just wanted to thank you sincerely for sending [redacted] along with Art to the COMNAP Fuel Workshop yesterday.

  They all made a great contribution and we look forward to having the workshop report out shortly. We really appreciated the significant travel of [redacted] who made such a valuable contribution."

- From Ron Smith, AEG Commander, SFA, to [redacted] and various NSF representatives and Military personnel regarding increases in daily airlift payload, November 9, 2005:

  "Would like to thank those whose efforts and teamwork produced the coordinated results of the daily payload numbers. You're raising the bar to a new standard as we organize to win."

- From Scott Heineman, Naval Sea Systems Command, to Captain Wilkins, NAVSEA 00C and Mr. Richard Asher, NAVSEA 00CB regarding the support RPSC provided to the *Krasin* repair operation, January 30, 2006:

  "I would like to thank all who helped make this difficult task possible under the most severe conditions. Complex waterborne repairs worldwide are our business but doing them in Antarctica is even more demanding. The

following organizations under the direction of George Blaisdell and Terry Melton made our tasks here achievable:

Cargo, Carpenter Shop, Dive Locker, Electricians and UT's, Fleet Operation's, Fuels, Galley, MCC, Supply, TelCo, VMF....

I apologize if I left anyone out. So many did so much, each day."

IT/Comms

- From Paul Thompson, RTSC [redacted] regarding a corporate IT award for [redacted] February 21, 2006:

  [redacted] just an FYI – we selecte [redacted] nd [redacted] for corporate IT awards. This is a very small group of awards – only about 10 - 12 company wide. I was pleased to have the Iridium project selected. Both have rec'd invitations to Rebecca's IT Forum in Dallas March 22 and 23. I've attached the citation for you. This will be a very nice opportunity for these employees to meet other RTN IT people."

Logistics

- From the MCM-500 Commander to [redacted] regarding cargo management, February 12, 2006:

  "It's time to congratulate you on your expert management of cargo this year. Your team has been truly teaming with the aviation units to produce outstanding results. We have missions yet to go, but it has been a real pleasure working with you. There was a unified effort and spirit of cooperative problem solving from Week 1 forward with the 500AEG/139EAS/304EAS Commanders to make this an exceptional year.

  Thanks for the excellent support."

- From Carolyn Stiglets, Ocean Ships Inc. to [redacted] regarding shipment of part for the USNS *Lawrence H. Gianella*, January 25, 2006:

  "Thanks for all your help in getting the urgent parts, for the *Gianella* to McMurdo. The Master confirmed the parts were delivered to the vessel yesterday."

Science Support

- From Ken Edele of SPAWAR to [redacted] regarding South Pole Meteorology support, February 21, 2006:

  "I really appreciate that. Record setting mission accomplishment this season could not have been done without the outstanding job you all did at South Pole MET. We relied on your observations, upper air data and climate summaries for our forecasts throughout the season and I am sure your accurate and timely submissions were instrumental in that success."

- From Dave Medley of PHI to Andy Young regarding helo scheduling, February 3, 2006:

  "I normally don't write these kinds of letters and I haven't really had a reason to in the last five years, but this year is different. I have had a very good season and one of the main reasons is because of [redacted] her staff. [redacted] have kept me informed of the daily activities and what is normally coming up. This has allowed me to plan the helicopter maintenance in a much more efficient manner and provide better customer service to the scientists. The schedule that she produces is normally right on the mark or it overestimates the time needed for the next day. I haven't seen anything like it since [redacted] left the Program. It has been a pleasure to work with them this season."

EMPLOYEE RECOGNITION

Table II-1 RPSC Employee Recognitions for KY06

Employee(s)	Achievement
[redacted]	Provided/analyzed three years of data, forecasts, engineering issues, and proposed solutions in support of the South Pole Master Energy Plan. Educated and supported the NSF consultant, producing ALL necessary data and answering ALL questions posed regarding power generation, fuel/electrical usage and the solutions needed for the long-term energy health of the South Pole Station.
Cargo, Carpenter Shop, Dive Services, Electricians and UT's, Fleet Operations, Fuels, Galley, MCC, Supply, TelCo, VMF - RPSC McMurdo Station and LCdr Don Peltonen, USCG	- *Krasin* RTP for final VT and video inspect. - All propellers/blades intact. - Photos/video of welds on Centerline Propeller bolt keepers, Blade #4, bolts #2, 4, 5, and 6 taken. - Demob'd all NAVSEA/Phoenix equipment from ice pier. - Returned all loan equipment from Dive Locker, VMF, Electricians, etc. - Cast off lines on *Krasin* for uw, tied up lines on *NBP*.
[redacted]	Raytheon CIO Excellence Team Award: Iridium Multi-Channel Program: This team developed the first-ever capability to provide 24x7 e-mail/data communications for the Amundsen-Scott South Pole Station. Continuous daily communications has been a goal of the National Science Foundation for more than 20 years. Gary and Bob have made that goal a reality with a cost effective and innovative Iridium solution.
[redacted]	Organization and Migration of CVS: As a result of Paul's extra efforts, document owners now have the ability to easily track each document through the approval, processing and posting stages in systems that are user-friendly. 1000 files for 233 controlled documents were migrated. Up-to-the-minute, accurate status reports are immediately available. The greatest benefit is all IT Departments working from the same collaborative knowledge base, as well as, a reduction of 12 labor hours minimum per week savings.
McMurdo WAN Bandwidth Improvement Team: [redacted]	This team displayed common commitment to the project's success. These individuals worked numerous extra hours in implementing and troubleshooting portions of the project. Without their commitment, the implementation milestone would not have been met and McMurdo would have had only a 1.544 Mbps WAN link for another year. Failure could have required a contract modification, which would have increased the cost of connectivity for the NSF.
[redacted]	Developed and established a standard project WBS format to be used with all projects. They also reviewed and had the format approved by the NSF client. This format has now been placed in to both the Timberline Estimating Software and Primavera P3 software allowing for direct transfer of information by project between the two systems. This limits hand entry error.
[redacted] SPSM team and South Pole support personnel	The SPSM team achieved a major milestone for the SPSM project by gaining conditional occupancy of the remaining wings of the Elevated Station, as well as the Dark Sector Laboratory. All functions have now been transitioned from the Dome to the new station, allowing the start of demolition and removal of the old facilities. This marks the end of running "two stations" and will allow for all administrative functions to be co-located in a safer and more fuel efficient structure.
[redacted] and ATO Staff	500 AEG Commander recognized ATO for their Expert Cargo Management: Teaming with the Aviation Units. "Unified Effort and Spirit of Cooperative Problem Solving from Week 1."
[redacted]	Reduced loading time and avoided $220K in longshore second shift cost
[redacted]	Development of smoking policy
Cryo Team	Pulling off a successful winter resupply on a very tight schedule
[redacted]	Planning for and support of Tourist Ship visits
[redacted]	Support and Planning of Tourist Ship visits
[redacted]	Fuel Management and Off-load
[redacted]	Management of ARFF Apparatus at Airfields
[redacted]	Development of new marine safety orientation for all deploying personnel

Table II-2 Manager Recognition of Employee Efforts

Manager	Recognition
From [redacted] to all RPSC employees regarding the Raytheon CIO Excellence award for [redacted] of IT, for their work on the Iridium Multi-Channel program, February 22, 2006	It is with great pride that I am able to announce that the team of [redacted] and [redacted] have been selected by Raytheon for the 2005 CIO Excellence Team Award for their work on the Iridium Multi Channel program. This team developed the first-ever capability to provide 24x7 e-mail/data communications for the Amundsen-Scott South Pole Station. Continuous daily communications has been a goal of the National Science Foundation for more than 20 years. Gary and Bob have made that goal a reality with a cost effective and innovative Iridium solution. South Pole Station broadband satellite connectivity for e-mail and other communications is available for only 11.5 hours each day. The broadband satellite connectivity period is often not aligned with normal business hours for the South Pole Station and other worldwide locations. This can cause communications delays of a day and a half or more for scientists and operations personnel communicating with university and business partners located outside of Antarctica. These Raytheon Polar Services Company engineers developed an inverse multiplexed Multi-Channel Iridium system that now carries e-mail traffic for the 12.5 hours each day that the main satellites are not visible. The team overcame obstacles with Iridium hardware and firmware that previously prevented Iridium systems from operating continuously. The team also developed the first ever mechanism for the detection and auto-recovery of Iridium equipment that becomes non-responsive due to call drops and other idiosyncrasies of the Iridium constellation and equipment. The auto-recovery feature allows the equipment to operate unattended. Using Iridium for data communications has been a technically challenging undertaking, requiring [redacted] to work closely with Iridium and Boeing to encourage them to make hardware and firmware modifications to their equipment to enable always-on communications. The result was a solution that allowed binding multiple small voice channels into a single larger data channel. The Iridium Multi-Channel System (IMCS) has been undergoing operational trials for the past 5 months during which it has provided the first ever 24 x 7 e-mail and data connectivity for the South Pole. The Iridium system carries 44-48% of the e-mail into and out of the South Pole each day. The NSF is pleased with the system and has decided to triple the IMCS its capability during the coming FY07 austral season. Although [redacted] drove the final solution, they want to recognize the RPSC Functional Engineering and Technical Operations personnel who contributed to the success of the project through the various phases; [redacted] for his Exchange expertise [redacted] for his Iridium expertise, and [redacted] for his network expertise. This effort epitomizes the spirit of innovation and Raytheon's commitment to offer solutions to our client. Please join me in congratulating them for a achieving this major accomplishment and significantly enhanced service for our customers.
From [redacted] regarding her work on ANDRILL, September 27, 2005	Brad Johnston stopped by my office to comment on the fine Jessie work has been doing in taking the lead on ANDRILL. He commented on the nicely detailed schedule as well as her presence and professionalism in running the review meetings. It is great to see this type of performance and receive such positive feedback. [redacted] – thanks for continuing to set a high standard by example – as the Kiwi's say, "Good on ya!"
From [redacted] to all airfield support personnel regarding support provided to the C-17 airlift, October 24, 2005	The below note is from the C-17 Commander in Christchurch NZ. "A Big Thank You" goes to Fleet Operations, Fuels, ARFF, AGE, ATO, VMF and surveyors for their outstanding efforts in reopening the "airfields" yesterday, Success is contributed to the can do attitude, "team effort" and hard work by all of you shown throughout the season. Thanks again for a job well done.
Relevant quote from the C-17 Mission Commander	"Please pass on to [redacted] and his team our thanks for an outstanding effort. Those folks are true professionals and make it all seem so easy! That's what makes this job so fun!"
From [redacted] to [redacted] regarding helicopter support for Dr. Peter Doran's Lake Vida project, November 22, 2005	Thank you for your efforts in supporting Peter Doran's project promptly after the IEE was approved.
From [redacted] relaying compliments from Dr. Patrick Neale, Chief Scientist on the NBP05-08 cruise, regarding RPSC's helicopter resupply of the ship, November 24, 2005	I'm forwarding Dr. Patrick Neale's (Chief Scientist, NBP05-08 cruise) SitRep, where in the last paragraph he recognizes RPSC's efforts in the helo resupply of the cruise. I appreciate your efforts in this achievement.

Table II-2 Manager Recognition of Employee Efforts

Manager	Recognition
Relevant comment from the November 16, 2005 NBP05-08 SitRep	"Overall, scientific operations have been going well considering the early spring conditions. Several days of more benign weather this week aided in alleviating problems with maintaining flowing water incubators. Another critical factor in success has been good coordination in operations between RPSC, ECO and science groups. Special recognition this week goes to *NBP* and MCM based personnel for logistic support in the rapid turnaround helicopter delivery of supplies upon arrival of air shipment in MCM."
From [redacted] V.P. of Communications for RTSC, to IT staff regarding the rpsc.raytheon.com website	Thanks again for your patience and professionalism on this project.
From [redacted] to the Port Hueneme Logistics staff, regarding SAAM flights	I write this memo to recognize the hard work and dedication of the Port Hueneme staff for managing the aircraft delays beyond your control for the SAAM flight that departed Pt. Mugu Naval Air Base yesterday. Your hard work and dedication demonstrates your ability to go beyond the extra step to meet this critical USAP milestone. Great work by all involved!
From [redacted] to all Logistics personnel regarding recruiting	This is to inform you that your hard work and dedication recruiting employees throughout Logistics has gotten you well deserved recognition from HR. During [redacted] Staff Meeting yesterday, HR requested that all Directors participate in a recruiting meeting scheduled this afternoon to discuss issues that HR is experiencing with other department recruiting practices. HR mentioned that Logistics is the only division that consistently recruits good employees, have backups when necessary and we get the process done on time each year. That compliment is a direct result of your hard work and perseverance to accomplish this annual requirement. HR wants to use Logistics as the model for all divisions to follow across RPSC. Congratulation for this outstanding effort.

RAYTHEON REACHBACK

General Management

General RPSC

- Virtually every RPSC Division Director works with an RTSC or Raytheon counterpart who provides coaching, mentoring, oversight and guidance. The primary value is improved leadership, enhanced training, and audit verification, all at no additional cost to the NSF.
- Raytheon Six Sigma (R6σ) Training and Support. R6σ is our knowledge-based process for transforming our culture to maximize customer value. Program savings from R6σ equal $13.5 million since contract assumption.
- Raytheon Legal Staff Support, RTN Company. RTSC provides legal assistance with lawsuits, employment termination, and contracts.
- Raytheon Business Insurance.

Communications

- Raytheon provides weekly and monthly employee newsletters from Corporate Headquarters and assists with public relations issues.

DSG

- The Raytheon Travel Council has assisted RPSC in many ways, including with the American Express Corporate Travel Card, AMEX travel discounts, Corporate Expense Reports, American and Qantas Airlines booking agreements, and hotel and rental car agreements. The corporate American Express card also provides insurance coverage for business travel.

EH&S

- Raytheon sent a Safety Audit Team, including personnel with ergonomics and operations safety expertise, to inspect McMurdo, South Pole, and Dry Valley field camps.
- Raytheon Corporate is providing support services from ergonomics consultants and top safety officers as part of the RPSC initiative to drive injury rates down to world-class levels.

Finance

- We receive the support and advice of the RTSC financial team on an ongoing basis, to include Finance Shared Services (FSS) for payroll, travel and expense reporting, processing and payment, and Accounts Payable, and Employee Self Service (ESS) for timecard reporting.
- Raytheon provides the PeopleSoft employee numbering system and upgrades to the software, as needed.
- Raytheon provides SAP financial management systems and upgrades to the software, as needed.

Human Resources

- HR attended the Raytheon Human Resource Forum and the Diversity Summit.
- RTSC leaders conducted a site assessment of RPSC.
- Raytheon provided Internal Investigation Training for HR personnel.
- Raytheon provides the new RayCATS employment application process.
- The RTSC Human Resources [redacted] and the RTSC VP of Communications [redacted] performed an RPSC DHQ leadership and supervisory effectiveness assessment in August 2005. This was a precursor to developing an employee morale and leadership training program.
- [redacted] Raytheon Ethics and Compliance officer, visited RPSC to provide

assessment, ethics training and guidance programs.

- We use the Raytheon LifeResources Hotline, a confidential, comprehensive Work/Life and Employee Assistance Program that helps employees manage life's demands and reduce related stress. Services include parenting support, elder support, legal/financial assistance, convenience resources, college preparation, life learning, and up to eight free, face-to-face counseling sessions.
- Raytheon provides RPSC Human Resources with a host of HR support, including the Rayjobs.com website for applicants, assistance with legal/ethical/bereavement issues, an annual HR Review, the EOS (Employee Opinion Survey), ethics training, Cendant relocation packages, compensation training, administration of benefits plans, recruiting, job fairs, diversity forums, and more.
- Raytheon Real Estate Support provides assistance with relocation packages.
- The Raytheon Learning Institutes (RLI) is Raytheon´s primary enterprise-wide resource to design, develop, and deliver learning solutions. Their mission is to provide innovative learning solutions that are aligned with specific strategic and organizational objectives. RLI integrates the vast array of knowledge and capabilities that exist across the company into learning opportunities for Raytheon employees to sharpen their skills and leverage their capabilities, resulting in maximum value for our customers.
- We use RayTech for all temporary contract help. This resource provides appropriately-skilled, temporary labor as requested.

Medical

- Raytheon Global Health Resources is assisting us in our search for a Medical Director. They continue to provide support for occupational medicine training, and they assisted with the expanded UTMB subcontract for additional assistance until we hire a Medical Director.
- [redacted] is a Raytheon insurance product that provides international health coverage. Coverage is provided 24x7x365, worldwide. Medical services are the most complicated of those offered and can last up to several weeks. They involve [redacted] Assist's Medical Staff, in addition to other network providers, and often include post-case payment/billing coordination on the traveler's behalf. These services include physician/dental/hospital referral, medical case monitoring, shipment of medical records and prescription medications, medical evacuation, repatriation of remains, and insurance/claims coordination. When a Raytheon employee requires MEDEVAC, we use the services of [redacted]
- Raytheon Corporate Medical Director and Staff Support are available to provide assistance as required.

PA/QA

- RTSC Quality Assurance Support. RTSC provides assistance with ISO 9001:2000 Registration, trains Internal Quality Auditors, and conducts pre-compliance Internal Quality Audits at six-month intervals.
- The Raytheon Quality Index (RQI) provides performance quality data analysis and metrics to help RPSC make "no-doubt" business decisions and ensure customer satisfaction.

Procurement

- RTSC trained Procurement personnel on invoice processing procedures, resulting in more timely payments to vendors.
- The RTSC Vice President of Supply Chain provided RPSC a Supply Chain IPT Manager to help develop the next generation Supply Chain Capability for the USAP. RTSC also assisted RPSC with Blanket Pur-

chase Agreements and EXOSTAR bidding capabilities.

Operations

Area Directorate – Christchurch

- Raytheon Australia assisted in a financial audit of Christchurch operations to verify adherence to FAR, CAS, and Raytheon financial policies and regulations.

Area Directorate – McMurdo

- Raytheon supported RPSC on the MLS project during the proof-of-concept phase. This support included training RPSC and SPAWARS employees on the MLS system.

FEMC

- Raytheon Corporate Energy Conservation Support, R6σ Project. [redacted] the RTSC Vice President of Engineering, provided software and personnel support for facility condition assessment systems under development by FEMC.

IT/Comms

- Raytheon provided an acting IT Director for two months [redacted] while RPSC searched for a fulltime IT Director.
- [redacted] are providing leadership training for IT employees and are planning Director-level leadership training for the RPSC leadership team.
- Raytheon's National Polar-Orbiting Operational Environmental Satellite System (NPOESS) team visited McMurdo Station (at their expense) to assess the site, the satellite signal, and equipment for a planned weather station. The offshoot of this program will provide McMurdo Station with significant increases in communication bandwidth.

Logistics

- [redacted] RTSC VP of Supply Chain, provided a Supply Chain IPT Manager, [redacted] to help develop the next generation Supply Chain Capability for the USAP.
- [redacted] visited NSF HQ on a number of occasions to develop an overview of existing NSF issues and to develop a model for future requirements.

PMO

- In teleconferences with Raytheon ISS, we gathered tremendous information regarding their Primavera scheduling tool, and they provided us their process documents for implementation.
- [redacted] of RTSC is working with the PMO and RPSC Training Coordinator to establish a Project Management Professional certification class for RPSC employees, who will gain guidance and training on passing the PMP certification test.
- [redacted] VP of RTSC Metrics, has been working with our R6σ Program Manager regarding improvements. We have been working a review to be held at RPSC to provide leadership and support guidance regarding the R6σ program. We will use this guidance to incorporate more effectively the principles of R6σ in our current and future R6σ projects.
- We initiated a P3e/cinterface collaboration effort with RTSC's Live Training program in order to secure already-developed technologies that aid the USAP.
- We initiated a collaboration effort with RTSC's Mission Assurance and performance excellence team to enhance the level of support and quality of product delivery to the USAP.

COMMUNICATIONS

Section 1. Summary

Communications continues to successfully manage its wide range of responsibilities, which include:

- Publishing the *Antarctic Sun*, *P.S. News*, the *USAP Participant Guide* and Program brochures. The *Antarctic Sun* continues to be the most visited area of the USAP web site
- Overseeing and tracking other USAP publications
- Satisfying requests for information from Program participants, the general public and the media (the latter in coordination with the NSF and with Raytheon Technical Services Company)
- Coordinating OPP Artist & Writer rotating exhibits
- Coordinating informational presentations to the public by volunteer RPSC employees
- Managing the USAP digital photo library
- Developing the Internal Communication Survey and other communications
- Managing a variety of other special projects

Early in KY06, we selected our team of *Antarctic Sun* journalists, began the physical qualifying process, completed SIPs, and applied for the necessary permits. Shortly before deployment, the three contract journalists met in Denver to train, meet with science support staff, draft story ideas, begin making interview contacts, and discuss improvements for the upcoming season. We held phone interviews with the NSF (Office of Polar Programs and Office of Legislative and Public Affairs). In conjunction with the NSF and the USAP Photo Librarian, we created a "wish list" for photos we'd like to see added to the library. We drafted an outline of story ideas for the upcoming season and sent it to the NSF for review.

Between March and October, we published eight issues of *P.S. News* (*Polar Services News*), our internal employee newsletter. The paper builds morale and communicates RPSC accomplishments, objectives and events for the coming season. In addition to station and vessel updates, the issues contained articles and photos on the new IMS building at Palmer station, the Cryo Barn, SPSM, IceCube, and preparations for the IPY.

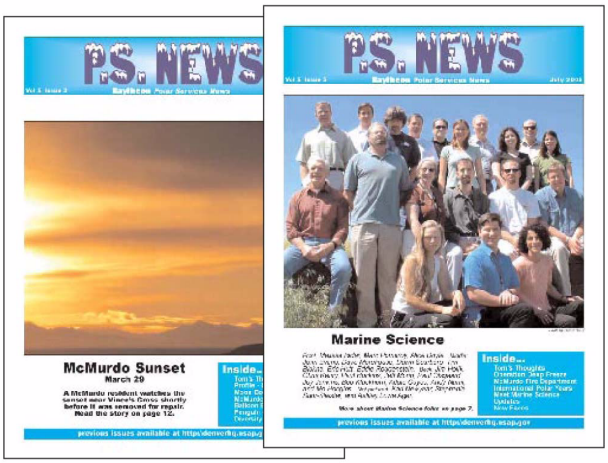


Figure 1-1 P.S. News

During the course of the KY06 austral summer field season, we published seventeen issues of the *Antarctic Sun* and posted them to the USAP portal, www.usap.gov. On average, we saw 2,000 visits per day to the web version, 10% from foreign countries. We received e-mails daily from around the world, demonstrating a wide international interest in the USAP.

Every issue of the *Sun* met its deadline. Most of the articles focused on Antarctic science, with the remainder describing the life and work of Program participants. At McMurdo, each issue included a "Little Mac" page – a local section for McMurdo residents with on-station information and opportunities.

Figure 1-2 The Antarctic Sun

Figure 1-3 "Little Mac" Pages

In January 2006, *Sun* journalists were asked to accompany and photograph members of a congressional delegation as they toured USAP facilities. The journalists established a plan, adjusted their schedules, and covered the group's activities for four days. They created photo CDs for the NSF representative to present to each member of the delegation. Despite the last-minute nature of this task, unanticipated travel (including a trip to the South Pole), extra work and odd hours, the journalists met their publishing deadlines.

We added over 800 new photos to the USAP Digital Photo Library, ending KY06 with over 2,300 photos, complete with captions, credits, and resolution options. We added a new "historical" category to highlight photos from the IGY era. The Photo Library averages 500 web visits a day and provides photos for a variety of uses around the world. The quality and range of photos continues to increase, enhancing the library's value as a remarkable publicity and educational outreach tool for the USAP.

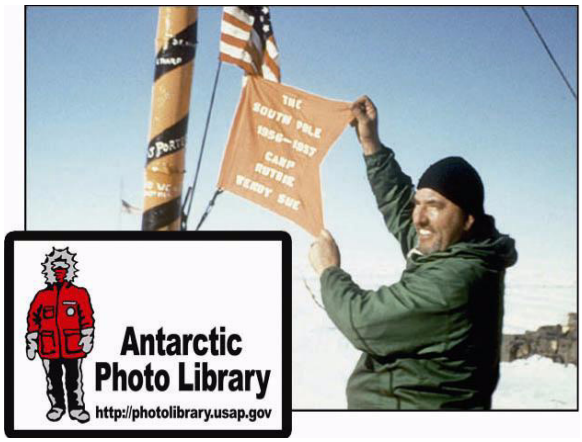


Figure 1-4 Antarctic Photo Library

We constantly respond to requests from the media, NSF OPP/OLPA, RPSC staff, Raytheon and the general public. During KY06, we worked with a wide variety of media providers and outlets, including local broadcast news reporters, screenwriters, authors, Associated Press writers, the *Tradeline Journal*, *5280 Magazine*, NSF press releases, and Raytheon newsletters.

Additionally, we track about thirty USAP publications created by various groups within RPSC.

We currently manage the rotating USAP art exhibits of Myers, Stenzel, Klipper and Campbell. This requires coordinating repairs, building crates, and arranging schedules and transporta-

tion. These exhibits have been displayed at the NSF, RTSC, RPSC, the Christchurch APT, the Wellington Embassy, and at several universities and museums.

We sent the Communication Specialist to the recent Deep Freeze reunion, where she collected oral histories and historical photographs. The specialist is also involved in local IPY planning meetings.

Finally, we continue to participate in morale building efforts at RPSC by sponsoring blood drives, raising funds and supplies for an adopted elementary school, participating in morale committee planning and events, maintaining an Ice-News bulletin board, holding learning-lunch presentations, and assisting other departments.

Publications in Process

In March 2006, we submitted a draft of the *2006-2008 USAP Participant Guide* to the NSF and are still awaiting approval.

In April 2004, we submitted for approval a draft of NSF's *USAP* brochure. We will coordinate printing once the NSF completes the layout. In August 2004, we submitted drafts for the *McMurdo Station* and *South Pole Station* brochures. Once they are approved by the NSF and sent to press, these publications, like the completed *Palmer Station* brochure, will reduce the effort and cost of creating "DV packets." They will also increase the access to and quality of USAP information.

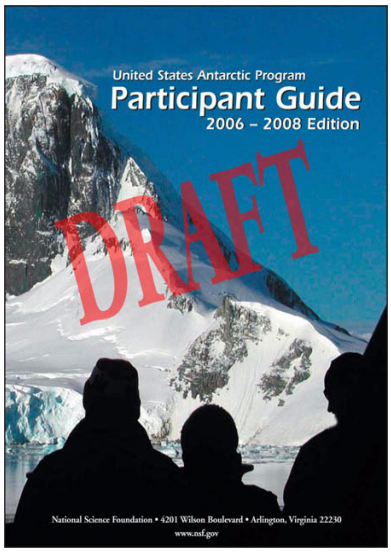


Figure 1-5 New USAP Participant Guide

Figure 1-6 Antarctic Brochures

As time permits, we are revising the 1998 USAP poster set, designed to answer the top ten questions people have about the Antarctic Program. Once complete, the posters will be converted to .PDF files and placed on the RPSC website and the USAP web portal, making them accessible to the public.

Other miscellaneous projects include updating stickers, patches, and trinkets to reflect the new web portal address, www.usap.gov.

Section 2. Qualitative Performance

A. Project Management

General Management

Accomplishment: We developed and implemented a two-week review cycle for science stories scheduled to run in the *Antarctic Sun*.

Benefit: This gave OPP ABMs more time to review stories pertaining to their areas of expertise, and more time for the writers to incorporate their edits.

Customer Satisfaction

Accomplishment: We organized over 100 volunteer presentations, reaching more than 9,000 people, from senior citizens to pre-schoolers. This process includes shipping and tracking loans of ECW gear, giving tours of Denver HQ,

supplying presentation materials, and recruiting and training presenters.

Benefit: This educational and outreach effort creates awareness of the USAP among the general public – a direct response to the NSF's Criterion 2, which calls for broader impacts.

Cost Savings

Accomplishment: We now distribute the *USAP Participant Guide* only to new participants and returning participants who specifically request one.

Benefit: This procedure saves the USAP approximately $2K per year.

Accomplishment: We perform many graphic and publishing layout tasks in-house.

Benefit: This is not only more efficient than outsourcing, but saves the USAP thousands of dollars each year.

B. Program Integration

Integration of Environmental, Health, and Safety Objectives Across Corporate Activities

Accomplishment: We routinely encourage, write and publish stories in the *Sun* and *P.S. News* about environmental, heath and safety issues.

Benefit: This published information adds emphasis and creditability to EH&S processes and initiatives.

C. Innovation/Process Improvement

Innovative/Technological Solutions

Accomplishment: We added a "historical" category to the USAP digital photo library, with over 500 IGY photos.

Benefit: These photos will be useful to USAP participants involved in IPY planning and will be a valuable resource for researchers concerned with the history of the IGY.

Responsiveness to Challenge and Change

Accomplishment: Journalists in McMurdo accommodated a last-minute request to accompany and photograph the congressional delegation for four days. This required flexibility, coordination, and long hours to accomplish, particularly in combination with their other tasks.

Benefit: The NSF has a visual record of the visit and the NSF representative was able to provide souvenir CDs to members of the delegation.

Section 3. Plans for KY07

We will continue to refine the relationships and processes involved with coordinating requests for information about the USAP, using a variety of publications, presentation tools, venues, and contacts.

Comms will play a significant role in IPY activities.

DEPLOYMENT SPECIALISTS GROUP

Section 1. Summary

The Deployment Specialists Group (DSG) had an extremely successful year. We continue to meet or exceed participants' expectations for deployment. We began KY06 with a metric of 18 points for timely ticketing of participants for continental movements, the highest point allocation within the USAP for a single metric. For the past four years, we have met, and in most instances exceeded, the target metric, resulting in customer satisfaction and documented savings in excess of $2 million per year. When metrics were renegotiated this year, the NSF identified this area as successful and dropped it from accountability. Even so, we identify excellence as an internal goal and continue to ensure cost-effective ticketing for deployment and other travel.

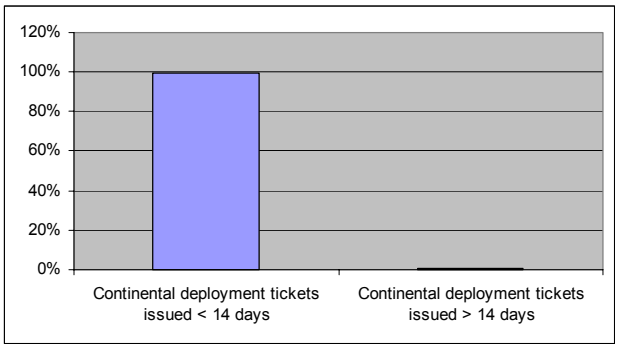


Figure 2-1 Continental Area Ticketing

Section 2. Qualitative Performance

A. Project Management

General Management

Accomplishment: We coordinated the 2005 USAP Annual Planning Conference (APC). We began planning for the conference in January by establishing a schedule for anticipated committee meetings. After reviewing the registration website, we made several enhancements to simplify the registration process. We met all Conference requirements, including coordinating several last-minute meetings to support NSF requests, and we met the budget, as identified in the approved APP.

Benefit: The 2005 APC in Charleston, South Carolina was a huge success.

Accomplishment: We assisted the NSF with the ANDRILL Conference in Denver in April 2005, providing hotel property reviews and contracts, airline ticketing and hotel reservations, audio/visual support, food and beverage selections and contracts, shuttle arrangements, name tags and other administrative support, and expense report submittal to over 160 participants.

We also supported several other conferences, including SPUC, Norwegian-U.S. Traverse of East Antarctica in Tromso, Norway, AOMG, ASC, Sea Ice, the Meteorite Working Group, the Scientific Committee on Antarctic Research (SCAR) Meeting in Munich, Germany, and IPICS II in Brussels.

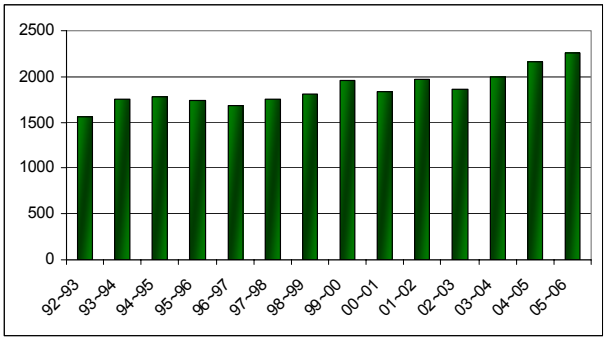


Figure 2-2 RPSC-Issued Deployment Tickets (Continental and Peninsula)

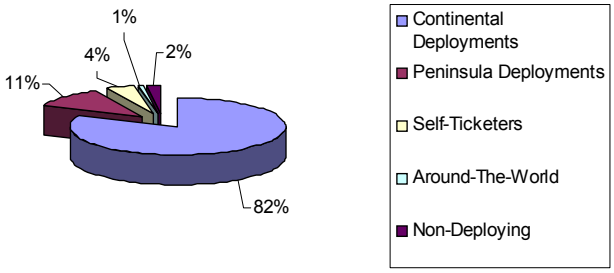


Figure 2-3 Continental and Peninsula Ticketing

We reviewed hotel properties in downtown Denver, Vail, and Colorado Springs for the 2006 APC. We selected the Grand Hyatt in downtown Denver, with the concurrence of the NSF. We finalized contracts to ensure availability and keep costs within per diem.

Benefit: Our expertise in contract negotiations, planning, and coordination continues to be a resource for the NSF and user agencies. Several letters of appreciation acknowledged the smooth, cost-effective, productive conference environment resulting from our professional and coordinated efforts.

Accomplishment: Our Population Management group met all reporting requirements during the season, seven days a week, including holidays. We responded to several new requests for population information from various RPSC departments and the NSF, such as SitReps, field camp activity data, and TRIR statistics. Requests for this kind of information have grown exponentially with the increasing amount of data generated by Population Management.

Benefit: The historical data we provide is a valuable planning and reporting tool used by other RPSC divisions and departments.

Accomplishment: Our airline seat blocking system continued to work perfectly, even when several science events deployed on different dates than originally planned. Our continuing strong relationship with airline carriers is key to maintaining this system.

Benefit: Seat blocking gives us enormous flexibility in supporting the demands of the ever-changing Program. We can obtain a seat on a sold-out flight (such as for a MEDEVAC or patient transport) at no extra cost. In cases where we would have had to pay for a first class or business class ticket for a sold-out flight, we only had to make a phone call and request assistance on behalf of RPSC and the Program. Documented savings exceed $40K per year. Thus, our strong relationship with airline carriers is a major contributing factor of RPSC's ability to support the demands of the ever-changing Program.

Accomplishment: We reviewed and documented the Technical Event process as part of a Raytheon Six Sigma (R6σ) project. We posted the entire Technical Event Application package on www.usap.gov.

Benefit: For the first time, formal guidelines, flowcharts, procedures, and applications for technical events are available to the user community.

Accomplishment: Another R6σ project was the creation of a Travel Authorization database, which replaced the extremely laborious paper system inherited from the previous USAP support contractor (Figure 2-4). [redacted] a subcontractor to the DSG, assisted with the design and implementation at no cost to the Program. We made additional enhancements in-house, including efficiencies in reporting and auditing and electronic storage of over-per-diem letters.

Benefit: The estimated cost savings to the USAP exceeds $10K per year.

Accomplishment: The NYANG identified a problem wherein commercial aircraft contracts to move their personnel were not established. Within hours, we placed all appropriate parties

Figure 2-4 Travel Authorization Database

in contact and negotiations ensued. We assisted further by providing creative solutions to other travel-related issues, including the use of RPSC hotel properties in Los Angeles, negotiating for day-beds at lower than per diem costs, providing USAP luggage tags (Figure 2-5), creating specific language for their airline travel records, assisting with airline carrier negotiations, contacting Customs and Immigration on their behalf in support of Government-issued orders versus the use of passports, and contacting Los Angeles Airport Security and Federal Aviation Administration (FAA) offices regarding their personnel and baggage movements.

Figure 2-5 USAP Luggage Tag

Benefit: Our services extend to other user agencies, as requested. Even though this is outside our Contract requirements, they are USAP participants and we are happy to provide our services. In this case, we helped facilitate the movement of NYANG personnel and baggage.

Accomplishment: We maintained ISO compliance during KY06. Internal audits identified our performance, recordkeeping and documentation as best practices.

Team members are constantly challenged to think of Program money as their own. We question requirements, ensure regulations and procedures are followed, and ensure that Program funds spent are kept to a minimum while still fulfilling the requirements of the traveler.

Benefit: Thorough documentation and recordkeeping facilitate audits. Maintaining ISO compliance allows us to cross-train other personnel with uniformity.

Accomplishment: With our help, the Clothing Distribution Center (CDC) in Christchurch completed a R6σ project that enhanced ECW gear distribution. The DSG worked with IT and drove the PTS changes that made it possible, adding a date/time stamp to the clothing screen, revamping the import process, and redesigning the CDC reports. The result is a database that automatically imports data from PTS and produces accurate clothing issue forms and jacket labels. Two Christchurch personnel achieved R6σ certification.

Benefit: Processing time for ECW gear is significantly reduced. The time spent gathering data is now a fraction of what it used to be (Figure 2-6, Figure 2-7). Clothing forms and jacket labels are now professional and consistent, and they can be produced effortlessly and accurately on demand. The estimated yearly savings to the USAP is $9K (USD).

Customer Satisfaction

Accomplishment: Customer satisfaction was at an all-time high, as evidenced by e-mail commendations, phone calls and grantee outbriefs. Kudos came from all parts of the user community.

> "I have yet to be disappointed by any activity involving you or your Travel Department. It is so helpful to receive such prompt and cheerful support…YOU are customer service!"
>
> *Grantee*

> "I can't thank you enough for your assistance and support. The operational implications of not having a single carrier, for the entire route, can be significant. You're a life saver."
>
> *NYANG Colonel*

> "I found your phone number and thought, why not try and see if they will help me, even though we're not Raytheon employees? I ran out of options and could not call the New Zealand Immigration and Customs office from my cell phone… Not only did you support us on a weekend, but you provided our flight members with new flights, found them a hotel, called New Zealand Immigration and arranged for their allowance into the country, wrote letters in support of their travel via a personal guarantee with Immigration, and spent several hours of your

weekend to support us. You contacted our Calgary office and the Ice to let everyone know their status. All of this well above and beyond in support of the Program. You took care of every single detail, when we didn't even know where to begin. You are professional, courteous, and above all you are fantastic!"

Kenn Borek Air

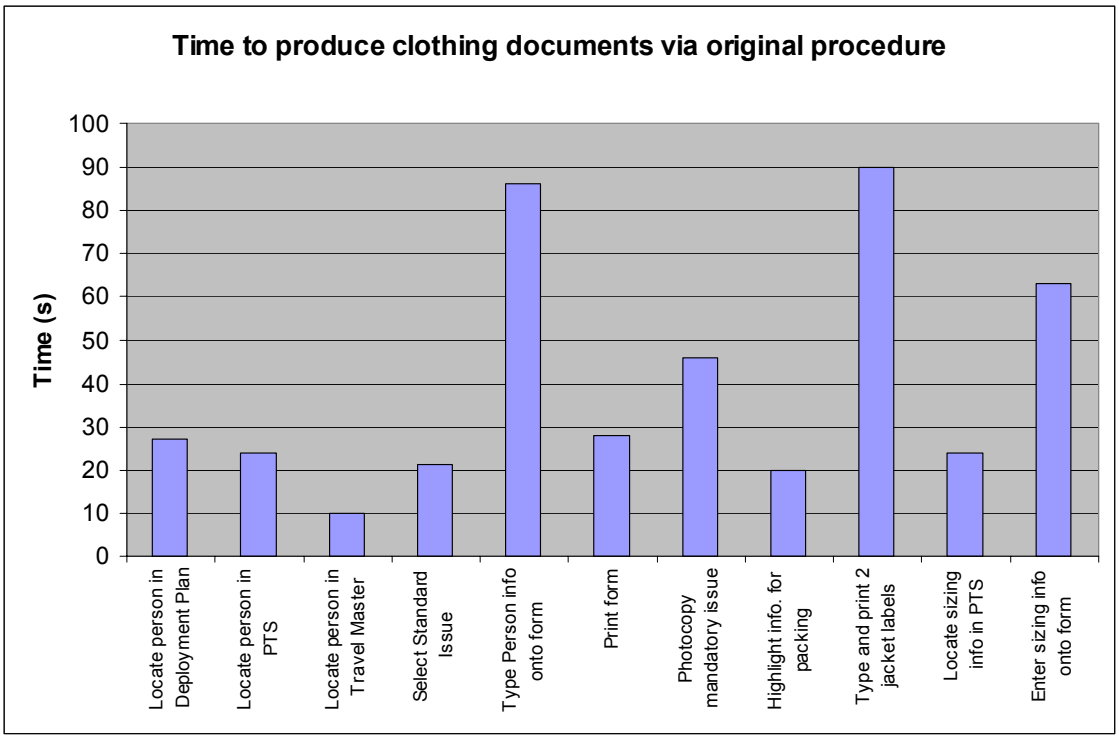


Figure 2-6 CHC R6σ Project, Time to Produce with Original Procedure (in seconds)

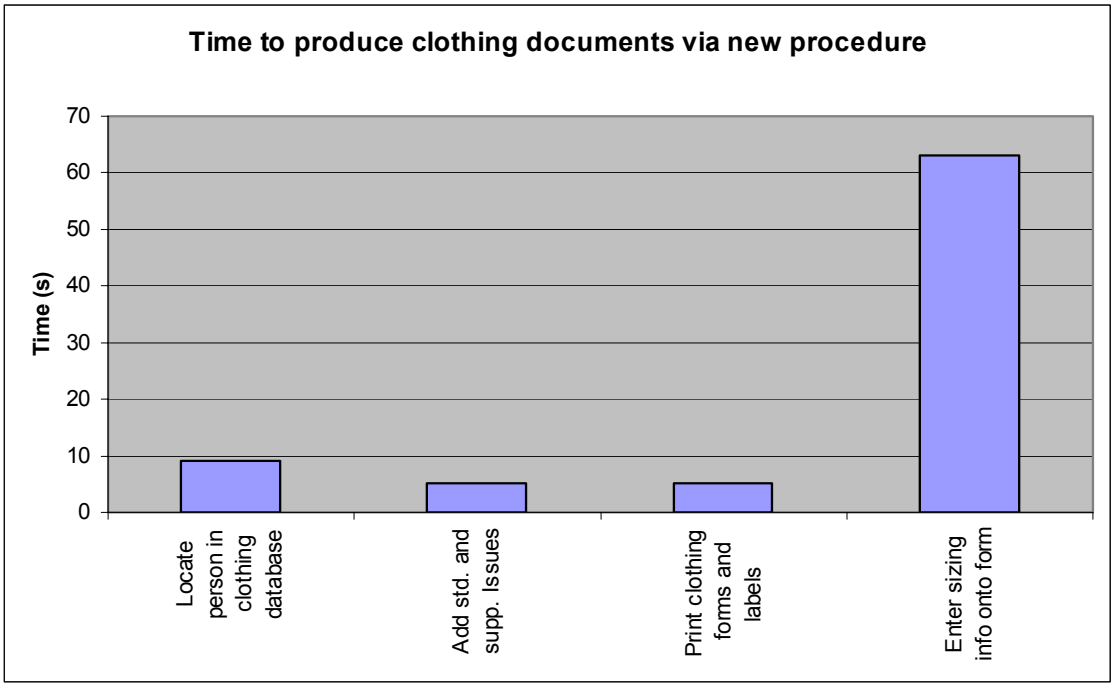


Figure 2-7 CHC R6σ Project, Time to Produce with New Procedure (in seconds)

> "The DSG has once again been a savior for getting grantees through our less-than-user-friendly system and down to the Ice. They always seem to be putting out fires before they start. They also do me a personal favor by keeping an eye out for anything that might need my personal attention or just passing along heads up information. This has proven to be very valuable in catching potential support 'gotchas' on the ice."
>
> *RPSC Science Support*

Benefit: Self-explanatory.

Accomplishment: We drove several initiatives to improve PTS in KY06. One major achievement was purging thousands of obsolete records. (Thorough backups were saved, of course, for historical support.)

We added fields to support ever-changing business phone practices: cell phone numbers, phone extensions, and international phone numbers.

We also added a date stamp to the medical and clothing screens. Each record is now flagged when the user saves a change.

Benefit: Since the purge, PTS response time is faster. This benefits every end-user.

Storing all participant phone numbers in PTS makes it unnecessary to refer to original paperwork.

The date stamp drastically reduces the amount of time various RPSC departments spend pulling reports from PTS. In DSG alone, we save up to three hours a day at the height of the season.

Accomplishment: Our mishandled luggage rate was 2.33%, well below the industry's rate of 7% (Figure 2-8).

Mishandled baggage continues to be an issue for all travelers. Although beyond RPSC's control, the statistics worldwide have increased. We meet regularly with the airlines, TSA, and gateway city airports to emphasize the criticality of ensuring USAP baggage moves efficiently. When losses occur, we investigate and follow up with e-mails and phone calls.

We continue to issue USAP luggage tags to all participants.

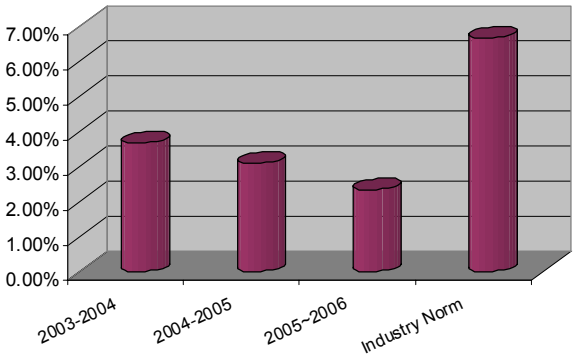


Figure 2-8 Mishandled Baggage

Benefit: The great majority of RPSC-ticketed participants arrive with their bags, reducing stress and minimizing missed Ice dates.

Human Resources

Accomplishment: We continue to support the USAP with experienced and knowledgeable personnel. Most of the team has been with the DSG since its inception – in excess of four years.

Team members received cross-training throughout the year, using best practices found throughout the industry and through online Raytheon Learning Institute courses. We make the most of our train-the-trainer program, where one person attends a class and trains other team members.

Team members are encouraged to participate in brown bag lunches and other programs offered at RPSC. We regularly distribute and discuss publications designed to support the team and their professional growth.

Benefit: Cross-training and rotating between the broad variety of tasks within the department ensures that personnel remain challenged. Their skill levels are enhanced, they're kept focused and fresh, and they enjoy the job more.

Accomplishment: We changed a contract position to a fulltime position in time for Mainbody 2005. Using temporary personnel during peak periods had meant constant re-hiring and re-training.

Benefit: All temporary help was eliminated. Having a single fulltime, multi-functional position ensures workflow continuity within the DSG.

Accomplishment: We made deployment packets available electronically in KY06 and posted all forms on www.usap.gov.

Benefit: Deployment is simplified for all participants. Up-to-date forms are available from anywhere in the world 24x7x365.

Cost Savings

Accomplishment: We completed a yearly review of hotel properties, shuttle services, and airline and rental car contracts.

Benefit:

Hotel Properties: We maintained below per diem rates for the Denver area. Savings ranged from 30-40%, depending on the property. The NSF continues to book reservations through RPSC, ensuring further savings on direct NSF-funded travel to the Denver area. Overall hotel bookings in the U.S. have drastically increased over the past year as business and personal travel increased. Because of high demand, prices have soared, and in many places it is difficult to find a hotel within per diem. We have not only been able to negotiate within the per diem, but well below it.

Long-Term Hotel Properties: Long-term rentals (in excess of 30 days) continue with outstanding success. The property used by RPSC continues to receive accolades from travelers, and the savings to the Program are substantial. Compared to the per diem, the Program realizes a savings of 59%.

Shuttle Services: We contracted new airport shuttle services, with a savings of 15% over the previous year (Figure 2-9). We continue to pre-arrange bulk movements to ensure the most cost-efficient movements possible. We identified new vendors, received cost proposals, signed contracts, and created pre-paid vouchers.

Raytheon
Technical Services Company LLC
Polar Services
Denver Colorado Express Shuttle
7400 S Tucson Way
Centennial, Colorado
80112-3938 USA
303.790.8606
Local 720-350-8050
Voucher provides shuttle service to/from DIA for
Raytheon Polar Participants
Certificate No. _____ Auth: _____
Shuttles depart DIA every half hour from 5am to 11:30pm, daily.

Figure 2-9 Shuttle Voucher

Airline Contracts: We negotiated major airline contracts with a 3% savings to the Program. We also renegotiated Miscellaneous Change Orders (excess baggage) costs, with a resulting 7% savings. These are the lowest cost in the U.S. ([redacted]) and worldwide [redacted]).

Rental Cars: In addition to [redacted] Raytheon Corporate Travel Council negotiated a contract with a second carrier, [redacted] agreed to the same level of services and costs as [redacted]. This offers our travelers a second choice of carrier.

B. Program Integration

Coordination Between WBS

Accomplishment: We initiated a cross-functional monthly meeting with Medical and Human Resources, where all members meet and discuss challenges and opportunities for improvement. We held other meetings with Information Security on the distribution of EntROB, with hiring managers on participant status checks, and with Science Support on distributing permit guidelines and applications.

Benefit: Several outstanding initiatives were conceived at these meetings and ultimately implemented, including:

- Creation of Excel macros to ensure read-only use of the USAP Participant Tracking (UPT) database, allowing virtually

everyone within RPSC to use the UPTs at any given time

- Validation formulas in the UPTs to prevent ticketing before all requirements are met
- Creation of a deploystatus@usap.gov account, which gives us the ability to manage mass e-mails to participants, i.e., EntROB and medical prescription shipping changes

Accomplishment: When the Long Duration Balloon (LDB) facility ran behind schedule, we stepped in and ensured the grantees were updated and re-ticketed accordingly.

Benefit: By serving as the point of contact, carefully managing delayed deployments and keeping key players informed, we allowed on-Ice personnel to remain focused on their work.

Accomplishment: We gave Logistics the benefit of our Access expertise, and we added a date/time stamp field to the widely-used Deployment List (distributed by the Transportation Planner) to identify new or modified records. We also added an "export to Excel" function.

Benefit: The date/time stamp identifies new or modified records and saves the DSG approximately two hours every time the Deployment List is published. The "export to Excel" function automates several steps and saves the end-user several minutes each time.

Accomplishment: At the request of the Housing Department, we used our Excel expertise to migrate McMurdo housing request information from PTS to the UPTs. This huge effort required adding new columns to the UPTs, transferring job codes and job points, replicating housing point formulas in Excel, creating macros for error-free input, and adjusting the workflow surrounding Housing Request Forms. We completed migration in August 2005.

Benefit: The time we required to input each Housing Request Form decreased from over three minutes per participant to 30 seconds. For Housing, the advantages of an Excel spreadsheet over PTS are numerous:

- Access to all participants at once
- Access to the other participant info stored in the UPTs (division, station, etc.)
- Date-stamped additions/revisions
- Flexible design – changes do not require software updates
- Customized housing views
- Filtering for roommate assignments
- Excel count and sort capabilities

Integration of Environment, Health, and Safety Objectives Across Corporate Activities

Accomplishment: We acquired the responsibility of producing the *Antarctic Treaty Report* participant list in KY06, since the DSG Muster Access database provides the same data more accurately and effectively. We spent forty-eight hours compiling the information, with another eight hours in Q/A, compared to the eighty hours required by IT. We created several other programs to further streamline the process.

Benefit: Delivery time is decreased from 80 to 18 hours, with a reduced possibility of human error.

C. Innovation/Process Improvement

Innovative, Technological Solutions

Accomplishment: Deployment packets became available electronically in KY06 (Figure 2-10). This was a huge endeavor, requiring the participation of the DSG, Medical, and IT. We posted forms for every participant type (grantee, technical event and RPSC employee) to the Internet (http://www.usap.gov/travelAndDeployment/deploymentPackets.cfm), then phased in the new system throughout the season; we sent deployment packages by mail, but as people requested additional copies (or when we received non-receipt notices), we directed participants to the website.

Benefit: Once fully implemented in KY07, paperless deployment packets will save the

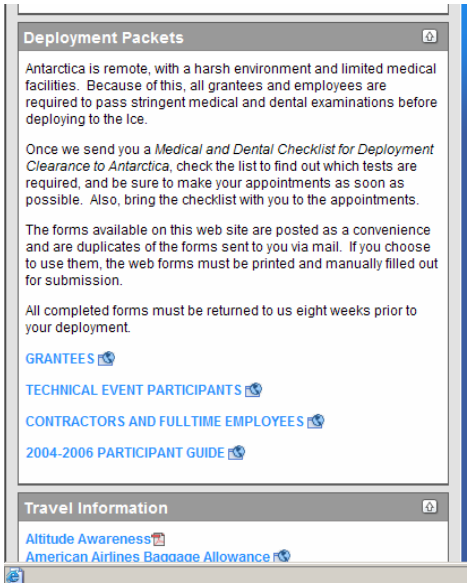


Figure 2-10 Electronic Deployment Packets

USAP more than $10K annually by reducing mailing, reproduction and labor costs.

Accomplishment: The task of contacting USAP participants who live all over the world has always been challenging. In KY06, we created a deploystatus@usap.gov account for semi-automated e-mails. We notified participants of programmatic changes to InfoSec EntROB, personal prescription guidelines in foreign countries, and permit regulations and applications. Going forward, participants will receive customized updates on their deployment status.

Benefit: This initiative ensures participants obtain clear, concise deployment information and receive timely and accurate responses to their questions. It eliminates hundreds of calls to the DSG phone line, reducing long distance charges and the associated labor costs.

Accomplishment: We created an Access database to store daily Muster Townlists (Figure 2-11).

Benefit: This database makes it possible to access historical population information quickly and with little effort. Previously, requested information was pulled from each muster separately and compiled manually, if it was available at all.

> " … A database that finally provides total seasonal population numbers and movements all in one location is absolutely fantastic. … This has been instrumental in our needs in the area of completing analysis of person days in the field and deployments in general."
>
> *Science Support*

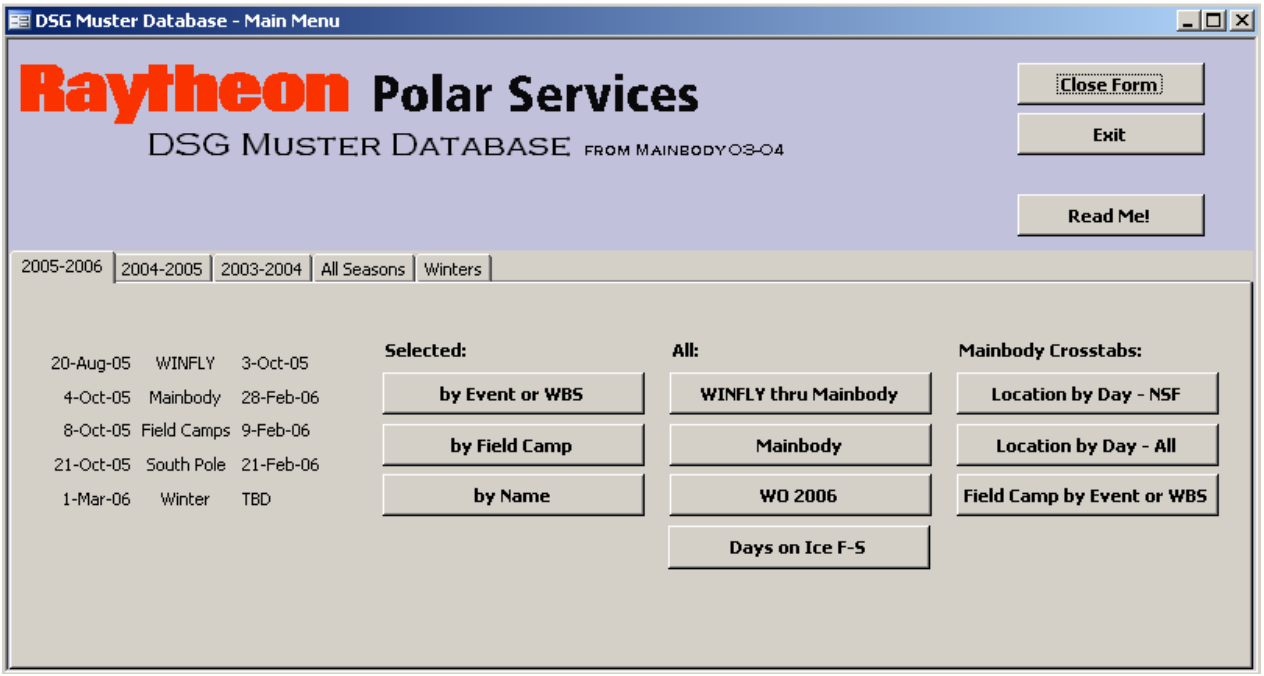


Figure 2-11 DSG Muster Database

Accomplishment: We met with New Zealand Customs and Immigration officials and arranged a nine-month visa for all RPSC- ticketed participants. Visas were previously limited to three months. A letter included in the ticket jacket we issue verifies USAP participation and provides 24x7x365 phone support for customs issues.

Benefit: Although this change was not implemented until October 2005, the benefits have proven outstanding. Previously, participants had to contact the New Zealand Immigration Office before leaving the Ice to ensure proper visas, which involved Chalet personnel and Christchurch Travel Office assistance. With the new nine-month visa, none of this additional work is necessary.

Accomplishment: All RPSC-issued airline tickets provide contact information for 24x7x365 assistance. This season there were several occasions when a grantee traveling with samples encountered roadblocks while in transit, even though he/she was carrying proper documentation.

Benefit: As the designated point of contact, we handled each issue in a timely and effective manner, ensuring uninterrupted movement of the grantee without compromising his or her valuable samples.

Accomplishment: We created customized Excel macros for team members and other RPSC departments, including Human Resources, Medical and McMurdo Housing.

Benefit: Macros that automate repetitive daily and weekly tasks save time and enhance job performance.

Visionary Management

Accomplishment: Previously, ticketing reviews required using two desktop PCs and dot matrix printers. The mono-chromatic monitors caused eye fatigue after several hours of use. The dot matrix printers constantly jammed and ribbons were difficult to obtain because the printers were old. Network connections were slow and dropped out regularly. Through peer networking, we discovered a web-enabled airline ticketing review system from Sabre. With the assistance of American Express and the IT Division, the system was installed and DSG Travel Coordinators attended train-the-trainer classes.

Benefit: We now complete all ticketing reviews with the new system. Previous problems have been eliminated, saving labor, time, and frustration.

Accomplishment: We worked with Safety, Human Resources, and Christchurch personnel to identify an effective means of providing the (new in KY06) safety awareness training to RPSC employees. We suggested several scenarios and provided cost proposals in support of this new initiative. ECW gear is now issued to participants the day they arrive in Christchurch.

Benefit: Issuing ECW gear the day of arrival saves the USAP money and frees valuable time for the safety awareness training now required of RPSC employees before deployment to the Ice.

Responsiveness to Challenge and Change

Accomplishment: With the implementation of www.usap.gov, we attended classes on website design and created a DSG intranet website (Figure 2-12).

The website provides access to:

- Deployment forms and information
- Up-to-date travel information
- Contact information
- The *USAP Participants Guide*
- Hotel listings for Punta Arenas and Christchurch
- Travel alerts.

Benefit: The intranet website provides 24x7x365 access to deployment information and eliminates calls to the DSG phone line.

Accomplishment: There were several major storms in 2005. As each storm approached, we were proactive in identifying personnel movements and arranging alternative travel. For example, an employee was in Miami when Hur-

ricane Wilma was forecast. No flights were available, so we extended her rental car and provided her with road maps and a safe route away from the path of the hurricane. During Hurricane Katrina, we re-routed several RPSC travelers out of the storm's path.

Benefit: Participants have a 24x7x365 resource in the DSG to ensure their safety and well-being are addressed in times of emergency.

Identified Issues

Issue: Late notice from the Ice was making it difficult to meet Muster Townlist and Camp Musters deadlines on Sundays.

Response: At our request, the NSF changed the muster deadline on Sunday from noon to 4PM Ice time.

Lessons Learned

If military personnel are to deploy as civilian support, we should involve Support Forces Antarctica (SFA) earlier in the deployment process. Our Technical Event procedures have been modified to support this type of event.

Section 3. Plans for KY07

We will fully implement web-enabled deployment packets in KY07. Participants will receive a lab kit and directions to the appropriate website(s) to download all medical, dental, and deployment paperwork.

The DSG Manager will continue as acting Medical Director while the Medical Director position remains vacant.

We will lead the site review for APC 2007.

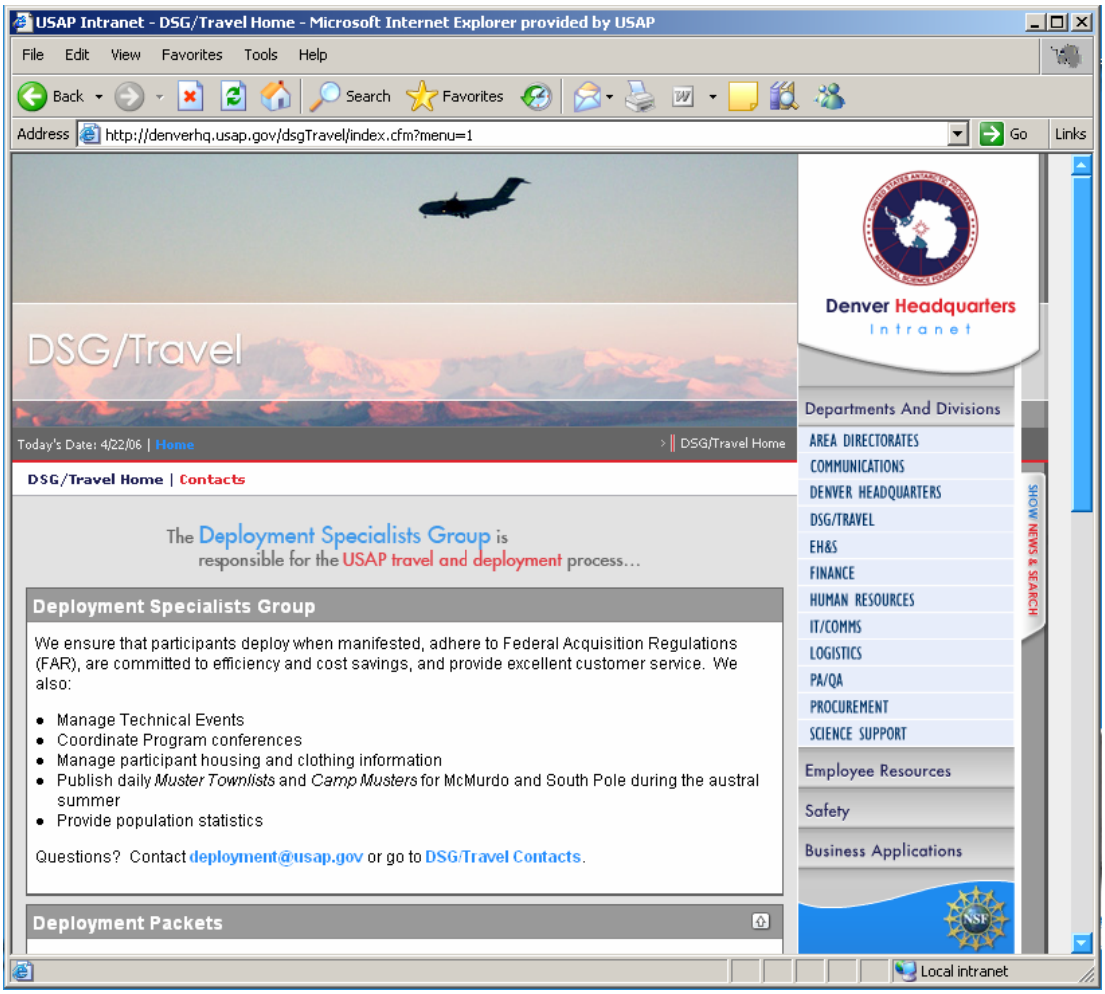


Figure 2-12 New DSG Website

ENVIRONMENTAL, HEALTH & SAFETY

Environmental, Health and Safety (EH&S) has seen significant change over the last twelve months. We reorganized in a way that gives us greater flexibility on the Ice and allows us to better support the NSF and other RPSC departments. Through effective hiring, we significantly increased the experience level of our staff. This has resulted in quicker and better environmental reviews and has allowed us to be more responsive to NSF requests. We reviewed all our safety polices and procedures, updated them to reflect changes in OSHA regulation, and made them site- or station-specific. Perhaps our most important change has been to upgrade RPSC's safety education program, which has resulted in a higher level of safety awareness throughout the Program and fewer injuries.

ENVIRONMENTAL ENGINEERING

SECTION 1. SUMMARY

Introduction

The Environmental Department focused on improving planning and efficiency during KY06. At the outset, we evaluated all outstanding environmental projects and selected ones for action based on the following four criteria: 1) Level of environmental protection conferred, 2) Importance to the client, 3) Legal requirements, and 4) Efficiency of resource use. We then compiled all selected projects into a comprehensive Environmental Work Plan.

The following sections summarize projects undertaken during KY06, in accordance with the Environmental Work Plan. A report that provides additional detail on these projects will be submitted to the NSF under separate cover.

Site Assessment and Clean Up

Consistent with the requirements of the Antarctic Conservation Act (ACA), the Environmental Department addressed 18 contaminated sites during KY06. We coordinated remote efforts with ongoing field events and made best use of McMurdo's General Assistant labor pool to assist with efforts close to station. An overview of the 11 most significant sites can be found in Table 3-1 and Table 3-2.

Figure 3-1 Drum and Debris Removal, Mt. Takahe

Figure 3-2 Debris Removal, Meserve Glacier

Table 3-1 Summary of KY06 Debris Recovery Efforts

Location	Debris	Date	Amount	Notes	Status
Allan Hills	Six fuel drums, contaminated snow, camp gear, and food	November 17, 2005, and January 2006	2940 lb[1]	During a two-phase effort, we located a buried field camp cache and removed materials dropped in 1987. We recovered approximately 20 gallons of contaminated snow from beneath a leaking drum found on-site. All of the fuel has been recovered from the site.	Open. An effort to remove a remaining field cache is recommended for KY07.
Cape Hodgsen	Misc debris, bits of wood, metal	November 9, 2005	40 lb	We performed additional reconnaissance by helicopter along the old overland traverse route from McMurdo to Black Island. We observed bamboo poles and flags along the entire route, and identified a pile of large wooden beams (each approximately 15 feet long) at GPS coordinates S 78^0 13.400', E 166^0 47.600'.	Open. Removal of wooden beams recommended for KY07.
Mt. Takahe	56 fuel drums, misc packing debris	December 13, 2005	1500 lb[2]	Over three days, a four-person team excavated and recovered all 56 drums from 4-6 feet beneath the snow surface. Using Twin Otters, we shuttled a total of 33 drums to a new fuel cache (S 76.298° W 109.801°) that is less likely to drift. We also took six drums of fuel to an existing fuel cache 100 miles grid south of Mt. Takahe. The remaining 17 drums of fuel were used by the Twin Otter crews during support of the operation. We transported miscellaneous packing debris (cardboard, wood, and parachutes) and empty drums back to McMurdo for disposal. No further action is recommended for this site.	Closed. All fuel drums have been removed/ relocated or used. All visible debris has been removed.
Meserve Glacier	Misc debris, human waste and crushed tin cans	January 26, 2006	510 lb	During this field effort, we discovered a former trash dump site, likely a remnant of the former U.S. Navy presence at the camp in the 1960s. We removed approximately 250 lbs. of trash consisting mostly of crushed tin cans. We identified previously-observed orange painted rocks as markers for a functioning helicopter landing pad and therefore left them in place. Given likely ablation at the site, debris may surface in the future.	Closed. All visible debris has been removed.
McMurdo Station	Windblown and historic debris	KY06	1600 lbs	Warm temperatures and receding glaciers have exposed historical debris around the McMurdo, in addition to debris scattered after winter storms. We performed recovery work on this debris between other scheduled projects, as time and logistics allowed.	Open. We anticipate an indefinite need to remove debris from storms and from McMurdo operations.

Sites where debris or materials were recovered via RPSC-managed efforts are listed. The table does not include five additional recovery/ reconnaissance efforts undertaken in 2005-2006, including: Cape Hallett, Lake Vida (battery), Cape Crozier, Turtle Rock, and four sites in the Dry Valleys (Clark/Upper Victoria Glaciers, Discovery Bluff, Bartley Glacier, and Butter Point).

[1] Estimate based on average drum weight of 440 lb/drum for 6 drums, plus 300 lb debris. Amount of debris other than drums is estimated based on description of items, as effort was undertaken by grantees during camp pull-out.

[2] Estimate includes 17 empty drums (80 lb/drum) and miscellaneous debris.

Table 3-2 Contaminated Site Characterization and Closure

Site	Description	Status
Dry Valley Drilling Project (DVDP) Boreholes Preserved with Fuel	Remaining fuel could migrate into scientifically valuable water bodies (Lake Hoare, Lake Vida, and Explorer's Cove) unless action is taken at three sites. We conducted site visits with a potential subcontractor (Webster Drilling), allowing us to generate a detailed cost estimate and a list of options so funds can be requested for closure in FY07.	Open and active. High priority for closure and site stabilization.
Cape Hallett	Three members of Antarctica New Zealand (ANZ) and one USAP participant spent three weeks decommissioning the remaining items at the former station, which included a 100,000 gallon above-ground storage tank, ten 800 gallon day tanks and a D4 Caterpillar Dozer. All decommissioned materials (primarily steel plates and beams) were staged along the western beach of Edisto Inlet, and 80% of the staged materials were removed via helicopter sling load to the Italian Antarctic Program vessel, the *Italica*. Additional site work included setting up a long-term environmental monitoring program for groundwater sampling, visual impact assessments and soil sampling in the vicinity of the former 100,000 gallon tank.	Closed for further remediation. Remaining debris must be removed. Ensure coordination for long-term monitoring.
Lake Bonney	To confirm that clean-up efforts were effective, we took characterization samples from the site of a small hydraulic fluid spill discovered on the surface of Lake Bonney on November 10, 2005. Results indicate only trace levels of petroleum remain (3.6 mg/L Total Petroleum Hydrocarbons). Site characterization will meet reporting requirements for the USAP Master Permit, and mark the completion of the clean up efforts that followed the spill.	Closed. Trace levels (below 1 ppm) of contamination remain. Clean up is considered complete.
McMurdo Helicopter Pad	We collected final site characterization samples at the site of the 2003 helicopter pad fuel spill, where 6,582 gallons of AN-8 were spilled. Due to the active status of the helicopter pad, the minimal exposure of the remaining fuel to the environment, and the minimal risk to human health, we recommend no further action for this site. Site characterization will meet reporting requirements for the USAP Master Permit, and mark the completion of clean up efforts.	Closed. No further remediation is recommended while the pad is in use.
Black Island	The site has been characterized at two discrete locations within the footprint of the Black Island camp and found to contain TPH levels up to 61,000 mg/L. Although the contamination appears to be stable and confined, the area beneath the generator shack is of primary concern due the relatively high levels of TPH we found there. The site is considered open for remediation to mitigate the potential for the petroleum contamination to migrate. Site characterization will meet reporting requirements for the USAP Master Permit.	Open and stable. Removal of soil beneath the generator shack at Black Island is recommended.
WINFLY Sea Ice Spill	Site characterization followed the clean up of 2,200 gallons of AN-8 onto the sea ice 1.3 miles from McMurdo. The spill occurred on September 28, 2005, and samples were collected on October 4, 2005. Five locations within the spill area were sampled to an average depth of 3 ft. Results confirmed fuel did not migrate into the ice, and cleanup efforts were highly successful, with only trace levels (below 1 ppm) detected.	Closed. Trace levels (below 1 ppm) of contamination remain. Clean up is considered complete.

Figure 3-3 Tank Demolition and Sampling, Cape Hallett

Environmental Department personnel located and recovered an estimated 6,290 pounds of debris from the Meserve Glacier, Mt. Takahe, Allan Hills, Cape Hodgsen, and McMurdo. The most notable recovery effort was at Mt. Takahe, where we excavated a total of 56 fuel drums from 4-6 feet beneath the snow. The drums were moved to another fuel cache location, and some of the fuel was used for the recovery effort itself. We also conducted seven reconnaissance-and-recovery efforts: Lake Vida (battery), Cape Crozier, Turtle Rock, Clark/Upper Victoria Glaciers, Discovery Bluff, Bartley Glacier and Butter Point.

In addition, we characterized and closed four contaminated sites (Cape Hallett, McMurdo's helicopter pad, the Lake Bonney Spill Site, and the 2005 WINFLY Sea Ice Spill Site), with two sites remaining for follow-up in KY07 (the Dry Valley Drilling Project boreholes and the contamination beneath the generator shack at Black Island).

Soil decontamination using the M1-12 Infrared Treatment system began in earnest at McMurdo in October 2005, following several years of planning, environmental review, and pilot testing. The Environmental Department contributed substantial support to this project, primarily by providing on-site field testing and certified lab analytical testing to ensure treatment efficacy. A total of 330 cubic yards of soil were tested over the course of the season, and results showed that average contamination levels in the soil were reduced by 98.4%. The project ensured that the requirements of the USAP Master Permit regarding the length of time contaminated soil can be stored at McMurdo were met.

Research and Investigation

The Environmental Department has an ongoing program of research and investigation in order to better accomplish its mission. During KY06, two areas were selected for research, based on their importance to Program operations and on their potential for environmental impacts.

Figure 3-4 Abandoned Borehole Containing Diesel, Lake Hoare

We investigated sources of sediment loading into Winter Quarters Bay, using a two-pronged approach. First, we conducted interviews with both Operations personnel and scientists to learn about sediment loading sources, concerns, and possible management actions. Second, we took field measurements to estimate relative inputs from both pier operations and natural sources. The information we gathered will not only help us better understand the nature of potential impacts, but it will also help us identify management actions.

We also undertook an extensive literature search to better understand how fuel interacts with sea ice. Our goal was to understand how well the sea ice serves as a mechanical barrier to the marine environment. In particular, we were interested in determining whether we should characterize a sea ice spill by coring, as drilling cores can enhance vertical migration of the fuel. This information should help us better manage large scale sea ice spills.

Field Camp Audits

Conducting productive, safe, and environmentally sound field work in remote settings is one of the most challenging aspects of the USAP. Overall, KY06 continued a positive trend towards increased environmental protection,

largely due to a collaborative effort within RPSC, NSF and the grantee community.

One aspect of this collaborative effort consists of field camp audits. The Environmental Department conducted 18 of these audits during KY06, ranging from temporary camps in the Dry Valleys to established camps on the polar plateau. The objectives of the Field Audit Program include supporting best management practices and ensuring compliance with environmental regulations. For each site, we completed a comprehensive audit form, including a photo log.

Audits were performed at the following field camps:

- Big Razorback
- Penguin Ranch
- Southern McMurdo Sound Site Survey
- Allan Hills
- Lake Vida (B-211-M)
- Black Island
- Blood Falls (I-139-M)
- Bull Pass AFTEC Facility
- F6
- Lake Fryxell
- Friis Mountain (G-063-M)
- Lake Bonney
- Lake Hoare
- Marble Point
- New Harbor
- Odell Glacier
- Lower Erebus Hut
- WAIS Divide

Key findings and corrective actions resulting from these audits were:

- Rising water at Lake Bonney has flooded the lower steps on the helicopter pad, and the water level is approaching the radioisotope lab. The NSF, RPSC Field Science Support, and RPSC Environmental will work together on a plan to address this issue for KY07.
- The USAP needs consistent standard practices for providing spill kits and containment materials to Antarctic field events. Despite best efforts by all departments involved, containment is not always where it needs to be. Affected sites this year included WAIS Divide and Lake Vida. The NSF, RPSC Field Science Support, and the RPSC Environmental Department have formed a Six Sigma effort to address this issue before KY07.
- There appears to be a shortage of small solar power units that can be used to power laptop computers. With the expansion of wireless capabilities, field laptop use is expected to be more widespread. Without additional solar units, increased laptop use will require the field deployment of more small generators and fuel. This issue has been brought to the attention of Field Science Support, but a corrective action plan is not yet in place.

Water Quality Management

The KY06 Drinking Water and Waste Water Monitoring Summaries are currently being prepared by EH&S and will be submitted to the NSF and applicable RPSC divisions in March 2006. All yearly sampling results will be included in these reports.

Drinking Water: For the first time in the USAP, Safe Drinking Water Act (SDWA)-compliant Consumer Confidence Reports were completed. These reports, which summarize water quality results for both McMurdo and the South Pole, were distributed at the end of January 2006 to both station populations.

Results compiled to date demonstrate that the conservative goals for clean drinking water established by the USAP have been met during KY06. Water produced at McMurdo and South Pole easily meets the EPA National Primary Drinking Water Regulations (NPDWR) under the SDWA. This is quite an accomplishment, particularly for the South Pole, as process refinements have been needed for the new treatment system set up in 2002 as part of the South Pole

Station Modernization project. Palmer Station and *LMG* samples were collected on February 3, 2006 and results will be compiled in the Drinking Water Monitoring Summary.

Through coordination with FEMC and Operations, we made process improvements at the South Pole to address the former "blue water" issue related to corrosion and high copper levels. In McMurdo, we took action (flushing), concurrent with careful monitoring, to reduce the amount of lead in drinking water prior to the occupation of dorm rooms. We also addressed high levels of fluoride at Lower Erebus Hut.

We issued a total of three drinking water public health alerts during KY06: two for lead (Chalet and Medical, McMurdo) and one for high fluoride concentration (Lower Erebus Hut). Subsequent sampling at the Chalet and Medical buildings showed that lead levels were below USAP minimum goals, and the health alerts were removed. Fluoride concentration at Lower Erebus Hut decreased throughout the duration of camp occupation and met the Maximum Contaminant Level requirement at a sampling conducted on January 4, 2006.

Waste Water: We conducted annual waste water sampling at all three stations during KY06, in accordance with the USAP Waste Water Monitoring Plan. The resulting data was used to calculate loading values on the local environment and to measure the performance of the McMurdo Waste Water Treatment Plant (WWTP).

In November 2005, the Environmental Department assisted with a pilot study at the WWTP, during which process improvements dramatically improved the effluent quality (73% improvement in solids removal, for example) (Table 3-3). We expect that there will be additional improvements in effluent quality as we continue to implement the recommendations of the 2005 WWTP Technical Event.

Table 3-3 Improvements to Wastewater Treatment Effluent Water Quality, McMurdo Station

Water Quality after Process Changes		CBOD mg/L[1]	Suspended Solids mg/L	Ammonia (NH_3) mg/L	Total Phophorus mg/L	Alkalinity mg/L	Fecal Coliform Cells/100 ml
Nov	Average	11.5	38.5	0.6	27.8	39.0	64.0
Dec	Average	3.4	10.2	0.3	24.0	28.5	27.8
% Increase in Removal		70.4%	73.5%	47.2%	13.6%	27.0%	56.6%

[1]CBOD: Chemical Biological Oxygen Demand, a measure of the ability of the effluent to decrease natural oxygen levels in the marine environment.

Education and Awareness

Environmental protection in Antarctica requires that all USAP participants be adequately trained in environmental policies and procedures. To accommodate the USAP's wide variety of training needs, we have developed a strategic, tiered approach to education that is based on the role and function of each participant and on his or her work setting. Our goals for this approach include making the best use of existing venues (to improve efficiency) and providing tailored training when needed.

All USAP participants received a general orientation by viewing an 18-minute video entitled "Protecting Antarctica's Environment." RPSC employees were trained in this way before deploying. McMurdo-bound USAP participants not trained pre-deployment (such as grantees, NSF personnel, and support contractors) received their general orientation on station.

In addition to a general orientation, we provided work center supervisors with additional pre-deployment training regarding their responsibilities for waste management and spill response.

We delivered updated PowerPoint slides to Palmer Station personnel this year to enhance their training practices. A review of training practices at Palmer Station, on the USAP

research vessels, and at the South Pole revealed that Palmer and research vessel training is largely effective, while some improvements are needed at the South Pole. These improvements will be planned for KY07.

We provided training on the new Antarctic Specially Managed Area (ASMA) for all participants bound for the McMurdo Dry Valleys. This training, which consisted of a review of helicopter procedures and a new 16 minute video presentation, is a considerable improvement over past practices. It facilitated a noticeable increase in the awareness of, and consideration for, environmental issues in the McMurdo Dry Valleys.

The Environmental Department participated in every in-brief for science parties at McMurdo. During these in-briefs, science party personnel were informed of their duties under applicable laws and treaty agreements, and they were briefed on any project-specific environmental issues. We also provided individual, tailored training to science groups as needed and helped refine field plans when necessary. We attended selected out-briefs to follow up on projects with unique environmental issues.

Environmental Impact Assessment

In keeping with our mandate to provide comprehensive environmental oversight to Program activities, we reviewed nearly 200 science, engineering, and operational projects during KY06. Nineteen of these projects required a more detailed environmental evaluation. After assessing these projects, we drafted the appropriate documents and submitted them to the NSF for review and signature. The 19 projects are listed below.

1. Adoption of Contingency Plan for Fuel Offload Over Sea Ice at McMurdo Station: Initial Environmental Evaluation (IEE) signed 1/12/2005, NSF Tracking # MCST0601.IEE
2. Installation of Secondary Containment at Marble Point: Record of Environmental Review (ROER) signed 12/14/2005, NSF Tracking # MCMP0600.R01
3. Testing of an Ultrasonic Gopher and Use of Conventional Drilling Techniques for Sampling Underlying Brine, Lake Vida, McMurdo Dry Valleys: IEE signed11/21/2005, MCDV0601.IEE
4. Tracer Experiments in the Lost Seal and Von Guerard Streams, and Lake Bonney and Lake Joyce Shore Sediments: ROER signed10/20/2005, MCDV0600.R02
5. Coring through Ice Cover in DV Lakes: ROER signed 10/20/2005, MCDV0600.R03
6. McMurdo Sound Site Survey: IEE signed 10/20/2005; MCMS0601.IEE
7. Mechanics of Dry-Land Calving of Ice Cliffs: Science Investigation at Taylor Glacier Terminus and Associated Camping in Blood Falls Vicinity: ROER signed 10/14/2005; MCDV0600.R01
8. Development and Use of Alternative Overland Traverse Route System from McMurdo Station to Black Island, Antarctica: IEE signed 10/13/2005; MCBI0600.IEE
9. Decommissioning and Removal of the AST/RO Building from the Dark Sector, South Pole Station: ROER signed 9/29/2005; SPDS0500.R03
10. Contaminated Soil Treatment: IEE signed 9/29/2005; MCST0501.IEE
11. Decommissioning and Removal of the Viper Telescope from the Dark Sector, South Pole Station: ROER signed 9/21/2005; SPDS0500.R02
12. Bandwidth Improvement Project - Installation of Communications Shelters, Antennas, and Temporary Milvan: ROER signed 9/21/2005; MCBI0500.R01
13. Large-scale water sampling at Pony Lake, Cape Royds: ROER signed 9/20/2005; MCFC0500.R02
14. Installation of Antenna at Explorers Cove for Remotely Operable Micro Environmental Observatory (ROMEO): ROER signed 9/20/2005, MCDV0500.R06
15. Road Crossing Installation for Glycol Loop: ROER signed 8/8/2005; PLST0500.R01

16. Amendment for Traverse Proof of Concept IEE: Amendment signed 8/4/2005; PGAN0302.IEE.AM1.doc
17. Use of small, non-motorized, wheeled cart on land at Dry Valley camps for moving propane cylinders: ROER signed 7/27/2005; MCDV0500.R05
18. Installation of Background Imaging of Cosmic Extragalactic Polarization Telescope: ROER signed 7/25/2005; SPDS0500.R01
19. WAISCORES/Deep Ice Core Drilling: IEE signed 6/22/2005; PGFC0501.IEE

SECTION 2. Qualitative Performance

A. Project Management

General Management

Accomplishment: The Environmental Department created and filled a new position for a drinking water/waste water specialist. We consider this new position critical to our ability to manage drinking water quality throughout the USAP.

Benefit: This action addressed a multi-season gap in attention to drinking water and waste water systems before problems reach a critical point.

The new specialist immediately identified the need for process improvements in both drinking water and waste water treatment. These improvements were implemented at McMurdo, South Pole, and the Lower Mt. Erebus Hut, bringing us into compliance with the SDWA, including practices for disinfectant monitoring and for the distribution of Consumer Confidence Reports.

The specialist brought expertise into the USAP just in time to avert confusion over which provisions of the EPA's Total Coliform Rule and Surface Water Treatment Rule apply to our water systems. The new specialist also brought improvements to sample collection practices (targeted sampling, coordinated with monitoring by Operations personnel), allowing us to benchmark system performance and augmenting our decision-making regarding future process control changes.

Finally, using public relations skills and open communication, the specialist was able to avert growing concern among members of the Antarctic community about the quality of their drinking water, with minimal involvement needed from the NSF.

Accomplishment: We recognized the need for improved organization and planning and held a series of collaborative meetings within the department and between RPSC and the NSF. We used the outcome of these meetings to create the first ever comprehensive Environmental Work Plan, which was implemented in KY06.

Benefit: Improved planning within the department allows us to move forward in meeting client expectations and legal requirements in an atmosphere of resource constraints.

Customer Satisfaction

Accomplishment: We received many favorable comments from both the science community and the NSF regarding our efforts to improve the distribution of secondary containment materials and spill kits, particularly in the Dry Valleys. During field audits and in conversations at McMurdo, scientists expressed appreciation that spill kits and containment materials were provided to them even before they asked.

Benefit: This recognition confirms that RPSC's efforts to improve environmental support to field events are largely successful. Following are three examples of specific recognition from grantees:

- G-088-M (Siddoway): Members of this group expressed particular appreciation for the support we provided them on their drum release and subsequent clean-up. The PI was thankful for our quick response in getting the supplies they needed to the field. Equally important was our follow-up to ensure the group had the support they needed for the clean-up.
- I-139-M (Hallett) (Blood Falls): Members

of this group expressed appreciation for our field support during their camp put-in, and for the innovative rigid containment we provided for use on the glacier.

- LTER B-042-M (McKnight): The PI expressed appreciation for the support we provided her team in planning for their field season.

Accomplishment: The NSF recognized the Environmental Department's successful response to a 2,200 gallon AN8 fuel spill on September 28, 2005. The spill occurred 1.3 miles from McMurdo, off the sea ice runway road. In a fluid and efficient team effort, we contained the spill within four hours of receiving the initial report. We set recovery sumps in place to remove liquid product, and removed overlying, fuel contaminated snow by hand.

Benefit: Subsequent site characterization (sea ice core samples) confirmed that cleanup efforts were highly successful, with nearly 100% of the product removed. The WINFLY 2005 Sea Ice Spill Site is considered closed and no further action is required.

Cost Savings

Accomplishment: The Environmental Department researched and procured a new water treatment system for the Lower Erebus Hut. The new system costs less and has better water filtering capacities, resulting in savings of $23.45 and $60.45, respectively, for each of the two required filter cartridges.

Benefit: This procurement enhanced fluoride removal at Mt. Erebus and saved Science Construction $1678 over KY05's materials budget.

B. Program Integration

Coordination Between WBS

Accomplishment: The Environmental Department assisted a November 2005 Technical Event (Integrity Environmental, LLC) in addressing Waste Water Treatment Plant controls.

Benefit: This collaborative effort resulted in much-needed improvements to waste water treatment. Many of the T-event's recommendations were implemented immediately, with the result that effluent quality was significantly improved, most notably with a 73.5% reduction in the amount of solids discharged to the marine environment. Operators now spend considerably less time cleaning out weirs. In addition, nutrient loading was decreased by 47.2% for ammonia and 13.6% for total phosphorous. Results of this successful effort will be presented to the NSF as an information paper for inclusion in the 2006 Antarctic Treaty Consultative Meeting.

Accomplishment: To overcome problems with fuel containment on uneven ice surfaces and glaciers, the Environmental Department worked with Science Construction to place simple wood structures beneath the commercially available flexible berms.

Benefit: The modified berms were taken to Taylor Glacier above Blood Falls and used to contain fuel. No spills occurred.

Accomplishment: The Environmental Department partnered with the Marble Point camp supervisor to design a containment system for liquid storage on the cargo line. The effort made best use of extra liner material at McMurdo that would otherwise have been retrograded.

Benefit: When complete (estimated by January 2007), this project will result in a great improvement in secondary containment at Marble Point, with minimal cost to the Program.

Integration of Environmental, Health, and Safety Objectives Across Corporate Activities

Nearly all activities of the Environmental Department are directed toward integration of environmental objectives across corporate activities.

C. Innovation/Process Improvement

Innovative/Technological Solutions

Accomplishment: The Environmental Department joined a team effort to clean and recycle a total of 70 fuel drums at Marble Point, allowing

them to be used as urine and grey water barrels at Dry Valley field camps.

Benefit: By cleaning the drums at Marble Point, we eliminated round-trip transport for 70 drums between Marble Point and McMurdo. Although we have not completed a specific cost benefit analysis, it is expected that substantial logistical resources were saved, with no increase in labor.

Responsiveness to Challenge and Change

Accomplishment: Because of EH&S re-structuring, staff vacancies, employee turnover, and personal leave, we experienced a shortfall in personnel during KY06's planning cycle. The Environmental Department's desire to support improved program planning throughout the USAP made this lack of resources especially challenging. However, we pooled subcontractor support and took advantage of the experience and knowledge of former employees and contract workers to piece together the resources needed to overcome the shortfall. We established a schedule with the NSF for environmental clearance, maintained open communication, and met all schedule commitments for providing draft EIA documents.

Benefit: We were able to handle multiple issues critical to Operations and Science in a timely manner, preventing impacts to project schedules. For example, timely signature of the IEE for the WAIS Divide project (I-477-M, Taylor) prevented project delays. A draft IEE for last-minute approval of a project at Lake Vida (B-211-M, Doran) was prepared in just three weeks, despite considerable complexity in the environmental analysis. We also met the pre-deployment need for detailed environmental planning for many science events bound for the McMurdo Dry Valleys, including B-425-M (Fountain), B-300-M (Chin), B-268-M (Gooseff), B-015-M (Bowser), and G-060-M (Dowling).

Identified Issues:

Issue: There is a need for standard processes for providing secondary containment materials and spill kits for Antarctic field events, consistent with Program policy as established by the USAP Master Permit, the Dry Valley ASMA, and specific EIA documents. Secondary containment materials for preventing fuel spills are not always provided where they are needed, despite the best efforts of many people.

Response: We have launched a Six Sigma project to ensure multiple departments within RPSC work together as needed to address this situation, under the guidance and direction of the NSF. Additional resources will be requested for this effort.

Issue: Pre-deployment environmental awareness training is not provided to non-RPSC participants. Substantial time and effort is expended to provide training at McMurdo, and to follow up on individuals who miss scheduled training.

Response: This problem could be effectively resolved by changing the venue to Christchurch. Because of other pressures and priorities at Christchurch, the need to move environmental awareness training was not addressed in KY06 but will be addressed before KY07 deployment.

Issue: Drinking water samples collected from Bldg. 207 have historically tested high in lead concentrations during the changeover from Winter to Summer populations, due to excessive water residence times from room inoccupation.

Response: In coordination with the Plumbing Shop, we instituted unidirectional flushing of the interior distribution system in all unoccupied rooms in Bldg. 207 before the arrival of Mainbody personnel. The result was no lead violations during WINFLY sample collection from Bldg. 207, for the first time ever. We will continue to use line flushing in areas of low usage and long water residence time during KY07. This will provide customers with better water quality and address corrosion concerns by assuring that chemically stable water flows through the system periodically.

SECTION 3. PLANS FOR KY07

In KY07, the Environmental Department will use strategic planning and change-management to re-set the baseline for the Environmental

Department's O&M budget, while ensuring alignment with the priorities of the NSF. Although the total dollar amount requested in the FY07 APP is expected to remain static for the Environmental Department, we anticipate that changes to the staffing plan, deployment schedule, and other direct costs will increase the overall effectiveness of the department.

The Environmental Department plans to make every effort to further develop our ability to support the USAP's efforts in regard to planning and environmental risk management. We will give particular focus to emergency planning and spill prevention. We will make efforts to improve integration and coordination with other divisions and departments within RPSC, and we will ensure that attention is preferentially applied to areas of high environmental risk.

Specific goals for next year including the following:

- Implement the Dry Valley Drilling Project stabilization project, minimizing the risk to Explorer's Cove, Lake Vida and Lake Hoare
- Provide support to ASMA plans in the Dry Valleys and at the South Pole (expected final KY07), including improved data collection
- Streamline environmental field support
- Expand the audit and inspection program to include McMurdo and the airfields
- Implement Dry Valley ASMA Training, using Modules 2 and 3
- Conduct an environmental site visit and drinking water audit at Palmer Station

HEALTH AND SAFETY

SECTION I. SUMMARY

Staffing

KY06 proved to be a challenging year for staffing in the Health and Safety Department, but a combination of strategic hires and carefully directed deployments permitted us to complete our tasking with minimal negative impact.

We deployed a talented contract EH&S Coordinator and two fulltime EH&S staff to McMurdo during WINFLY 2005, giving us a full complement of staff at McMurdo for most of KY06. This allowed us to increase the training schedule and implement several key programs and policies. For example, the EH&S Director and the Health and Safety Manager had the time to conduct focused audits.

For personal reasons, the contract EH&S Coordinator left the company in late January 2006 and his duties were temporarily assumed by a contract Safety Specialist and two fulltime Denver EH&S staff. Unfortunately, the replacement coordinator was injured in a motor vehicle accident on her way to the airport. Since there was no time to find and hire another qualified candidate, we deployed the fulltime Senior EH&S Lead to McMurdo for the winter. We do not anticipate a large impact to KY07 operations at Denver Headquarters as a result of this action, but there may be some brief impact to EH&S activities at Palmer Station.

Fortunately, we were able to fill the critical contract Safety Engineer position at the South Pole with a Certified Industrial Hygienist. Station personnel have been extremely pleased with his work, and he has been instrumental in overseeing key construction projects at the station. This highly-qualified individual has also been able to provide much needed safety training and guidance on newly-implemented programs. His early deployment (October 2005 versus February 2006) helped maintain consistency in the USAP safety program for both the summer and winter seasons.

For the fourth year, our station services management subcontractor (NANA) deployed a Safety Manager to McMurdo for several weeks during KY06. This person provided valuable safety and sanitation expertise to the dining and housing service areas (training, inspection, ergonomic evaluations, etc.). His experiences at remote Arctic locations proved to be of significant value to both EH&S and the USAP.

Activities and Events

One of our primary missions during KY06 was developing and fostering a safety culture among USAP participants. Although there were many changes to the safety program (some of which inspired resistance among station personnel), EH&S staff placed special emphasis on easing the transition to new programs and policies.

We realized, for example, that Antarctica's unique work environment would make implementing some new policies difficult. For that reason, we introduced a program whereby work center supervisors could request a temporary waiver from strict adherence to policy. Before granting a waiver, however, safety personnel carefully assessed each situation, looking for solutions that might have been missed. The waiver program accomplished several things:

- It ensured that policies and procedures were followed to the maximum extent possible, and that the most protection possible was provided
- It identified areas of deficiency
- It produced a safe and effective interim solution
- It encouraged worker participation and buy-in for the safety program
- It promoted a positive safety culture through empowerment

Two of the safety policies introduced during KY06 were particularly notable. The first of these was actually an existing policy that had not been adequately enforced: RPSC's Fall Protection Program, which mandates a 100% fall protection at heights greater than 4 feet. In the

process of implementing this policy throughout the Program, we discovered that the inventory of approved fall protection equipment on station was limited. We immediately placed an emergency order for fall protection equipment for the remainder of KY06 and submitted a baseline order for KY07.

The second policy, regarding material handling and lifting, was derived from NIOSH lifting guidelines. Although NIOSH sets a limit of lifting 50 pounds without assistance in ideal conditions, Antarctica's less-than-ideal conditions prompted us to lower the limit to 40 pounds in an effort to reduce the excessive number of lifting injuries RPSC was experiencing. Despite the difficulties we encountered in implementing this policy, preliminary data shows that we were successful.

There were several other notable events during KY06. In December 2005, Raytheon Corporate conducted a third KY06 audit of all McMurdo and South Pole facilities. The audit team consisted of two health and safety experts and one ergonomics expert. The purpose of this particular audit was twofold: 1) to review the implementation of RPSC Health and Safety programs and policies, and 2) to gauge the effectiveness of site management policies. The audit team found 85 discrepancies, and we have developed a corrective action plan to address them.

The Health and Safety Department conducted a Personal Protective Equipment (PPE) assessment at McMurdo toward the end of the austral summer. Our purpose was, first, to thoroughly review PPE use and requirements, and second, to identify equipment needed for KY07. We will use the results of the assessment to monitor future PPE use and maintenance, as well as to allocate appropriate budgetary resources to PPE.

Based on manager requests, employee concerns, and the need to establish baselines for contaminants, we conducted sampling at several sites during KY06. For example, during a routine inspection of the Hazardous Waste area, we detected a strong odor of xylene emanating from one of the tents. However, air sampling showed that xylene levels were within acceptable exposure limits. In another case, an RPSC employee voiced a concern about potential carbon monoxide (CO) contamination in the air of Delta passenger cabins. We monitored the air in these cabins and found no detectable levels of carbon monoxide. (We would note that this kind of response to a concern helps build a trusting relationship between EH&S and the community as a whole.)

As part of our effort to maintain a record of baseline contaminant levels in work centers, we monitored CO and combustible gas levels in the VMF Heavy Shop. The readings were within acceptable limits, but we will monitor the area periodically to ensure compliance. We also sampled the Berg Field Center (BFC) for contaminants generated during rope cutting, sled waxing, and the use of glues and hardeners. We found that all levels were within acceptable ranges. However, we noted that special precautions should be taken while using glues and hardeners in confined areas.

We have scheduled additional baseline monitoring for the 2006 austral winter (KY07).

Section 2. Qualitative Performance

A. Project Management

General Management

Accomplishment: EH&S personnel conducted a thorough review of past injures to determine if there was an underlying factor (or factors) responsible for the rising injury rate. One potential factor that stood out was a lack of clearly-defined training for certain job tasks. Acting on this information, we decided to place greater emphasis on training employees in an effort to drive down the injury rate. We introduced an aggressive training program requiring that all employees, including Supervisors, be trained before reporting to their assigned duties. Developing and implementing this "New Hire Orientation" training required significant planning and coordination.

Supervisors received safety training in Denver as part of their orientation. This mandatory training included an eight-hour overview of general safety awareness and a four-hour session on accident investigation procedures, root cause analysis, job hazard analysis, and the use of the new Safety Health Incident Event Logging Data (SHIELD) reporting program.

Initially, non-supervisory employees were required to attend the eight-hour General Safety Awareness session in Denver. However, realizing that we could not capture everyone this way, we relocated training for McMurdo- and South Pole-deploying employees to Christchurch, although time constraints there forced us to abbreviate the training session to five hours. We scheduled and conducted additional General Safety Awareness and site-specific training once certain deploying personnel reached the Ice.

Benefit: Providing this training to employees before they began work gave them a greater knowledge base concerning safety issues and helped drive down the number of serious injuries (28 fewer accidents during August-December of KY06 than in the same time frame of KY05). It also reinforced RPSC's commitment to a safe work environment.

Accomplishment: In the health and safety field, new federal regulations and updates to existing regulations are issued constantly. However, some elements of the RPSC Health and Safety Program had not seen substantive revisions since 2001 and as such did not meet current federal (or Raytheon) requirements. Accordingly, we added missing program elements and revised existing elements of the RPSC Health and Safety Program, including:

- Job Hazard Assessment
- Hazard Communications
- Electrical Safety
- Lockout/Tagout/Try
- Fall Protection
- Confined Space
- Welding, Cutting, and Brazing
- Blood-borne Pathogens
- Hot Work Permits
- Ergonomics
- Compressed Gas Cylinder Storage and Handling

Benefit: Revision or addition of these program elements has increased overall job safety awareness in the EH&S program and has contributed to an overall reduction in injuries (Figure 3-5).

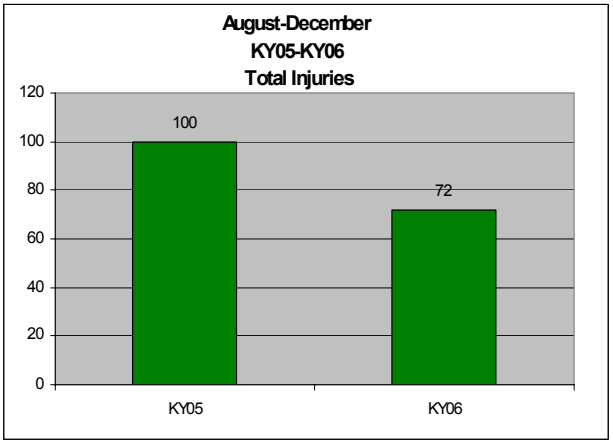


Figure 3-5 Injury Rate Comparison, August-December KY05 and KY06

Cost Savings

Accomplishment: RPSC saw 28 fewer injuries during August-December of KY06 than in the same time period of KY05.

Benefit: Based on injury trends, we estimate that 11 of those 28 injuries would be considered recordable incidents. Since the average Worker's Compensation cost per injury is [redacted] the reduced injury rate translates to an estimated savings of [redacted] The net gain in productivity realized from a lower injury rate may also substantially contribute to increased cost savings.

B. Program Integration

Coordination Between WBS

As our mission is to ensure the health and safety of all RPSC employees, almost everything we do involves coordination with other WBS work centers.

Accomplishment: During KY06, we had an Ergonomics consultant and the Corporate Ergonomics expert review work processes and equipment in the galley. (Station Services accounted for approximately 20% of the recordable injuries in KY05.)

Benefit: Based on the review, galley management modified some of its work processes and implemented a rotation schedule. This schedule was designed to give employees a break every three hours from heavy, muscle-intensive activity, as well as reduce repetitive motion injury. In a further effort to reduce the injury rate, employees were encouraged to participate in stretching exercises.

Reviews of this nature provide managers with valuable information, helping them take proactive approaches to issues. In this case, galley managers adjusted tasking and work processes to mitigate injury. Work center reviews can also serve to foster a culture of open communication between workers and supervisors. For example, galley employees were told to inform their supervisors at the first sign of pain.

Integration of Environmental, Health, and Safety Objectives Across Corporate Activities

Accomplishment: We have modified RPSC Health and Safety programs to adhere to the Raytheon corporate strategy of holding line management accountable for unsafe behaviors. Primary responsibility for employee safety now resides within the work center.

Benefit: This strategy promotes the integration of Health and Safety issues throughout the organization and helps foster the attitude that safety is the responsibility of all employees. This supports the goal of a safe and healthful workplace.

Accomplishment: EH&S personnel worked closely with all RPSC departments to provide training to new hires before their deployment. We coordinated with the Deployment Specialists Group, Human Resources, and Operations personnel to determine class schedules, sizes and location.

Benefit: The result was a seamless process that provided new employees with vital safety information before the start of their respective assignments, thereby helping to reduce the injury rate.

C. Innovation/Process Improvement

Innovative/Technological Solutions

Accomplishment: During KY06, we implemented the SHIELD program. This database, developed by RPSC's IT Division, allows for the reporting and tracking of incidents, such as injuries, spills, property damage, fires, near misses, and unsafe conditions. The program interface leads the person entering data (the "reporter") through a series of screens that assists the reporter in not only providing information on the incident, but also in developing root cause analyses and corrective actions.

Benefit: As a result of implementing the SHIELD program, RPSC saw a marked increase in the number of unsafe conditions and near miss events reported. This indicates a culture shift toward increased safety awareness (Figure 3-6).

Using the SHIELD program also helped managers understand the process of accident investigation and root cause analysis. It promoted a review of policies and procedures and led to identification of deficiencies in these same policies and procedures. It promoted and encouraged collaboration between supervisors and employees in the development and review of Job Hazard Analyses. The corrective action portion of the database encouraged managers to assume responsibly and ownership of their work areas.

In addition, studies suggest that for every major injury that occurs, there are 29 minor injuries and 330 near misses or unsafe acts. The SHIELD program, by placing equal emphasis on reporting unsafe behaviors, provides a much better index of ongoing safety performance than accident rates alone. Typically, an injury is the end result of a causal sequence triggered by an unsafe behavior. In providing an effective tool for proactively reporting unsafe acts or behavior,

accident causal chains can be identified and addressed before a serious incident occurs.

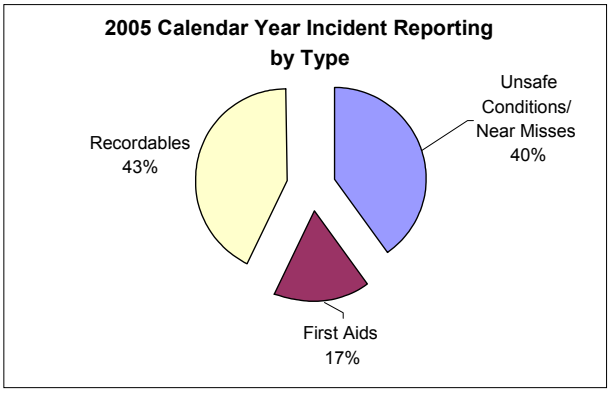


Figure 3-6 Reported Incidents by Type, CY05

Visionary Management

Accomplishment: RPSC is committed to making health and safety a core value of the USAP, and we have taken the first steps toward developing a world-class program in that regard. We have established a solid foundation by ensuring that our programs and policies comply with current regulatory guidelines and standards, and we have instituted educational and training programs that foster positive cultural changes regarding safety behavior.

Benefit: A world-class health and safety program will reduce injuries, save money, increase employee morale, and attract quality applicants.

Responsiveness to Challenge and Change

Accomplishment: To accommodate the Antarctic working environment and minimize the impact on science, we initiated a waiver program for the newly implemented fall-protection and 40 pound policies. The program was not intended to relieve work centers from the requirement to follow industry standards. Rather, it was a process that allowed workers to employ temporary, less restrictive methods while ensuring that the basic intent of the standards was followed. A waiver offered the most protection possible until appropriate procedures could be implemented or appropriate equipment purchased.

Benefit: The waiver program ensured that safety policies and procedures were followed to the greatest extent practicable. Hazards to workers were minimized while at the same time avoiding impacts to science. The program also encouraged greater participation in the safety program. Table 3-4 lists waivers granted for KY06.

Identified Issues

Issue: During an audit, we discovered elevated CO_2 levels in the pump house. The readings ranged from a high of 1175 PPM to a low of 376 PPM. The mean was 569 PPM.

Response: We placed an emergency work order to install an exhaust pipe in the roof of the pump house. The pipe produced an improvement in air quality, but CO_2 levels were still too high for human occupancy. We suspected that a leak in the engine housing was causing the problem, and we suggested increasing the exhaust pipe diameter to get a larger flow volume.

Issue: Over the last several years, we have seen an increase in ergonomics-related injuries among galley staff. The problem is due to outdated equipment and the nature of the tasking.

Response: An Ergonomic Consultant and in-house Ergonomics expert conducted a thorough review of galley processes and equipment. We recommended installation of ergonomically friendly equipment, such as foot-activated water sprayers and dishwashers, and the implementation of safer work practices, such as stretch breaks and job rotation.

Issue: Moving heavy and cumbersome items in the field (such as propane cylinders, 55 gallon drums, and ice core boxes) presented a considerable problem, particularly in regard to implementing the 40 pound rule.

Response: Science Support modified their procedures to comply with the new policy. Field teams began using commercially available drum dollies and wheel barrels with modified wheels (to traverse uneven or rocky terrain) for the transport of heavy and bulky items. At McMurdo, ice core boxes were transported into the storage freezer via conveyer.

Table 3-4 KY06 Waiver Requests

Seq. No.	Division/Dept	Title	Status	Actionee	Status Date	Comments	Valid Through
1	Science	Unloading AF pallets in the Field	Approved	N/A	10/18/2005		KY06
2	Science	Handling 100lb Propane tanks at field camps	Approved	N/A	10/18/2005		KY06
3	Science	Dive Operations	Approved	N/A	10/18/2005		KY06
4	Science	Movement of 55 gal drums in the field	Approved	N/A	10/18/2005		KY06
5	Science	Mountaineer and Search and Rescue Services	Approved	N/A	10/22/2005		Permanent
6	Science	Helo Cargo movement in the field	Approved	N/A	10/22/2005		KY06
7	Science	Helo Cargo movement at McMurdo	Approved	N/A	11/24/2005		KY06
8	Science	Ice Core Movement	Approved	N/A	11/16/2005		31-Dec-05
9	Science	Arrival Heights roof access	Approved	N/A	11/17/2005		31-Jan-06
10	Logistics	ATO AF pallet (in town)	Approved	N/A	12/21/2005		KY06
11	Logistics	Operation of McMurdo APO	Approved	N/A	11/16/2005		KY06
12	Medical	Stretcher lifting	Approved	N/A	11/16/2005		Permanent
13	Operation	Fuel tanks	Approved	N/A	11/16/2005		KY06
14	Logistics	Food warehouses	Approved	N/A	12/15/2005		KY06
15	Logistics	Compressed Gas Handling	In Work	Embree	12/17/2005	Awaiting resubmittal	
16	Station Services	Prepared Food Handling	Approved	N/A	12/17/2005		KY06
17	FEMC	MRSF Roof Access	Approved	N/A	12/15/2005		KY06
18	FEMC	Utility Pole Climbing	Approved	N/A	12/15/2005		
19	FEMC	Bldg. 120 Roof Access	Approved	N/A	12/15/2005		KY06
20	Logistics	Supply Warehouses	In Work	Embree	12/17/2005	Awaiting resubmittal	
21	Logistics	CSEC Warehouses	In Work	Embree	12/17/2005	Awaiting resubmittal	

Issue: We discovered a critical shortfall in supplies of Personal Protective Equipment (PPE) and Industrial Health Equipment (IHE) at South Pole, and the equipment we located on station was in disarray. This was a critical safety issue.

Response: We conducted an extensive inventory of the resources available and placed a priority order for sufficient additional PPE and IHE.

Lessons Learned

We learned that implementing major new policies and programs without first establishing adequate communication between EH&S and other RPSC divisions, and between EH&S and the NSF, can lead to confusion. It can also lead to resistance, and therefore to increased problems with implementation. This is especially true of programs and policies that significantly impact how people do their work. Many departments were unable to comply with new requirements this season because of equipment, process, and staffing constraints.

We conducted an end-of-season survey with all supervisors for feedback on both the negative and positive aspects of safety program implementation during KY06. In addition, we held several meetings with the NSF and with RPSC Division Managers. The information we gleaned from these efforts will help us to chart a smoother course when introducing future changes. Early planning and early communication are the keys to success.

Section 3. Plans for KY07

We are currently implementing a program to address the asbestos issue in certain buildings, and we have arranged for employee training in asbestos awareness. For example, housekeeping staff will attend a specific training program for employees who may come in contact with residual asbestos during the course of their daily activities. RPSC will also be providing asbestos worker-level training.

We will conduct baseline industrial hygiene assessments for all stations. These surveys will look for potential chemical contaminants, and they will establish a baseline for noise pollution levels.

We will provide on-Ice orientation to all non-RPSC personnel. This will include a general orientation to the station and basic safety awareness training, tailored to the specific needs of the participant. We will also provide training relevant to specific operations, such as hazard communication, electrical safety, and fall protection.

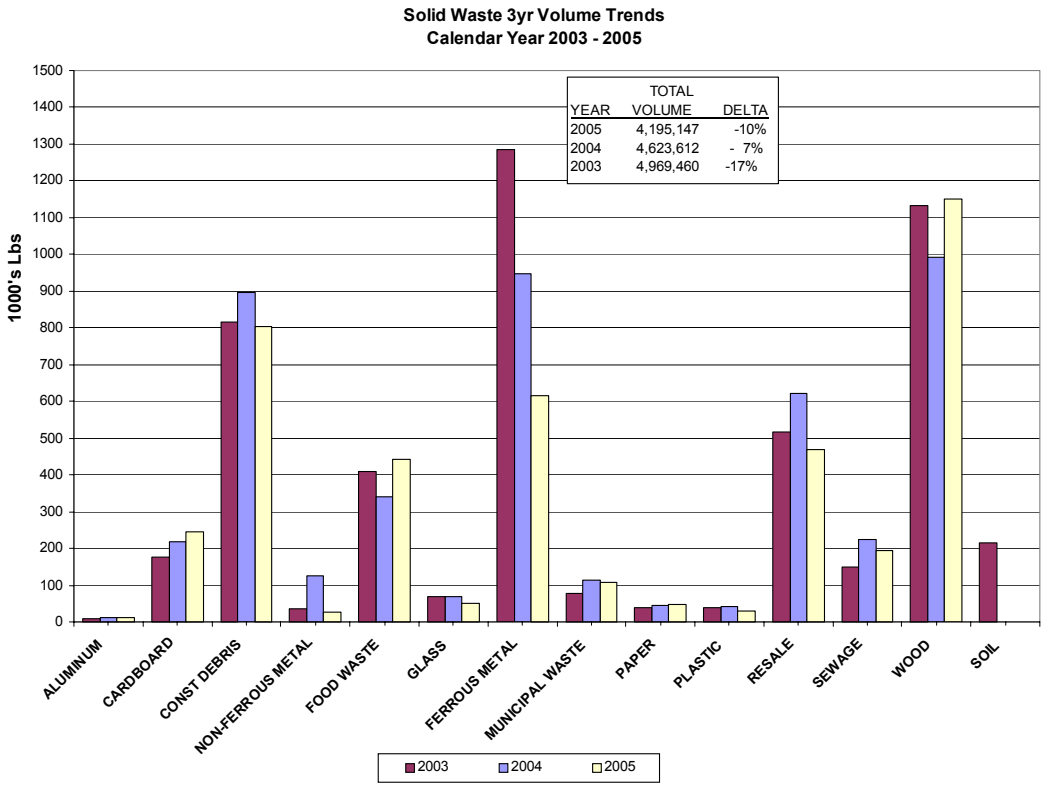


Figure 3-7 Solid Waste Volume Trends, 2003-2005

WASTE MANAGEMENT

Section 1. Summary

The Waste Management Department saw key successes in all aspects of its KY06 operations. As in KY05, we provided a significant level of direct labor support to process and package waste for several projects. These projects, which included the Inventory Reduction Project (Retro Project) and South Pole Station Modernization (SPSM), generated large volumes of both solid and hazardous waste. Support for SPSM alone required over 550 labor hours from McMurdo-based Waste Management personnel.

Fortunately, we were able to defray or eliminate much of the disposal costs resulting from these projects. For the second consecutive year, we de-gassed and rendered non-hazardous the compressed gas cylinders we received from the Retro Project Team, saving approximately $250K in disposal costs. We also realized significant savings by renegotiating the unit cost and disposition of the propane cylinders we received from the Retro Project Team. These combined savings were critical, as the Retro Project was not funded for waste disposal.

We developed a variety of process improvements and cost saving measures as part of the continuous improvement initiative we instituted in KY05. Many of these improvements were driven by container and pallet failures, the result of inferior and off-specification materials mistakenly procured for our use. However, the situation forced us to develop innovative and more efficient ways to package paper, glass, and non-recyclable waste.

We safely neutralized approximately 20 pounds of unstable chemicals at Palmer and South Pole Stations, and we successfully decontaminated approximately 300 cubic yards of fuel-contaminated soil using the IR treatment unit. We also completed closure of the Palmer Station landfill. Removing the resulting landfill waste required a special shipment, but we found a way to include all accumulated Palmer Station hazardous waste in that shipment. This will allow us to defer the scheduled 2006 hazardous waste shipment until 2007.

Solid Waste

For the third consecutive year, USAP solid waste volume declined (Figure 3-7). We processed 4.20 million pounds in KY06 versus 4.65 million pounds in KY05, a 10% decrease. The decline is attributable to an approximately 40% reduction in ferrous and non-ferrous metals (433,000 pounds), a 25% reduction (151,000 pounds) in resale materials, and a 10% reduction (92,000 pounds) in construction debris. We also saw declines in glass (26%, 18,000 pounds) and plastic (25%, 10,000 pounds). These reductions were offset by significant increases in wood (16%, 158,000 pounds) and food waste (29%, 100,000 pounds), with lesser increases in cardboard (13%, 27,000 pounds) and paper (6%, 3,000 pounds). We attribute the bulk of volume reductions in KY06 to extensive heavy metal waste cleanout in KY05 and to the current low level of construction and demolition activity.

The annual recycling/reuse percentage for all solid wastes declined slightly from 65% in KY05 to 62% in KY06 (Figure 3-8). However, this is consistent with the average program rate from 1992 to present. Recycling and resale rates decreased (24% and 11% respectively) while reuse and incineration rates increased (27% and 13%). The disposal rate remained constant at 25%.

Hazardous Waste

KY06 hazardous waste (742,000 pounds) decreased by approximately 6% from KY05 (747,000 pounds) (Figure 3-9). Significant reductions in state-regulated (44% decrease, 172,000 pounds total), radioactive (51%, 5,000 pounds) and lab-pack (43%, 4,000 pounds) wastes offset similarly significant increases in petroleum-related wastes (56%, 123,000 pounds) and ACA wastes (63%, 12,000 pounds). Petroleum waste reused on-station increased by 11% (17,000 pounds), while petroleum waste shipped for disposal increased by 160% (106,000 pounds). We attribute the bulk of this

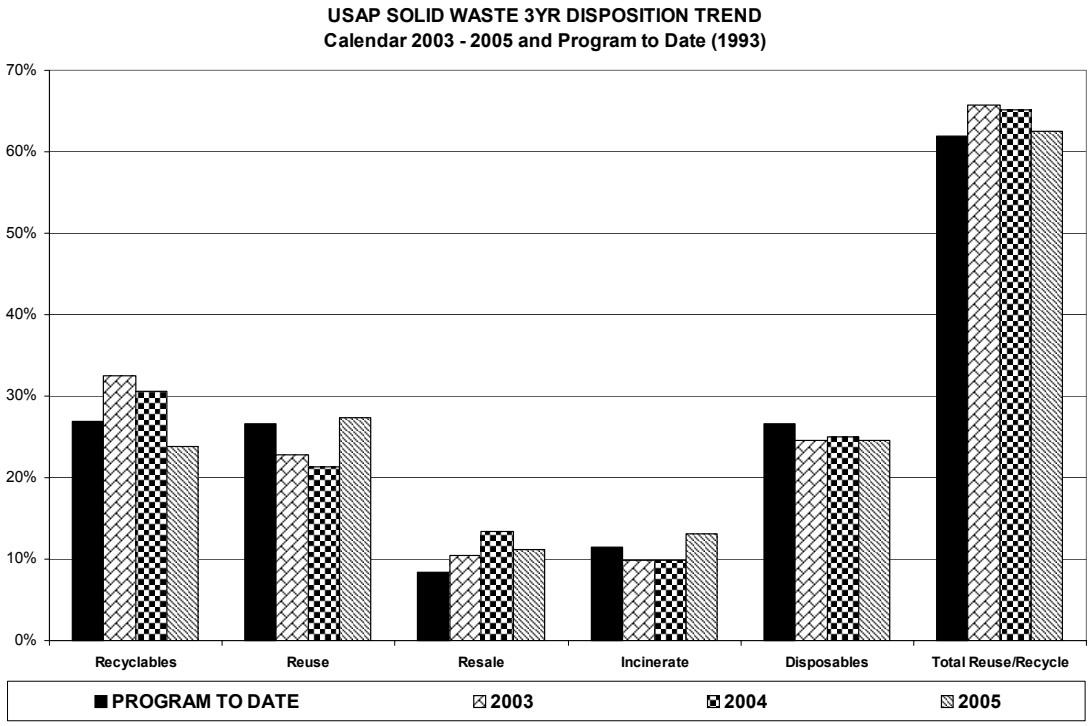


Figure 3-8 Solid Waste Disposition Rates, 2003-2005

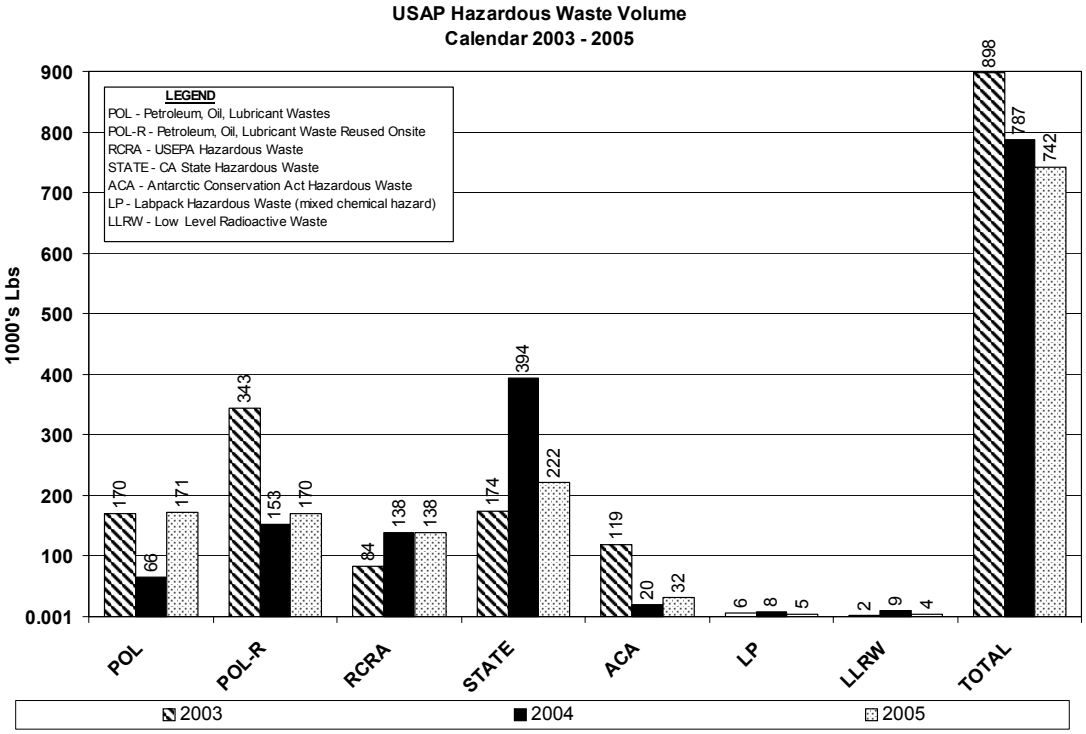


Figure 3-9 USAP Hazardous Waste Volume, 2003-2005

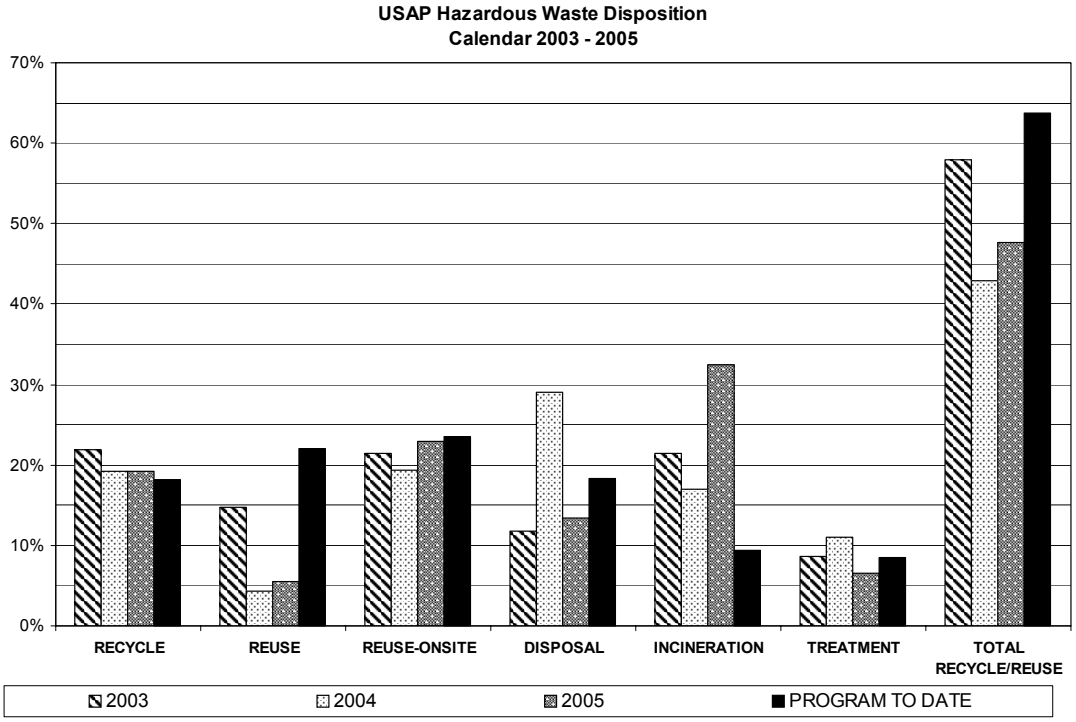


Figure 3-10 USAP Hazardous Waste Disposition, 2003-2005

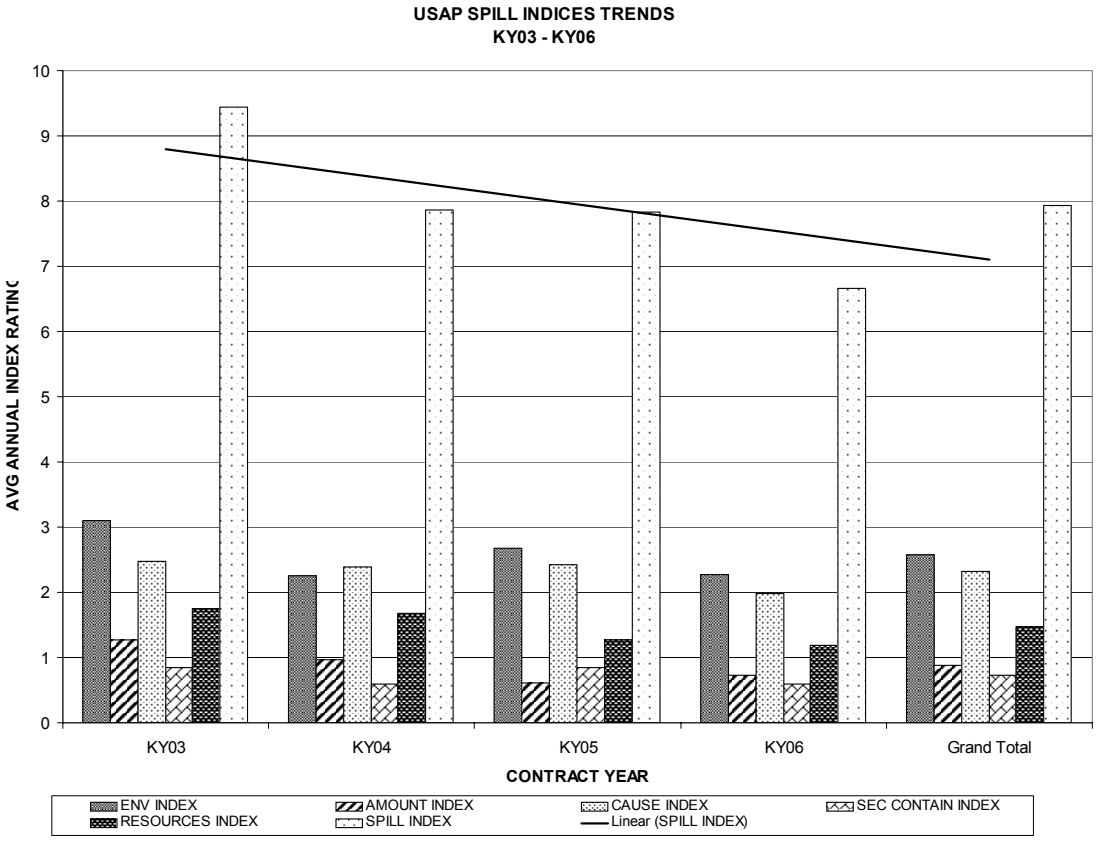


Figure 3-11 USAP Spill Severity Indices, KY03-KY06

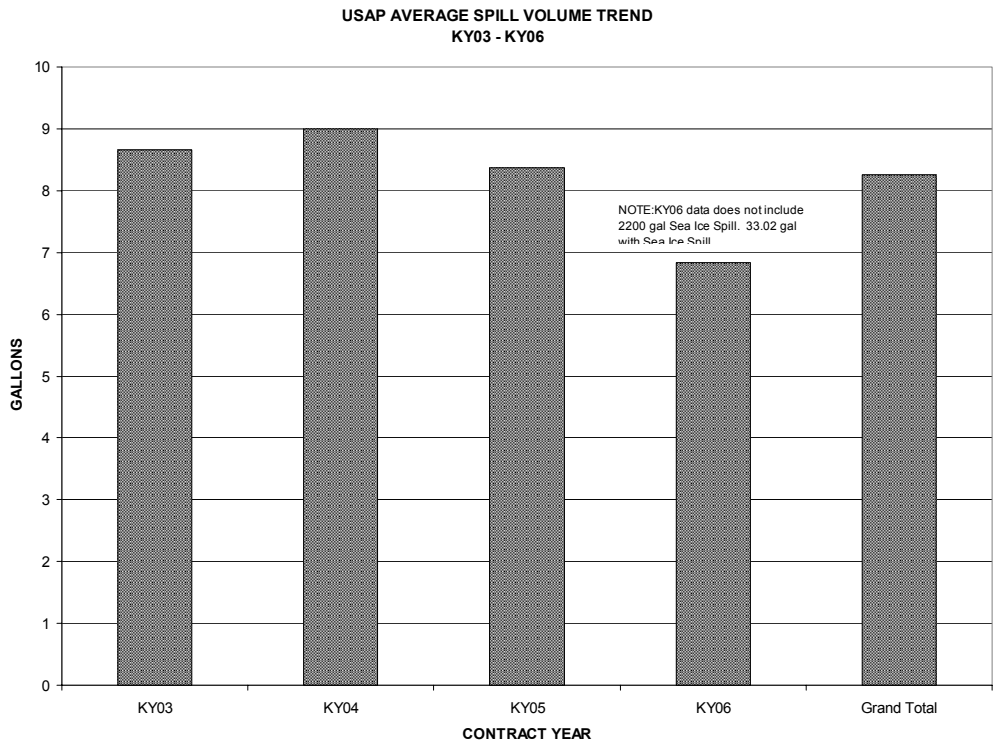


Figure 3-12 Average USAP Spill Amount, KY03-KY06

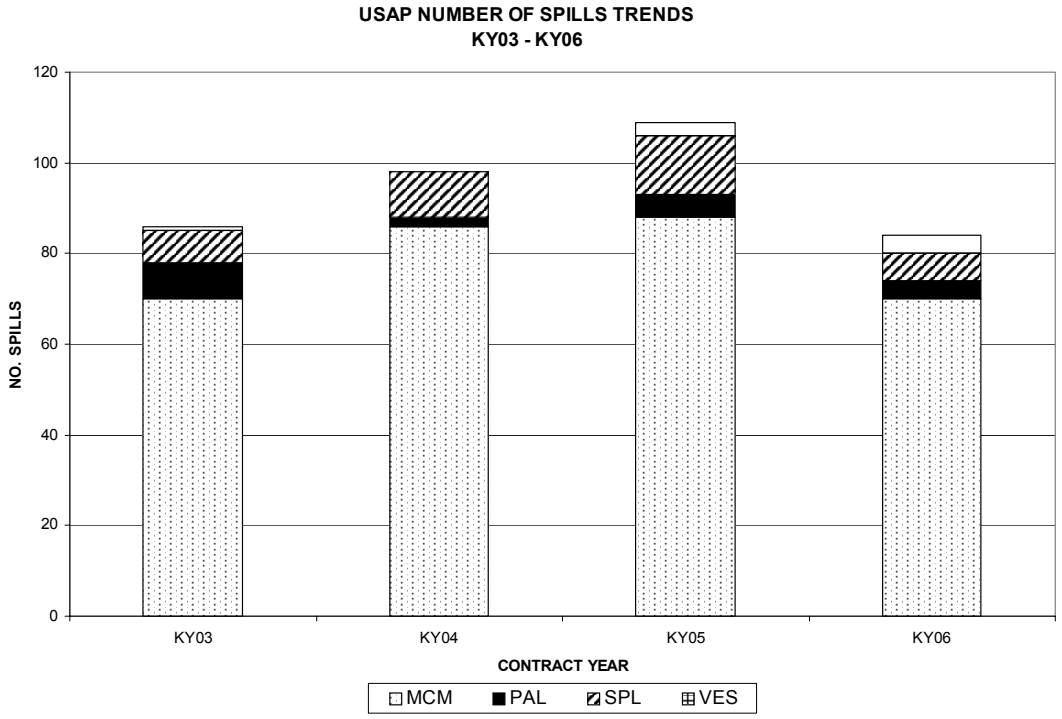


Figure 3-13 Number of USAP Spills, KY03-KY06

increase to the WINFLY sea ice spill, which represents more than half of the total increase in petroleum-related waste.

The annual recycling/reuse percentage for all hazardous waste increased from 43% to 48% in KY06 (Figure 3-10). While recycling remained constant at 19%, reuse, reuse on-site, and incineration all increased. As a consequence, treatment and disposal rates decreased. In fact, disposal decreased by more than half from the KY05 rate of 29%. This is a positive trend, as it diverts waste from the landfill stream.

Resale

Resale volume decreased by 24% (151,000 pounds), to 470,000 pounds in KY06. This decline is primarily attributable to the continued success of the Retro Project in reducing excess and obsolete materials. At the time of this report, the U.S. auction had not occurred. Consequently, proceeds and cost savings information was not available and will be provided to the NSF separately.

Spill Response

The overall spill rating index declined by approximately 13% this year, from 7.83 in KY05 to 6.78 in KY06 (Figure 3-11). If the WINFLY sea ice spill is factored out, the decline increases to 15%. This is a significant decrease, clearly indicating improving trends in RPSC's efforts to reduce overall spill impact. Additionally, the current annual index is 15% below the long term index of 7.96. "Secondary containment," "cause" and "resource" indices also declined by 30%, 19% and 6%, respectively. Decreases in these indices indicate success with spill prevention, through improvements in the use and availability of secondary containment; prevention of operator error caused spills; and a reduction in the resources required to clean up spills.

The only index that increased was the "spill amount" rating, which increased by 38% with the sea ice spill or 19% without it. The spill amount index does not have a linear relationship to actual spill amounts, the average volume of which actually declined by 18% to 6.83 gallons (Figure 3-12). Although this data may appear contradictory, integrating the total number of spills, which dropped by 23% in KY06 (Figure 3-13), with the improved "cause" index indicates that there is a trend toward fewer smaller spills caused by operator error – clearly a positive trend and an improvement in spill prevention efforts (Figure 3-14).

Section 2. Qualitative Performance

A. Project Management

General Management

Accomplishment: We developed a Waste Information Plan designed to facilitate the estimate of waste disposal costs associated with special projects.

Benefit: The Waste Information Plan supports the project-based management initiative by providing a means to estimate waste volume and its associated transportation and disposal, as well as other costs.

Cost Savings

Accomplishment: For the second consecutive year, we were able to render compressed gas cylinders non-hazardous for both transportation and disposal. Additionally, we renegotiated unit disposal costs and the intended disposition of waste propane/butane tanks, which resulted in a significant number of the tanks being recycled.

Benefit: These procedures saved an estimated $250K in disposal costs.

Accomplishment: For the second consecutive year, we obtained approval to conduct the resale auction at RPSC facilities at Port Hueneme.

Benefit: Conducting the auction on base saves an estimated $40K in material transport, facility lease, permit, and security costs.

B. Program Integration

Coordination Between WBS

Accomplishment: Working with engineers from the Environmental Engineering Department, we

successfully de-contaminated 300 cubic yards of fuel-contaminated soil with the Infrared Treatment Unit.

Benefit: De-contaminating soil on-site will reduce or eliminate the requirement to ship the soil off-continent for treatment, saving considerable disposal and transportation costs while at the same time providing clean fines for construction and/or roads.

C. Innovation/Process Improvement

Innovative/Technological Solutions

Accomplishment: We developed new procedures for baling plastic.

Benefit: Banding loose plastic is generally very difficult. Our new procedure simplifies the process and significantly reduces the time and effort required.

Accomplishment: We developed a special pallet for transporting food waste containers.

Benefit: In the past, we were restricted to transporting only a single container of food waste at a time. The specialized pallet we developed allows us to transport four containers simultaneously, improving efficiency by 300%.

Accomplishment: We developed a way of efficiently using closed milvans for storing construction debris.

Benefit: Using milvans in this way gave us additional flatrack capacity for special projects and significantly reduced the labor required to load materials.

Section 3. Plans for KY07

We plan to continue the McMurdo-based Retro Project and expand its activities to South Pole and Palmer Stations.

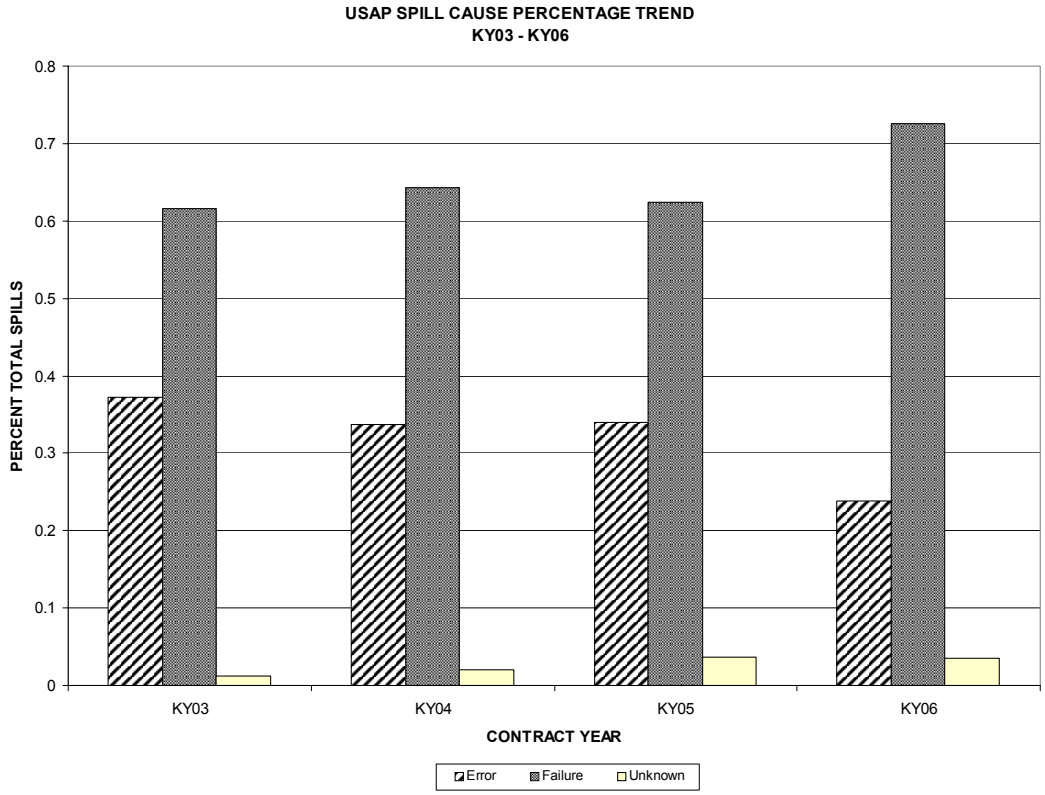


Figure 3-14 USAP Spill Cause, KY03-KY06

FINANCE

Section 1. Summary

Finance's primary responsibilities are Budget, Property Administration, Timekeeping, and General Accounting. In KY06, we provided service in all these areas and added more application in Budget and Audit Support. Specifically, we worked on the new budget software project and supported several audits in KY06, including internal RPSC audits, an NSF Property audit, and five audits by the Defense Contract Audit Agency (DCAA). We are updating procedures according to the DCAA incurred cost audit and expect to continue doing so well into KY07.

We delivered several key documents to the NSF this year, including the Annual Program Plan (APP) for FY06 (after extensive internal and external review), Financial Property Reports, and monthly financial information via Polar Operations Financial Management System (POFMS).

We maintain the ATMs at McMurdo Station and support RPSC employees in matters of pay, expense reporting, and cash distribution. We act as the bank for other agencies, including the Army Post Office (APO), and we worked with the NSF and military representatives this year to improve the support provided to the APO. For example, we can now transfer APO funds by wire. We also worked closely with the NSF to identify and resolve certain funding issues. Coordination between RPSC and the NSF on budget matters is essential in light of the budget constraints we continue to operate under.

In KY06, we met all of our performance metrics and earned 100% of our allocated points.

Section 2. Qualitative Performance

A. Project Management

General Management

Accomplishment: We completed and submitted the FY06 Annual Program Plan (APP) to the NSF in October 2005. The APP is an essential RPSC deliverable. While we are awaiting final written approval of the FY06 Final APP from the NSF Contracting Officer, we have received approval from the NSF Technical Representative.

Benefit: Funding for KY06 can now be released.

Accomplishment: We finalized performance metrics for April 2005 through March 2006.

Benefit: We met all of our performance metrics and earned 100% of our allocated points.

Customer Satisfaction

Accomplishment: We delivered monthly financial information to the NSF on schedule, via POFMS.

Benefit: This fulfills an ongoing NSF financial requirement.

Accomplishment: We completed the quarterly, interim, and final property reports by the required dates.

Benefit: Accurate and timely property reporting meets another ongoing NSF requirement.

Accomplishment: We supported the annual property audit conducted by KPMG and NSF Property and Finance personnel. The audit confirmed the accuracy of our reporting. We received a copy of the management letter from the NSF in February 2006.

Benefit: Independent confirmation lets the NSF know it can rely on the accuracy of our reporting.

Human Resources

Accomplishment: Business Objects consultants conducted Master System User training for the

new budget and finance software with RPSC and NSF representatives. Action items were assigned to a project team and the Business Objects consultants. We completed our task of reviewing and verifying each component to ensure that the modifications and fixes identified during the Master System User Training were completed.

Benefit: Master System Users will train and serve as in-house technical resources for end-users.

B. Program Integration

Coordination Between WBS

Accomplishment: We consulted with all divisions and with the NSF before selecting and activating the new budget software.

Benefit: Partnering with the divisions and NSF in this matter ensured that all the requirements of stakeholders and end-users had been captured and considered in the decision process. The result is software that better meets everyone's needs.

C. Innovation/Process Improvement

Innovative, Technological Solutions

Accomplishment: After considerable research, consultation with all stakeholders, and coordination with the vendor to make necessary modifications to the package, we installed and began using the Business Objects Budget and Finance Software.

Benefit: This integrated budget software tool allows RPSC and the NSF to develop multi-year budgets, integrate data from multiple contractors, and enhance reporting capability.

Accomplishment: We can now transfer funds by wire from the APO.

Benefit: This process eliminates the need to hand write and mail checks to New Zealand from either McMurdo Station or the U.S.

Visionary Management

Accomplishment: We are improving the documentation for quarterly expenditure reports.

Benefit: This ensures that appropriate documentation is available for audits.

Accomplishment: We are revising the procedure for moving construction-in-progress to real property.

Benefit: Once complete, the procedure will provide a more accurate reflection of real property to the NSF on financial statements.

Responsiveness to Challenge and Change

Accomplishment: During KY05, [redacted] informed us that the McMurdo ATMs would have to be upgraded during KY06. We coordinated closely with RPSC IT and [redacted] o have the upgraded ATMs shipped to McMurdo in February 2005 and installed in October 2005.

Benefit: The transition to upgraded ATMs was seamless and had minimal impact on community use.

Section 3. Plans for KY07

We plan to enhance the capability of the new Budget and Finance Software as POFMS is phased out. We plan to improve our documentation to support quarterly expenditure reports, and we will complete and deliver the FY07 Annual Program Plan. Finally, we will work with the new NSF Property Auditors to ensure a smooth transition.

HUMAN RESOURCES

Section 1. Summary

Human Resources (HR) provides support to all employees within RPSC, fulltime and contract, on the Ice and at Denver HQ. Recruiting, retaining, and developing employees are the team's key functional areas.

HR saw significant management changes in KY06. The HR Director left in April 2005 and was not replaced until August 2005. In the interim, the Recruiting and Diversity Manager assumed the acting Director role, with the entire HR staff contributing so that no services were interrupted.

The Recruiting team continues to recruit skilled candidates for RPSC's many and unique positions. The annual RPSC Job Fair in April always draws a large candidate base. In KY06, we achieved a 11% hire rate from the Fair, significantly higher than average. We completed 36 recruiting trips across the country, from Seattle to Baltimore, with a stop in Pascagoula, MS. Target audiences included military, minorities, construction workers, women, and truckers.

We successfully met our metrics for WINFLY and Mainbody recruiting but missed the metric for winter hiring, triggering a cause and effect review. Two improvements resulted: the NSF agreed to move the hiring deadline from February 1 to season close, and we worked with hiring managers to modify best practices.

Employee retention (fulltime and contractor) continues to be a challenge, particularly in the construction and mechanical trades. Retention factors include the military engagements in Afghanistan and Iraq and heavy construction activity in the Gulf region.

We filled key Director positions in IT and HR from outside Raytheon. Both new Directors have extensive experience in their respective fields. The new FEMC Director is a long-time Raytheon employee. The critical position of Science Support Director was filled by a long-time RPSC employee whose expertise in that area is well-known.

There were significant changes in the Polar Education program. We created and filled a Senior Training and Development Specialist position in March 2006. This new position is indicative of RPSC's strong commitment to developing and training RPSC employees. The Polar Internship program deployed eight college interns during the austral summer. One of the interns is now wintering-over on a contract. This is directly attributable to his strong performance as an intern.

We offered multiple training and development programs during the year. In September 2005, we offered six courses designed to enhance the skills of supervisors. These courses were provided free by United Behavioral Healthcare, a partner in providing benefit programs to RPSC.

The HR team conducted sixteen 360 degree reviews for management staff.

Section 2. Qualitative Performance

A. Project Management

General Management

Accomplishment: We have established a higher level of integration within RPSC staff and between functional and operational directors. We have improved selection processes, in-depth orientations, and the education and training of hiring and supervisory managers.

Benefit: We anticipate improved contract employee capabilities, improved retention, and a better understanding of where HR fits into the organization.

Human Resources

Accomplishment: In September 2005, we developed and implemented a six-course training program for supervisors. The courses focused on people management and the following team building skills: "Building Successful Teams," "Coaching and Counseling Techniques," "Dealing with Conflict," "Leadership," "Negotiation and Resolving Conflict," and "Taking Charge of Your Time."

Benefit: Supervisors are better trained to give timely and appropriate feedback to employees, both formal and informal. Feedback from supervisors confirmed the courses increased their confidence in managing personnel.

Accomplishment: Within six weeks of her start date, the HR Director deployed to McMurdo. While in Christchurch, she conducted orientations for over 625 contract summer employees.

Benefit: Deployment is a key to understanding on-Ice culture, a critical element for HR. The experience will enhance her effectiveness.

Accomplishment: Working with the Chief of Operations, we developed an RPSC "people plan" that focuses on employee development, meeting management, ethics training and communication protocols. In developing the plan, we used feedback from an RTSC site assessment, the semi-annual employee opinion survey, and numerous skip-level meetings to identify issues we can address to improve employee morale. We have implemented the initial phases of the plan by hiring a Senior Training and Development Specialist and simplifying the contract employee rehire process.

Benefit: By addressing identified employee concerns, we expect to see RPSC experience a greater retention rate for top performers, both fulltime and contract. Improved morale enhances the working environment for all RPSC employees and promotes higher productivity and Program commitment. Merging all RPSC training programs and activities into one function, led by a subject matter expert, ensures better use of training resources.

B. Program Integration

Coordination Between WBS

Accomplishment: We worked extensively with Hiring Managers to identify, select, and hire top-tier candidates for all positions, fulltime and contractor.

Benefit: By hiring the best candidates, RPSC provides the best possible service to our client, the NSF.

Integration of Environment, Health, and Safety Objectives Across Corporate Activities

Accomplishment: We assessed contract employee performance and safety achievements. One hundred thirty employees achieved a rating of "Far Exceeds" or "Exceeds" in Safety and were awarded an extra bonus, in recognition of their commitment and leadership in Safety. This was an entirely new way of coordinating safety with the overall assessment.

Benefit: Integrating the two scores and awarding an additional bonus reinforces the point that safety is everyone's responsibility and part of the total performance appraisal. When employees are rewarded for safe practices, safety for everyone increases.

C. Innovation/Process Improvement

Innovative, Technological Solutions

Accomplishment: We now use RayCATS (Raytheon's Internet employment application process) for 100% of employment applications.

Benefit: We have reduced paperwork and a faster review of potential candidates.

Responsiveness to Challenge and Change

Accomplishment: In response to employee feedback on the lengthy process required to hire returning employees, RPSC developed a procedure that allows these employees to simplify their employment contract rehire process.

Benefit: We anticipate reduced paperwork, improved employee morale, and increased retention of contract employees.

Identified Issues

Issue: A very competitive labor market for skilled recruiters led to a number of resignations and subsequent difficulty in filling open Recruiter positions in HR.

Response: We surveyed Denver-area salaries for recruiters. We requested, and the NSF agreed to, an increase in mid-range pay levels for recruiting staff. As a result, the number of qualified candidates applying for recruiter positions increased. We will monitor the situation, since it appears recruiter compensation must continue to increase.

Lessons Learned

Due to concerns expressed by employees during the HR Site Assessment Survey, we are putting together a Leadership Development Plan (LDP) to address such concerns. The LDP will incorporate in-depth training by Raytheon senior leaders (including Corporate Counsel, Ethics Officers, and Diversity and Compliance leaders) in the legal aspects of management, ethics, and building an inclusive culture. The Senior Training and Development Specialist will conduct monthly development sessions focusing on coaching employees for peak performance, creating strong and meaningful development plans, and managing change.

Section 3. Plans for KY07

We will work with hiring managers to streamline hiring practices.

We will revamp the post-season evaluation process to ensure quality feedback, better reward outstanding performers, and lessen the burden for on-Ice management.

MEDICAL

Section 1. Summary

Medical consists of Medical Screening and Clinic Operations. Medical Screening provides pre-deployment screening of all USAP participants. Clinic Operations manages the operation and support of the clinics at McMurdo, South Pole and Palmer Stations, field camps, and research vessels. The Medical Director provides clinical expertise to RPSC on health promotion, occupational health, and emergency preparedness.

Medical Screening

Medical Screening ensures that all USAP personnel deploying to Antarctica meet the physical qualification (PQ) standards for medical, dental and psychological health set by the NSF.

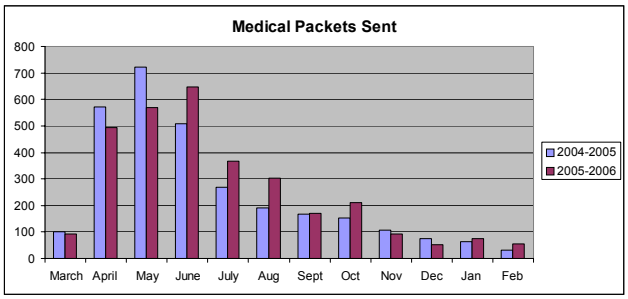


Figure 6-1 Medical Packets Sent, 04-05 thru 05-06

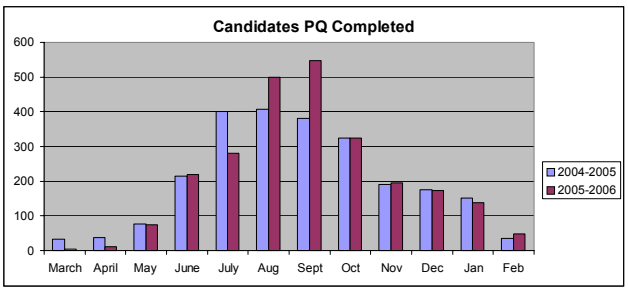


Figure 6-2 Candidates PQ'd, 04-05 thru 05-06

In KY06, we sent medical packets to 3088 candidates and cleared 2456 for deployment (Figure 6-1, Figure 6-2). This reflects an increase of 4.4% and 1.2%, respectively, from KY05. The graphs clearly show the unusually high number of personnel PQ'd in September, just before Mainbody, and the scramble in February to PQ alternates for winter-over candidates who did not PQ.

Medical Screening personnel worked closely with Human Resources, the Deployment Specialists Group (DSG) and division management to expedite personnel through the PQ process. Several candidates were flown to Denver to PQ and for psychological screening. The Christchurch Medical Coordinator was also instrumental in expediting several urgent hires in New Zealand. We are increasingly successful in bringing candidates to Denver for screening early in the PQ process. This allows more time for hiring replacements if needed.

Only 96 candidates did not physically qualify (NPQ), a rate of 3.8%, which is consistent with previous years. A total of 443 candidates (17.6%) were approved for summer-only deployment. The relatively small number of NPQs versus the number of deployment packets mailed identifies the benefits of medical screening. Medical NPQ is only one reason why a candidate may not complete the PQ process. Many potential candidates decline to apply or drop after testing starts. 399 personnel did not return exam or test data and 167 started the process but dropped out before completing the screen. These cases are not counted in the PQ or NPQ statistics.

All candidates who do not PQ have the option of applying for a waiver from the NSF. Thirty candidates re-tested and changed their status to PQ or summer-only PQ. A typical example is a candidate who begins taking blood pressure or cholesterol medication in order to re-qualify. Of the remaining NPQs, 19 requested waivers. This was lower than previous years because some requests were not supported by RPSC and not forwarded to the NSF for review. The NSF approved 13 waivers (most for summer-only deployment) and denied five.

Psychological screening is only required for winter-over candidates for McMurdo and the South Pole. The total number of psych screenings dropped to 388 for Winter 2006, a reflection of smaller winter-over populations. Twenty-five candidates (6.4%) did not pass their psych PQ, a rate consistent with previous years. Of the 344 psych candidates (89%) screened in Denver, only 16 required re-evaluation on the Ice. A three-person team from Nicoletti-Flater Associates deployed to McMurdo and the South Pole in January to screen summer-contract personnel hired for the winter and original winter-over hires who could not make it to Denver for screening prior to deployment. They performed 30 psych evaluations and 14 re-checks, with an additional six evaluations and one re-check in Christchurch. Seven on-Ice candidates were screened via Video Teleconference (VTC); three New Zealand candidates were screened by phone. Some staff members have recommended returning to a two-deployment psychological screening schedule to catch early and late season on-Ice hires. However, VTCs provide a more economical option for meeting the needs of these few individuals with satisfactory and cost-effective results.

The simplified dental screening for summer-only candidates at McMurdo and South Pole continues to be a success. If the candidate's personal dentist notes no problems and recommends deployment, the Medical Director can designate a "2-D" clearance. This is a provision for short-term deployment and avoids full clearance. Analysis shows this does not cause more dental problems on the Ice, so the program was expanded for the 05-06 summer season. This year 895 candidates (35.6% of all dental PQs) received "2-D" dental clearance, nearly double last year's quantity. This saved $17K in subcontract chart reviews.

Only new candidates receive the *USAP Participant Guide*. Returning candidates are asked to return a postcard to request a copy. The *Guide* is also available from the USAP website: www.usap.gov. Savings are estimated at $2K per year. In KY07, only the personalized checklist, lab kit, and instructions will be mailed to each participant. Recipients will be instructed to download all other medical and deployment forms from the website.

Responsibility for mailing drug screening kits transferred from Medical to Human Resources. (Drug screening is a Raytheon employment issue, not an NSF requirement for deployment.)

Medical Evacuations and Patient Transport

There were only five MEDEVACs this year: two RPSC employees, one Navy person, and two non-USAP personnel. This was fewer than usual (Figure 6-3), but each one was complex. None of the MEDEVACs could have been prevented by medical screening.

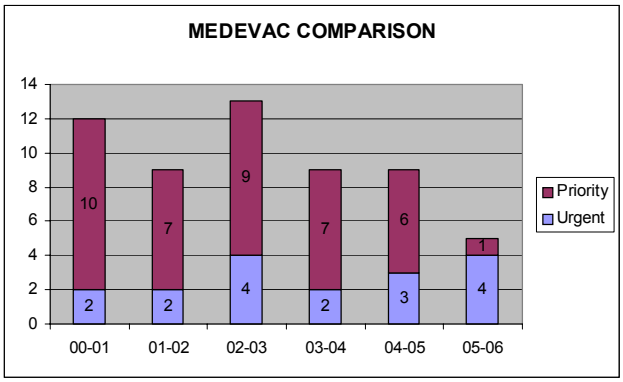


Figure 6-3 MEDEVACs, 00-01 thru 05-06

The first MEDEVAC was notable as it originated at Palmer Station. The British Antarctic Survey provided a Twin Otter that could land on the glacier behind the station. The patient and attending physician flew to King George Island and then on to Punta Arenas, Chile, where the patient received treatment. International cooperation between the British, USAP, and Chilean personnel was outstanding.

The two non-USAP MEDEVACs were notable for the complexity of international cooperation they required. The first occurred on 19 January and involved a crew member aboard a Uruguayan fishing vessel, the F/V *Paloma V.* The second originated on the tourist vessel I/B *Kapitan Khlebnikov* on 27 January. Each patient was transported to McMurdo for evaluation.

Once stabilized, the patients were flown to Christchurch for treatment.

The Uruguayan patient highlighted the need for translator services for the international community we support. To mitigate this problem in the future, Medical is working with the DSG to identify multi-lingual personnel willing to provide their translator services. Medical staff also has the use of various Internet sites for translation services.

The tourist MEDEVAC was notable for the medical management it required, and for the extended coordination with New Zealand authorities required for transporting a terminal patient. The lessons learned are being used to enhance our MEDEVAC equipment inventories and procedures.

Patient transports are defined as transport of a patient for medical reasons but without need for care en route. There were 41 patient transports this year; most in the last two months of the season. Many transports were for PQ verification or resolution before station close. Fourteen cases (34%) were in response to injury, and seven cases (17%) were for dental problems. We will audit each case to verify that medical problems could not have been predicted (and therefore prevented) by the PQ screening process.

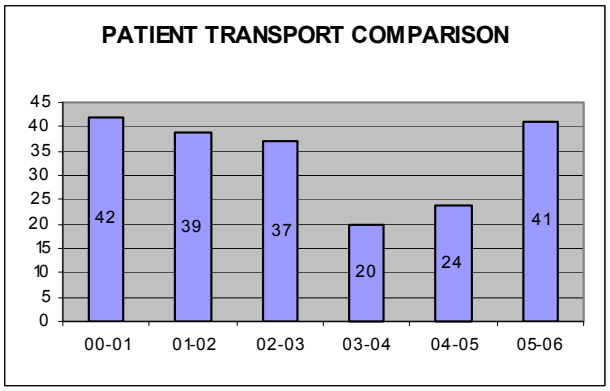


Figure 6-4 Patient Transports, 00-01 thru 05-06

McMurdo Clinic

The McMurdo clinic is the largest USAP medical facility, with a staff of up to nine supporting a community of almost 1100 during the summer. The McMurdo clinic also supports area field camps and provides medical backup to Scott Base.

Table 6-1 McMurdo Clinic Workload, 93-94 thru 05-06

McMurdo Workload	93-94	94-95	95-96	97-98	98-99	99-00	00-01	01-02	02-03	03-04	04-05	05-06
Medical												
Medical Visits	2586	1347	1783	2092	3453	3472	3626	3240	3944	3941	3299	2956
Lab Tests	2221	1137	731	194	547	468	709	1187	2325	2091	2023	943
X-Rays	514	317	195	157	408	359	262	252	288	288	202	314
Ultrasounds									38	6	26	9
Telemed Consults										64	24	26
Physical Therapy					540	670	625	513	809	720	1343	972
MEDEVACs	22	22	16	27	35	44	54	9	13	10	9	4
Patient Transports								33	37	20	24	41
Dental												
Patient Visits	586	450	197		247		520	563	743	523	631	552
Dental Procedures	4500	2118	1458				842	865	829	609	1187	1222
Dental MEDEVACs	9	1	5		1	9	3	0	2	2	1	7

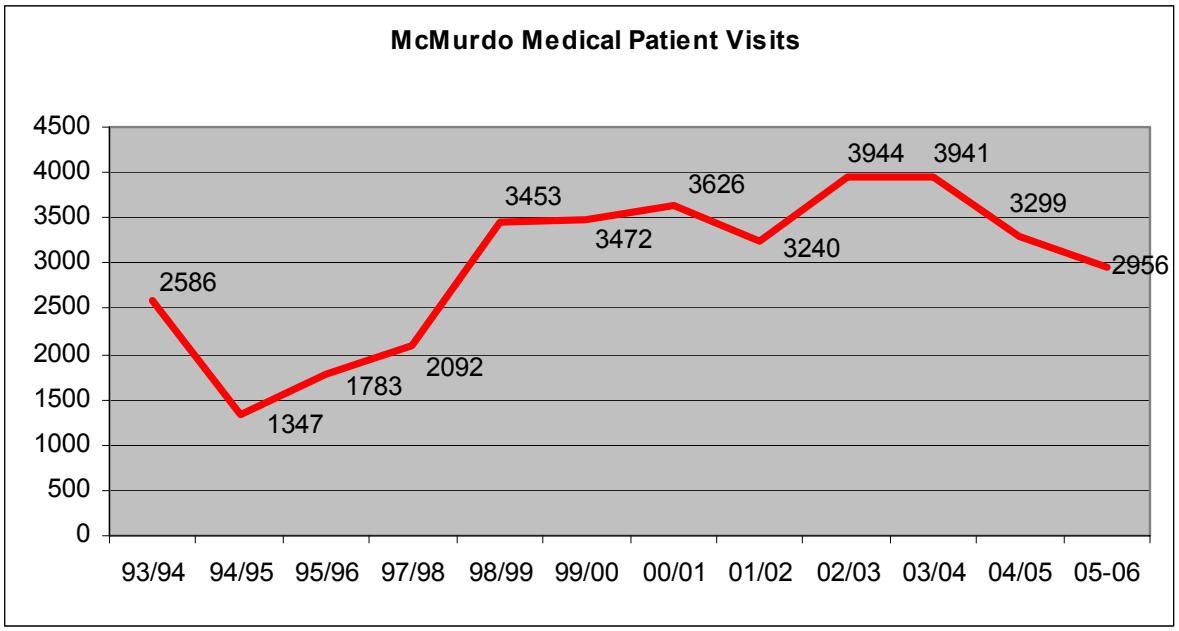


Figure 6-5 McMurdo Patient Visits, 93-94 thru 05-06

Workload at the McMurdo clinic was lower in almost all categories this year (Table 6-1, Figure 6-5). One factor may be a relatively mild outbreak of the McMurdo "crud." The elimination of the Physical Therapy Assistant position and the gap in dental care during staff turnover may also have contributed to a reduced workload. Staff members continue to express concern that the safety program discourages patients from seeking care for minor injuries or strains. However, the impact remains unverifiable.

We continue to evaluate and expand our capability to manage potential medical and trauma risks. New equipment this year includes a portable ventilator, a portable x-ray machine (Figure 6-7), a defibrillator/monitor, a QBC analyzer, a Bair Hugger IV fluid warmer, and a CoaguChek-S analyzer.

South Pole Clinic

Patient workload at the South Pole was more typical, compared to last year's flu outbreak and record-breaking visits (Figure 6-6). As SPSM construction winds down, the workload is expected to decline further, even as other science construction continues. The Medical Director and South Pole Physicians continue to work closely with FEMC and Operations in order to maintain superior support for high-risk activities.

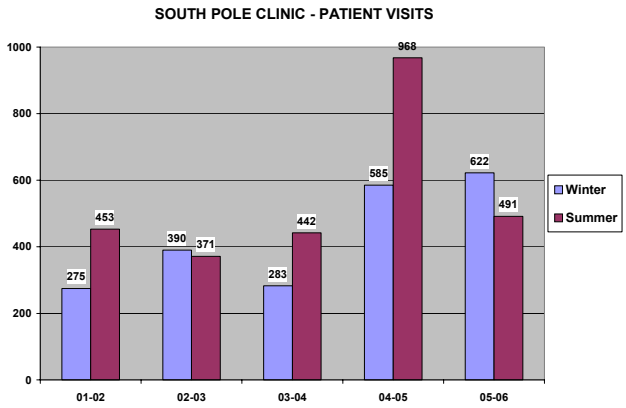


Figure 6-6 South Pole Patient Visits, 01-02 thru 05-06

Altitude sickness is a constant concern at the South Pole. This summer we identified only 10 patients who required care in the clinic and only one who required transport back to McMurdo. Participants are increasingly mindful of overexertion during acclimatization and taking prophylactic medication to prevent altitude sickness. The New Zealand Medical Coordinator dispensed approximately 160 Diamox prescriptions in Christchurch so that personnel could start prophylactic medicine even earlier than a layover in McMurdo would allow.

Figure 6-7 Portable X-Ray Machine

Most of the equipment in the South Pole clinic was purchased new two years ago when the clinic opened, and it remains in top shape. A problem developed with the JedMed digital imaging system. This system uses fiber-optic scopes and various lens attachments to obtain still or video images. The light source burned out over the winter and staff inserted a temporary light to maintain function. The manufacturer provided a loaner system that is now at the clinic while the old unit is being repaired.

South Pole also received a Bair Hugger IV Fluid Warmer and a CoaguChek-S analyzer this year, the same as McMurdo. A new safe for storing controlled medications replaced the unit with a broken combination lock. We sent out one of the Impact 754 Ventilators for factory refurbishment over the winter.

The South Pole clinic is the newest (and best equipped) medical facility in the Program. However, the medical staff is hindered by the clinic's unsuitability for major trauma or surgery. The lack of storage and counter space, plus the difficulty in maintaining patient privacy in the open layout, further hinders services.

Palmer Station Clinic

The smallest USAP clinic has capabilities equivalent to McMurdo and South Pole. This is significant because even though the clinic has a much lower patient workload, Palmer's remoteness makes MEDEVACs much more difficult and complex. Patient volumes this year were typical, other than the MEDEVAC mentioned above.

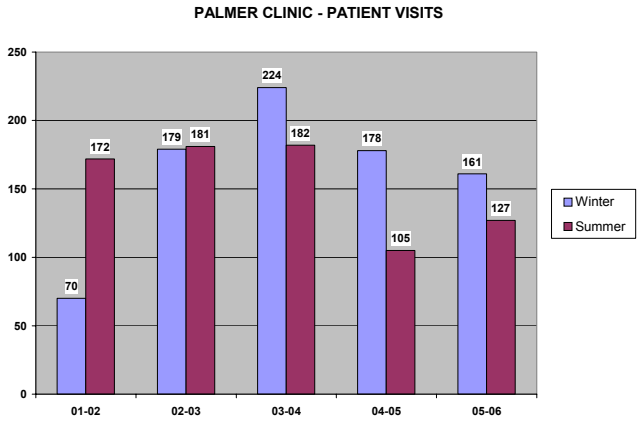


Figure 6-8 Palmer Patient Visits, 01-02 thru 05-06

New equipment for the Palmer clinic this year includes two oxygen concentrators and a Bair Hugger Hypothermia Treatment and IV Fluid Warmer.

Training

Each Medical staff member hired has an extensive background in his or her medical specialties. However, pre-deployment training is essential to help them adapt to the unique environment of Antarctica. All medical staff members receive one- to two-day "Medical Staff Pre-Deployment Training" from the Health Services Manager and Medical Director in Denver. Many staff members receive extra training to fulfill the unique needs of the USAP clinics. Training in KY06 included:

- Dentistry for Physicians – In the absence of a dentist on station, winter-over Physicians must cover dental needs. Our Dental Consultant in Denver provides one to two days of orientation. This training covers dental equipment and cements, pain relief, temporary fillings and crown repair. Physician Assistants (PA) also receive this training. Even so, Physicians are often uncomfortable providing dental care. We are researching other resources for more extensive training through the Air Force and other organizations. As always, consultation is available to assist Physicians with dental care.
- MEDEVAC Training – Each year a group of McMurdo and South Pole medical staff members train for two days with the NYANG. This group reviews procedures, discusses flight medicine concerns, becomes familiar with airframe configurations, and establishes a positive working relationship with the military. Communication between organizations is essential for effective MEDEVAC management.
- Hyperbaric Medicine – At least one Physician or PA per McMurdo summer is trained in hyperbaric medicine. This allows them to work with the Dive Team to treat dive injuries. Hyperbaric treatment is also effective for other conditions, such as carbon monoxide poisoning. The 2005 winter Physician and the 2006 winter PA received hyperbaric training for the winter season.
- Ultrasound Training – Without an ultrasound technician at any of our clinics, the Physicians and PAs at all three stations must perform their own scans. We provide two days of training at the clinic managed by our teleradiology consultant, or at the adjacent hospital facility.
- Digital X-Ray System – This half-day training teaches doctors and PAs to effectively generate, manipulate, and transmit digital x-ray images. How to troubleshoot common equipment problems is also covered. The Biomed Equipment Repair Tech trained with our vendor to more effectively perform preventive maintenance, including how to clean the units at each station. Connectivity and transmission problems may still require IT assistance.
- Christchurch Medical Orientation – The Christchurch Medical Coordinator arranges for most medical staff members to meet with Dr. Pascoe or other key members of the local medical community. These medical personnel coordinate MEDEVACs or patient referrals. It is particularly important for the Flight Nurse to learn the admission process at Christchurch Hospital. In addition, it is essential for the Laboratory Technician to work smoothly with Canterbury Health Lab for samples sent from the clinic.
- Telemedicine Orientation – The McMurdo winter Physician spent a day at the University of Texas Medical Branch (UTMB) to meet telemedicine consultants, review equipment operations, and establish a rapport with the specialists that support the Program.

Medical Staff also attends Raytheon Orientation and Safety training and station-specific training. The training includes some of the following: Ropes (South Pole), Air Sampling at NOAA and Scripps (Palmer Station), and Search and Rescue.

Additional training on the Ice prepares volunteer teams to assist in the event of a medical emergency (Figure 6-9). McMurdo conducts an extensive Mass Casualty Incident (MCI) drill each season (this year in April and December). The clinic trained three teams of volunteers to assist as stretcher bearers, recorders, and auxiliary help. Volunteers learned how to set up and support a triage system before the drill. Lessons learned were documented in an extensive after operations report and will be studied in an effort to improve the program. Training continued through the season to maintain readiness. Other

personnel on station, such as Firefighters and the SAR team, have medical skills and are important resources in an emergency.

Figure 6-9 Volunteer Training - McMurdo MCI Drill

South Pole and Palmer Stations do not have fulltime Firefighters or SAR personnel and so must train volunteers for these functions. At Palmer, the station Physician stages fire drills in coordination with the designated Fire Marshal. He conducts debriefs to review problems and identify improvements. He trains with the Ocean and Glacier SAR teams (OSAR/GSAR), which helps in developing responses to potential emergencies. This exercise also integrates medical care even when a Physician is not a member of the team. The GSAR team's performance was outstanding in support of the Palmer MEDEVAC. The team prepared the runway and transported the patient to the waiting plane. Palmer also trains a trauma team that can assist the solo Physician in emergency response and management of complex patient cases.

At the South Pole, Physicians (both winter and summer) conduct extensive training and drills for the volunteer Trauma Team and Fire Team throughout the year. A volunteer surgical assistant team is also trained each season. This group assists the physician and PA in the event of a major trauma or surgical case.

The South Pole summer physician, a Red Cross-certified CPR instructor, trained personnel in CPR and on the Automatic External Defibrillator (AED) and provided Red Cross certification. This is a much appreciated benefit to the volunteers and encourages them to educate and support their community. (McMurdo and Palmer Physicians also provided CPR and AED training to community members, but were not able to provide certification.)

Section 2. Qualitative Performance

A. Project Management

General Management

Accomplishment: In the absence of a Medical Director (who resigned in January 2006), Medical Director responsibilities were split to fulfill the needs of the department. The DSG Manager is acting as Medical Administrative Director. The Medical Screening Supervisor is fulfilling the acting Medical Processing Director responsibilities. The Health Services Manager continues to coordinate operations of the clinics and subcontracts. We identified procedures for rapidly notifying the Program Director and NSF of medical emergencies, and these worked very effectively when MEDEVACs occurred.

Benefit: With the current organization, all responsibilities are covered until a new Medical Director is hired.

Accomplishment: We continued the simplified "2-D" dental screening for summer-only candidates at McMurdo and South Pole for a third year. This avoids sending the chart to the Dental Chart Reviewer for full clearance.

Benefit: PQs were expedited, savings over $17K in subcontract chart reviews.

Accomplishment: We renewed five medical subcontracts in FY06. We maintain 14 subcontracts to support medical screening and consultation to Antarctic clinics. The five requiring re-bid were:

Medical Laboratory Testing for Pre-Deployment Screening: The largest medical subcontract ($250K per year) manages specimen collection, lab kits, and centralized blood/urine analysis. There are only two national labs capable of meeting USAP requirements and both bid on the contract. [redacted]

Dental Chart Review, Consultation, and Training: Dental reviews require extensive familiarity with the station clinics in order to effectively screen out dental conditions. This experience is also important in providing pre-deployment training to station Physicians and providing dental consultations. Therefore this contract was re-awarded to [redacted]

Radiology Readings and Telemedicine Support: RPSC has invested extensive time and resources in establishing teleradiology and VTC links with [redacted] Such links makes it impractical to pursue other suppliers. The contract was re-awarded t[redacted]

Diagnostic Radiology Services for Pre-deployment Screening: Several bidders had facilities closer to Denver HQ, but [redacted] emained the most cost-effective. The contract was re-awarded to [redacted] We continue to send c[redacted] location for chest x-rays, mammograms, gall bladder ultrasound studies, and other radiology screening.

Benefit: Regular subcontract re-bids ensure services are provided at competitive prices.

Accomplishment: The RPSCNZ office in Christchurch continues to maintain contracts in support of the USAP. These contracts include: [redacted]

Benefit: The high level of support from contacts in the Christchurch medical community is essential to the quality of the USAP healthcare program.

Accomplishment: We minimized the potential for a flu outbreak by providing over 120 flu vaccinations at Denver HQ and 20 at Palmer Station. We also purchased flu vaccines in New Zealand and administered them at McMurdo and at South Pole.

Benefit: There were no confirmed cases of influenza this season and no impact on USAP operations, such as the flu outbreak that impacted the South Pole so significantly last year.

Customer Satisfaction

Accomplishment: The Congressional delegation that visited the South Pole in January required extra medical support. Medically, they were an unknown risk, since none of the DVs completed the normal PQ process or provided us with medical records. Of special concern was the potential for altitude sickness.

The South Pole Physician coordinated with the South Pole Area Directorate and NSF Managers to integrate medical support into the station plan to handle any contingency. Two nurses from the McMurdo clinic flew to the South Pole to supplement the medical staff there. The nurses accompanied the group, monitored their health, and kept oxygen and resuscitation gear close by.

Two of the DVs received oxygen in the clinic to reduce altitude symptoms, but there were no emergencies.

Benefit: Medical care was available immediately if needed. All personnel returned home safe and healthy.

Human Resources

Accomplishment: When the Medical Director resigned in early 2006, the remaining, experienced long-term staff (minimum six years with the Program) effectively maintained operations, especially during MEDEVACs.

Benefit: The high level of staff experience and commitment prevented any interruption in medical operations and management.

Cost Savings

Accomplishment: Psychological support to departing South Pole winter-over personnel was reduced at the NSF's direction. Instead of deploying in October, a psychologist from Nicoletti-Flater Associates was available for counseling in Christchurch for redeploying winter-overs.

Benefit: Savings to the program was over $14K. Few personnel took advantage of even the reduced services. As a result, the program is being evaluated for further reduction as long as effective avenues of support are maintained.

B. Program Integration

Coordination Between WBS

Accomplishment: We coordinated several complex MEDEVACs this season.

- To MEDEVAC a patient from Palmer Station, the Palmer Physician worked extensively with several international agencies, including the British medical staff at Rothera, [redacted], and the Chilean doctors receiving the patient. The entire Palmer community worked to prepare for the flight and manage the patient.
- McMurdo MEDEVAC'd two non-USAP personnel that required multiple modes of transport. The coordination included civilian vessels and Italian personnel. This multi-organizational effort concluded with assistance from New Zealand physicians and health authorities when the patients arrived in Christchurch. Communication between Medical personnel and the Air Force Flight Surgeon, Support Forces Antarctica (SFA), and military flight crews was essential.

Benefit: All MEDEVAC patients received outstanding medical care, equivalent to care in the U.S.

Accomplishment: We worked with IT to maintain the telemedicine connectivity so essential to the USAP healthcare system.

- We maintain subcontracts for support from [redacted] or most medical specialties, with [redacted] for teleradiology and [redacted] Associates for psychology consultation and counseling.
- IT established a VPN link with Diversified Radiology to review images and conduct video consultations from their offices in Denver. This effort maintained strong controls for patient privacy.
- Hurricane Rita was a particular challenge when it interrupted support from [redacted] in [redacted] Extensive coordination was required to re-establish all connections. Alternate links and sources ensured the clinics always had support.

Benefit: The station clinics received consultation when it was required for patient care.

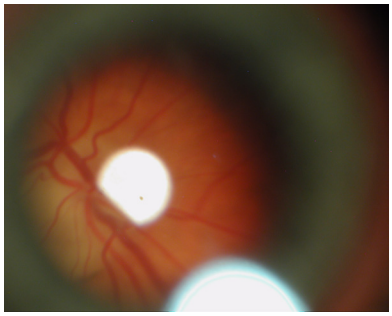


Figure 6-10 Slit Lamp Telemed Image

Accomplishment: For the second year, McMurdo's PA trained with the McMurdo Search and Rescue (SAR) team before deployment. During the season, she trained with and provided medical training to the SAR as well as JSAR team (integrating the New Zealand personnel into a Joint SAR team). At Palmer Station, some of the physicians were able to attend pre-deployment training with the OSAR team. All Physicians continued training with OSAR and GSAR teams throughout the year.

Benefit: The medical training is essential to the mission of each SAR team. Medical personnel are able to work seamlessly with teams and maintain effective patient support, regardless of the emergency encountered.

Integration of Environment, Health, and Safety Objectives Across Corporate Activities

Accomplishment: The kitchen staff at McMurdo continues to experience a high rate of repetitive strain injuries. To minimize risks, the Physical Therapist met with each shift twice a week to perform wrist and forearm massage. Staff members were offered stretching and exercise programs throughout the season.

Benefit: Although the repetitive strain injury rate remained disappointingly high, greater numbers or severity of injuries were likely prevented. In addition, this response was instrumental in fostering trust between the community and the clinic. A positive relationship with the community is essential to monitoring its status.

Accomplishment: Each clinic worked within its community to promote healthy work habits and lifestyles. At McMurdo, the physicians gave presentations at the first All Hands meeting of each season. The sessions encouraged hand washing to prevent transmission of the "crud," among other safe practices. South Pole and Palmer Physicians provided safety trainings throughout the season. Winter staff provided smoking cessation counseling, along with nicotine patches. Cholesterol checks were provided at several points during the winter. Each clinic administered flu shots in November and December.

Benefit: These efforts were likely a factor in the relatively low rate of upper respiratory infection this year, which translated to increased worker productivity. This was a large morale boost to the medical personnel at the stations.

Accomplishment: Every injury treated in the clinics was reported on a Medical Injury Report Form (MIRF). Follow up visits were documented with MIRF addendum until each case was closed. Clinic staff at all three stations worked closely with EH&S, Human Resources, and Supervisors to resolve injury investigations and close Worker's Compensation cases. The McMurdo Physicians, PAs, and the Physical Therapist conducted weekly "roundtable" discussions on all active injury cases to ensure consistent treatment and thorough follow-up. The Medical Director reviewed significant cases by phone to provide support and ensure consistency across stations. We revised MIRF procedures and forms to ensure patient privacy.

Benefit: Medical providers learn from each other, and constant communication ensures that treatment is consistent for all patients, that all cases get appropriate follow-up, and that no case is left unresolved. This process is particularly critical at McMurdo, with its larger medical staff and the need to interface with rotating Flight Surgeons.

C. Innovation/Process Improvement

Innovative, Technological Solutions

Accomplishment: We set up VTCs for on-Ice psych exams. Late NPQs and other late hires meant that several candidates required psychological screening after the Nicoletti-Flater team left the Ice. The VTC allowed a psychologist in Denver to interview seven candidates in McMurdo. Clinic staff administered the written test, followed by a live VTC. Three additional candidates in Christchurch were interviewed by phone for winter-over deployment.

Benefit: Late-hire candidates were effectively screened to minimize the risk of psychological problems during the winter. The VTC interview

is much more cost-effective than a second deployment for the psychological screening team.

Accomplishment: We used telemedicine consultations to avoid potential MEDEVACs and patient transports. Specialist consultation often allows us to manage a patient on the Ice rather than transport him/her to Christchurch for evaluation.

Benefit: Several patient transports were avoided. Impact to the work centers was minimized and the program saved the high cost of intercontinental transport.

Accomplishment: The Christchurch Medical Coordinator purchased a new printer/scanner machine to better transmit medical information to Denver HQ.

Benefit: New Zealand candidates can PQ (and deploy) more quickly.

Accomplishment: We continue to use the system developed last year to obtain Drug Enforcement Administration (DEA) approval for destruction of expired controlled medications. The DEA requires that controlled medications be tracked from manufacturer to use or destruction. This requirement directs us to ship all expired inventory back to the U.S. for destruction by a DEA-approved facility. We were able to negotiate a system to obtain pre-approval and perform destruction on site with appropriate controls and documentation.

Benefit: Each clinic had one session of controlled medication destruction this year. This saves the time and expense of tracking and shipping controlled medications back to the U.S. for destruction.

Visionary Management

Accomplishment: To mitigate potential risks to construction workers (especially high-risk IceCube drillers), the South Pole Physician installed a cache of medical supplies at the IceCube site. The physician taught IceCube members how to use an Automatic External Defibrillator and how to secure and transport a patient to the clinic. To boost the capability of the clinic staff, Surgical Assistant volunteers were trained to assist the Trauma Team (Figure 6-11). The training included emergency response and management of complex patient cases.

Figure 6-11 South Pole Trauma Training

Benefit: IceCube drillers and other at-risk workers will receive rapid, responsive trauma care, should one occur.

Responsiveness to Challenge and Change

Accomplishment: It was especially challenging this year to keep Clinic Operations at all three stations fully staffed.

- The Physician recruited for Palmer Station dropped and no alternates were available.
- The Dentist hired for WINFLY did not PQ and no alternates were available.
- The Mainbody Dentist left suddenly in early January.
- The Biomed Equipment Repair Technician could not deploy.
- The Flight Nurse resigned in December and the alternate was no longer available.

Benefit: In spite of such challenges, no station was ever without a physician.

- For Palmer we diverted the second Physician hired for McMurdo to Palmer in time for turnover and recruited another doctor for McMurdo. Palmer Station had uninterrupted medical support.
- We hired one of our Dental Consultants for WINFLY. Deploying to McMurdo for the

first time gave him insights that will enhance his consulting abilities.

- When we were left without a dentist in January, we contracted with a New Zealand dentist to provide short-term coverage. We deployed an Air Force dentist for the remainder of the season at no cost to the USAP (military TDY orders). McMurdo was without a dentist for less than three weeks.
- We adjusted equipment service schedules at McMurdo and South Pole and recruited an alternate Biomed Equipment Repair Technician. All medical equipment at McMurdo and South Pole were serviced.
- A new Flight Nurse was recruited and rushed through PQ and pre-deployment training. McMurdo was without a Flight Nurse for less than three weeks.

Identified Issues

Issue: RPSC requires all subcontractors to carry liability insurance indemnifying Raytheon for their activities. This was a problem for [redacted] in New Zealand, since his malpractice policy does not cover the consultation he provides to the USAP. No carrier in New Zealand will indemnify this risk because of the potential for lawsuits in the U.S.

Response: Raytheon negotiated with our liability carrier to add [redacted] to the RPSC malpractice policy specifically to cover his consultation support to the Program. He supplies his own malpractice coverage for treatment provided at his clinic in Christchurch.

Issue: A patient transported from the South Pole traveled with an oxygen tank but without a medical attendant. The Physician felt no medical intervention or expertise was necessary, but regulations require such patients to travel with an attendant. The case was not effectively coordinated with the flight crew in advance.

Response: We updated the checklists at McMurdo and the South Pole used to prepare a patient for transport or MEDEVAC. In the future, transport requirements will be addressed before any patient is moved. This case will be reviewed in next season's MEDEVAC training with the NYANG.

Issue: The CoaguChek Pro-DM blood analyzer was discontinued by the manufacturer and replacement reagents are no longer available. The machine measures coagulation factors (PT and PTT) in blood. It is important to monitor these factors in patients on long-term blood-thinner medication (e.g., Coumadin) and before administering medication for blood clots (e.g., Heparin or Enoxaparin).

Response: We purchased and shipped to each station new CoaguChek-S machines, reagents, and quality control solutions. In addition, we purchased new test capabilities for an existing machine, the I-Stat, to provide testing in another format. However, neither machine has all the capabilities of the older model. We will continue to research other options to meet our patient testing needs.

Issue: Medical Standard Operating Procedures (SOP) were outdated and ineffective.

Response: We conducted a complete review and revision of all SOPs at Denver HQ. We will review station-specific SOPs in the coming year to guarantee best practices.

Issue: The NSF denied the Medical Director's request for a blanket waiver to air-freight all medications, laboratory reagents, and medical records to Christchurch and Punta Arenas. Medications and laboratory reagents are ordered twice a year to maximize shelf life. Many medications require refrigeration or other special handling during shipment. Medical records must be expedited to the clinics as participants deploy.

Response: We wrote individual justifications to the Airlift Lift Review Board (ARB) for each item. Most medications and reagents are small and lightweight, making them affordable to ship.

Issue: The McMurdo clinic continues to suffer from the poor functional layout and lack of acoustic privacy inherent in the building. Patient

confidentiality remains difficult to maintain, and patient flow for a major trauma is poor. The ambulance dock is too high for our vehicles, making it difficult to transport patients. Floor tiles have been identified as containing asbestos and many tiles in high-traffic areas are cracking.

Response: While a long-term solution is dependent upon funding for a replacement clinic, the staff compensated by asking patients to call ahead and obtain a same-day appointment. This effort reduced patient care space usage. Scheduled appointments mean fewer patients in the waiting room and less chance to overhear doctor-patient conversations. A radio in the waiting room helps mask these conversations. To mitigate asbestos concerns, the floors were sealed with wax twice during the summer.

Issue: We are concerned about Bird Flu (H5N1 influenza) on the Ice. Participants travel widely, passing through endemic areas before deployment, and the close quarters on station are an ideal environment for spreading the virus. However, the potential risk is unknown and should be evaluated before implementing a response.

Response: The Medical Director wrote a study on potential responses to Bird Flu infections at USAP stations. This study covered rigorous monitoring, stockpiling medications such as Tamiflu, and increasing patient ventilation capabilities at the clinics. The resulting recommendations are not currently funded.

Lessons Learned

Effective enforcement of rest during acclimatization at the South Pole can dramatically reduce the incidence of altitude symptoms.

In regard to NSF inquiries, we are tracking and managing medical documentation to ensure completion. End of Season reports, NSF Medical Panel Reviews, and outbrief comments are likewise documented and tracked.

From last season's MEDEVACs, we learned:

- Potentially terminal MEDEVACs from McMurdo should be coordinated with Christchurch Airport Police in addition to the usual medical contacts. We are revising procedures.
- Extended hoses would allow more flexible use of ventilators in flight. We have them on order.
- Better intubation supplies are now on hand.
- Equipment and supplies issued for MEDEVAC/patient transport are being documented.

Section 3. Plans for KY07

We are actively seeking to hire a Medical Director. The position requires a physician with extensive patient care experience and a strong management background. Selection of the proper candidate requires approval from Raytheon and NSF.

In KY07, candidates will be instructed to download medical and deployment forms from the USAP website: http://www.usap.gov/travelAndDeployment/deploymentPackets.cfm. Only the personalized checklist, instructions and the lab kit will be mailed to candidates, saving nearly $10K per year in printing and mailing costs.

Medical will continue to evaluate new equipment for the station clinics. Purchase plans for FY07 include:

- New centrifuges for McMurdo and Palmer Stations to replace the aging units on site. These units have exceeded their life expectancy and do not meet current safety standards for lid interlocks.
- Oxygen Concentrators for the McMurdo clinic similar to those now in use at South Pole and Palmer. These units reduce reliance on compressed cylinders for oxygen.
- An electrosurgical unit for the Palmer clinic to replace the outdated "surgistat-B" unit.
- A microscope for the Palmer clinic to replace the current unit.
- A portable Ventilator for McMurdo, a second Impact 754 unit to replace an

outdated unit. A second ventilator allows for continued capabilities on station in the event one is sent out on MEDEVAC or for manufacturer calibration.

- A Dental Treatment Unit for the McMurdo clinic to replace the current unit that has reached the end of its life expectancy.

We will investigate possible ways to expand pre-deployment training, such as:

- Discussing opportunities for dental training with the Air Force.
- Sending more staff members to telemedicine training at [redacted]
- Providing doctors with Occupational Medicine training. Raytheon has identified sources for this training, which could improve our physicians' knowledge of OSHA and Workers' Compensation issues in their patient care.

The Christchurch Medical Coordinator will attend training and seek certification from the New Zealand Ministry of Health to provide flu vaccinations to participants as they transit through Christchurch. This will allow the immune response, which takes two weeks to reach full potency, to take effect before personnel are housed in the close quarters on station.

The standard formulary of medications stocked at all three clinics will be reviewed for updates and deletions. Some of the antibiotics have been superseded by newer drugs and can be phased out.

To comply with HIPAA regulations, the Medical Screening Office at Denver HQ has closed its office to visitors and/or non-medical employees.

We will implement a new dental "tray" system. Our Dental Consultant, who deployed at WINFLY, identified a need for this service and will prepare dental trays in Denver. The trays will contain a standard set of supplies and tools that will be sent to each station. Physicians need not be tasked with re-ordering dental supplies. We are reviewing the details.

We will continue to investigate alternative methods of recordkeeping. The cost of documenting and shipping charts continues to be problematic. Shipping delays could affect proper medical care on the Ice.

Winter-over personnel will conduct a complete review of pharmaceuticals, supplies, and equipment in response to End of Season reports. These reports identify outdated or obsolete items requiring disposal or retrograde.

Outbrief meetings identified dissatisfaction with the medical screening process. We plan a thorough review of this process.

PERFORMANCE ASSURANCE/QUALITY ASSURANCE

Section 1. Summary

Performance Assurance/Quality Assurance/ Mission Assurance (PA/QA) is responsible for:

- RPSC Contract Year (KY) Performance Measures
- USAP Performance Measures
- Corrective and Preventive Action Response System (CAPARS)
- Government Performance and Results Act (GPRA) Survey
- ISO 9001:2000 Corporate Certification for Quality Management System (QMS)

In addition, we coordinate data collection for, input to, and delivery of the *Antarctic Treaty Report*. We review the designs, statements of work (SOW), specifications, and drawings for RPSC projects. We pre-qualify subcontractors, inspect suppliers, perform audits of Port Hueneme operations, and manage the welding program. We also oversee on-Ice building inspections and the self-inspection program.

We manage the continued ISO 9001:2000 Corporate Registration of the QMS, which includes Internal and Registrar audits of Denver HQ, Port Hueneme, and Palmer Station, coordination of subcontractors, and publication and control of procedural documents. During KY06, we managed the development and reporting of the KY06 Performance Measures and the USAP Performance Measures, developed the FY2006 GPRA Survey, and conducted internal audits.

We completed vendor inspections (Figure 7-1) for the Power and Water Plant, MLS, LDB, and the10 Meter Telescope, as well as numerous other FEMC and Operations projects.

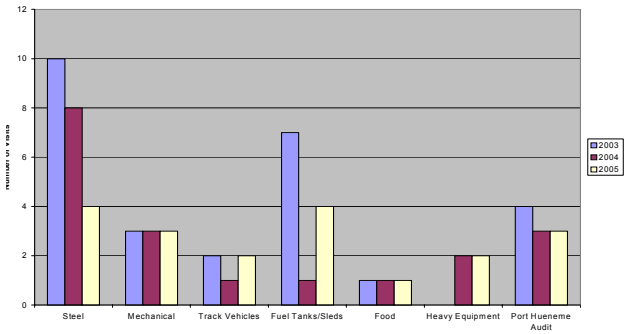


Figure 7-1 Vendor Inspections by Category

We reviewed 99 SOWs and Project Specifications and inspected ten vendors at manufacturing locations in the U.S., for USAP procurements totaling approximately $3.2 million (Figure 7-2). We pre-qualified these vendors through our aggressive PA/QA vendor qualification program.

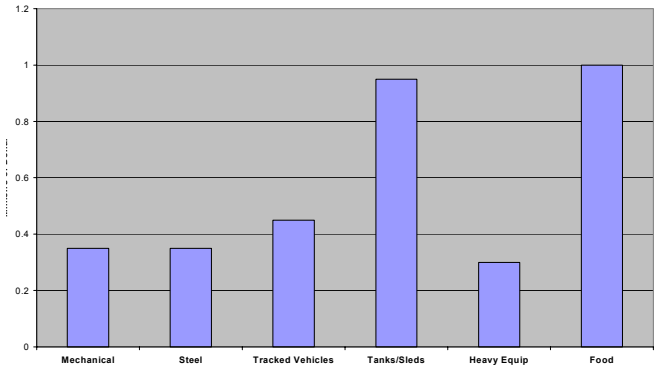


Figure 7-2 Vendor Inspections by Value

We performed three audits of Port Hueneme Operations, during which we observed warehoused materials, maintenance of long term storage materials, housekeeping, and materials staged for KILO-AIR, COM-AIR, COM-SUR, and vessel transport. We also audited ship offload in McMurdo to ensure procedures for the distribution of arriving materials were in compliance. As always, we reported any noted discrepancies to management. We found no discrepant materials received from any of the vendors previously inspected at vendor facilities.

Section 2. Qualitative Performance

A. Project Management

General Management

Accomplishment: The Quality Engineer, Quality Specialist, and Operations Support Specialist led or participated in internal quality audits, ship on-load audits, supplier audits, and the Procurement Card (ProCard) audit. We reported all findings to management.

Benefit: Internal controls provided by independent PA/QA audits and inspections ensure that suppliers can meet RPSC specifications, that nonconforming items do not enter the supply chain, that science sample return protocols are followed to minimize the possibility of damage, that critical processes are appropriately documented and followed, and that company ProCard are used according to procedure. These internal controls also ensure that RPSC operations adhere to company procedure and regulatory requirements.

Customer Satisfaction

Accomplishment: The on-Ice inspector conducted inspections in accordance with the Quality Assurance Program Manual, and the QA/QC staff conducted on-Ice audits and investigations as directed by management. Of note was our audit of the American Institute of Steel Constructors (AISC) at South Pole.

Benefit: On-site inspections ensure compliance to requirements and provide assurance to both RPSC and the NSF that work performed on-Ice meets industry standards.

Accomplishment: We developed an Excel spreadsheet to present FY2005 and FY2006 USAP Performance Measures for RPSC, CSFA, and SPAWAR. We compiled data and identified trends for FY1999-2004 and presented the information at the 2005 APC.

Benefit: The spreadsheet improves the collection, reporting and presentation of data and trends.

Human Resources

Accomplishment: We established a new position funded by FEMC, Certified Welding Inspector. Our winter-over Quality Technician became a Qualified Building Inspector.

Benefit: Welding and construction inspections by a certified Quality professional ensure project specifications and regulatory requirements are met and discrepant work identified in a timely manner.

Accomplishment: At the weekly assimilation training for new employees, we present the Quality Management System (QMS) and the Raytheon Six Sigma (R6σ) Program.

Benefit: New employees receive an introduction to the QMS, including its procedures and requirements, and learn about R6σ principles. As a result, they understand RPSC's commitment to both programs.

B. Program Integration

Coordination Between WBS

Accomplishment: We worked closely with FEMC, IT, and Operations to inspect suppliers and products, including the Program food supply and vendors/materials for the Power and Water Plant upgrade, the IMS, the 10 Meter Telescope Shield, LDB, and the MOGAS project.

Benefit: Our collaborative efforts ensure third-party inspections are performed by qualified individuals and materials quality remains consistent.

Accomplishment: We coordinated the testing and certification of New Zealand welders to ensure their work complied with the RPSC Weld Program and ASME Sec 9. Of the 33 welders tested, 12 failed, a 37% failure rate.

Benefit: The failure rate indicates that over a third of the welders considered for employment would not have performed adequately on the job. Our testing and certification effort prevented their deployment and eliminated the risk of substandard work.

Accomplishment: We conducted Internal Quality Audits of Denver HQ, Port Hueneme, and Palmer Station operations.

Benefit: Our findings resulted in a significant process improvement. We helped create and document a process wherein discrepancies in orders received at Port Hueneme are efficiently and quickly communicated to the Denver HQ Procurement personnel responsible for resolving them. Such timely and reliable tracking and resolution of discrepancies ensures that cargo is received, packaged, and shipped in time to meet ROS dates without undue reliance on COMAIR. We anticipate significant improvements in USAP cargo movement next season.

Accomplishment: At the request of Finance, we audited the ProCard system.

Benefit: An internal review of ProCard procurement controls ensured they are being properly used when committing USAP funds.

Integration of Environment, Health, and Safety Objectives Across Corporate Activities

Accomplishment: We watched for safety issues during our inspections and notified EH&S of any we identified.

Benefit: By serving as a second set of eyes for EH&S, we extended the reach and perspective of the safety program and helped emphasize RPSC's commitment to safety.

Accomplishment: Document Management worked closely with EH&S to ensure that EH&S procedures, policies, and forms are kept up-to-date at all Antarctic stations.

Benefit: Timely updates ensure that employees have access to current safety procedures and policies, eliminating confusion and allowing them to perform their duties according to the latest requirements.

Accomplishment: We prepared the annual *Antarctic Treaty Report* for NSF publication.

Benefit: The *Antarctic Treaty Report* is a valuable resource for information on USAP environmental activities and operational details.

Accomplishment: We maintained a zero TRIR in KY06.

Benefit: PA/QA employees did not lose time because of on-the-job injuries.

C. Innovation/Process Improvement

Identified Issues

Issue: The NSF felt there was a need for additional quality control on construction projects.

Response: We had the Quality Technician trained as a Qualified Building Inspector. Constant training and certification such as this ensures that our inspections are carried out by qualified personnel.

Section 3. Plans for KY07

In KY07, we plan to:

- Include McMurdo and vessel operations on the ISO 9001:2000 RPSC Corporate Certificate.
- Prepare for South Pole ISO 9001:2000 certification.
- Create and implement an interactive Internet-accessible GPRA Survey form to collect and report data.
- Create and implement a USAP Performance Measures interactive database on McMurdo's common network drive to collect daily data and provide real-time USAP performance reports.
- Assist IT/Comms in developing and implementing an enterprise-wide electronic document tracking/management system to expedite the approval and distribution of documents.
- Implement a multi-faceted distributed quality program for enterprise-wide training, awareness, and ownership of quality.

PROCUREMENT

Section 1. Summary

KY06 presented Procurement with many challenges, however the group did see several successes. Overall, deliveries to Port Hueneme for the vessel were approximately 90% on time. In KY06, Procurement processed [redacted] in purchases – an increase of 27.20% from KY05. Purchased lines were 34,326 – a 19.9% decrease from the previous year.

We conducted a mid-year reorganization, reassigning staff from the Procurement group to the divisions and organizing buyers according to commodity. Although this arrangement was designed to provide better service to RPSC divisions, it initially proved to be a challenge and resulted in some breakdowns in communication.

We initiated a management change in March, in conjunction with RTSC, and we undertook a reassessment of the group's organization and methods. These changes should improve the efficiency and overall performance of the Procurement team.

Section 2. Qualitative Performance

A. Project Management

General Management

Accomplishment: In order to address delays and other problems in processing invoices, we arranged to have a representative from Raytheon's Financial Shared Services (FSS) train Procurements personnel at Denver HQ. This training focused on partnering between FSS and the RPSC team to better align efforts.

Benefit: Improved understanding of FSS requirements allows the Procurement team to process invoices in a more timely manner, thus improving supplier satisfaction.

Customer Satisfaction

Accomplishment: Careful attention to the needs of the South Pole Traverse, the Black Island Bandwidth Improvement, and other high visibility projects resulted in the timely delivery to the Ice of all purchased equipment, supplies, and services.

Benefit: This focused support allowed these projects to proceed without delays.

Cost Savings

Accomplishment: Procurement issued six cost-plus, site-specific Master Agreements for the following commodities: one to GE Supply for electrical, two to Protech Sales and CC Distributors for plumbing, two to Arrow Supply and CC Distributors for industrial hardware, and one to Holt of California for Caterpillar parts and equipment.

Benefit: Master Agreements leverage a variety of products and develop strategic partnerships with suppliers. In three months, the effort resulted in $134K in savings and reduced administrative costs.

Accomplishment: Procurement conducted a reverse auction for a major lumber purchase. The pre-auction estimated cost for all lumber requirements was $480K. The auction resulted in a total purchase cost of $434,260.

Benefit: We saved $45K (9.5%) over conventional purchase methods.

B. Program Integration

Coordination Between WBS

Accomplishment: Working in concert with Marine Science Support, Procurement helped resolve lingering open cost items with Edison Chouest for completed work under dispute.

Benefit: Outstanding commitments of unspent funds were cleared up, freeing up funding for other USAP priorities.

Accomplishment: We began using Raytheon Enterprise Agreements for freight carriers such

as UPS (for small parcels less than 70 pounds), FedEx (for air/overnight), and Yellow Freight.

Benefit: These corporate agreements provide discounts of up to 70% and a streamlined process, resulting in significant cost savings and improved efficiencies.

C. Innovation/Process Improvement

Innovative/Technological Solutions

Accomplishment: We implemented a reporting process using data from the P1000 database to track expedited purchases and delivery times.

Benefit: The system allowed Buyers and Subcontract Administrators to determine the status of their orders and resolve discrepancies more expeditiously.

Responsiveness to Challenge and Change

Accomplishment: In response to issues related to departing staff, we developed a reporting system to track open requisitions and purchase orders assigned to former employees.

Benefit: The reporting allows improved continuity and minimizes failed purchases.

Identified Issues

Issue: Buyers and Subcontract Administrators did not have a defined archive for their outdated procedures.

Response: We developed an archiving procedure and assigned responsibility to the newly-established Division Specialist position.

Issue: Supplier evaluations were not sent to Port Hueneme personnel for their review and comment, as per procedure.

Response: We established a single point of contact and updated procedures to better track information flow between Denver HQ and Port Hueneme.

Lessons Learned

RPSC Master Agreements were not being managed effectively. Working closely with RTSC, we will expand the use of corporate-wide agreements to improve efficiency and increase cost savings for the Program.

Vacant staff positions hindered Procurement's ability to support internal customers. We will review overall Procurement requirements and develop an effective staffing plan, with vacancies handled more expeditiously. During peak periods, we will take advantage of TDY services to support permanent staff.

Section 3. Plans for KY07

In KY07, the Division Specialist will closely monitor the requisition flow to Buyers and Subcontract Administrators in an effort to improve order processing.

We will work with RTSC to expand the use of Raytheon corporate agreements to simplify sourcing, increase standardization, and leverage our buying power for greater cost savings.

As a result of Procurement's recent partnering with Raytheon FSS, all Buyers and Subcontract Administrators will have the tools to oversee invoicing, identify and correct problems, and maintain payment terms, thus improving relationships with the suppliers.

Management changes within Procurement will emphasize internal partnering and a supply chain approach to procurement. These efforts should result in improved performance for the USAP.

AREA DIRECTORATE - CHRISTCHURCH

Section 1. Summary

Management and Administration

KY06 has been a year of change for the Christchurch office. The deactivation of two U.S. military units shifted tasking to RPSNZ, along with a greater responsibility for USAP functions. In response, we appointed a Ramp Manager and implemented a "Continuity Book" to ensure our support is equivalent to what Detachment 13 and Airlift Military Command (AMC) Flight Operations provided to military units in the past. Overall, the change has been positive, enhancing our working relationship with transient military personnel.

Our staff relocated to the east wing of the administration building, and the Defense Contracts Maintenance Agency (DCMA) staff moved from the Air New Zealand hangar to the west wing. This shift consolidates USAP operations and makes better use of available office space..

To avoid VAT costs, we worked with the Christchurch shipping agent to load cargo onto the Russian icebreaker *Krasin*, which was under contract to the NSF. Southbound cargo was loaded onto the *Krasin* in Pusan, South Korea. To avoid VAT charges on the northbound voyage, a consignment of cargo was loaded on the *Krasin* in McMurdo, destined for the U.S. Embassy in South Korea.

During the season, a number of high-profile DVs, both military and civilian, deployed to Antarctica. We worked closely with the NSF, Christchurch Airport staff, N.Z. Police, the U.S. Embassy, Customs, and the New Zealand Ministry of Agriculture and Forestry (MAF) to support two of the DV parties. Our success in these efforts is an indication of the excellent working relationship that exists between the airport community and N.Z. authorities.

Another example of the good relationship we enjoy with the MAF was our ability to store contaminated soil from Palmer Station. We held the eight containers received from the *NBP* in October 2005 in the Customs Licensed Air Cargo Yard and loaded them onto the *American Tern* during its northbound Lyttelton port call.

We continue to employ N.Z. tradespeople to fill vacancies at McMurdo and South Pole. The hiring process has been improved, and we are

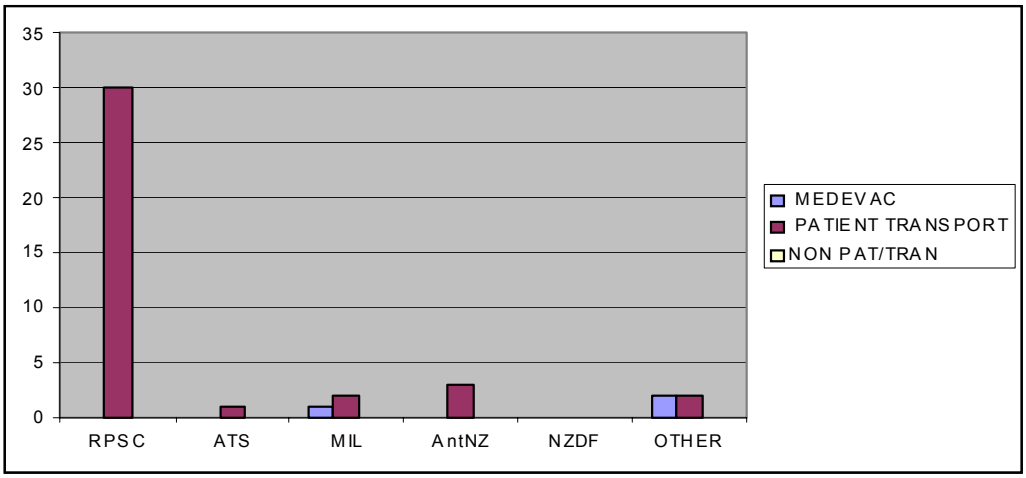


Figure 9-1 Christchurch Patients by Agency

now able to expedite participants through the PQ process to get them ready for deployment.

Ever-changing security requirements remain a challenge. Because there are direct flights from Christchurch to the U.S., our airport must meet TSA security standards. We held a series of meetings with the N.Z. NSF representative and management from Christchurch International Airport Ltd to identify the efforts required to meet these standards, due to take effect in April 2006.

Terminal Operations

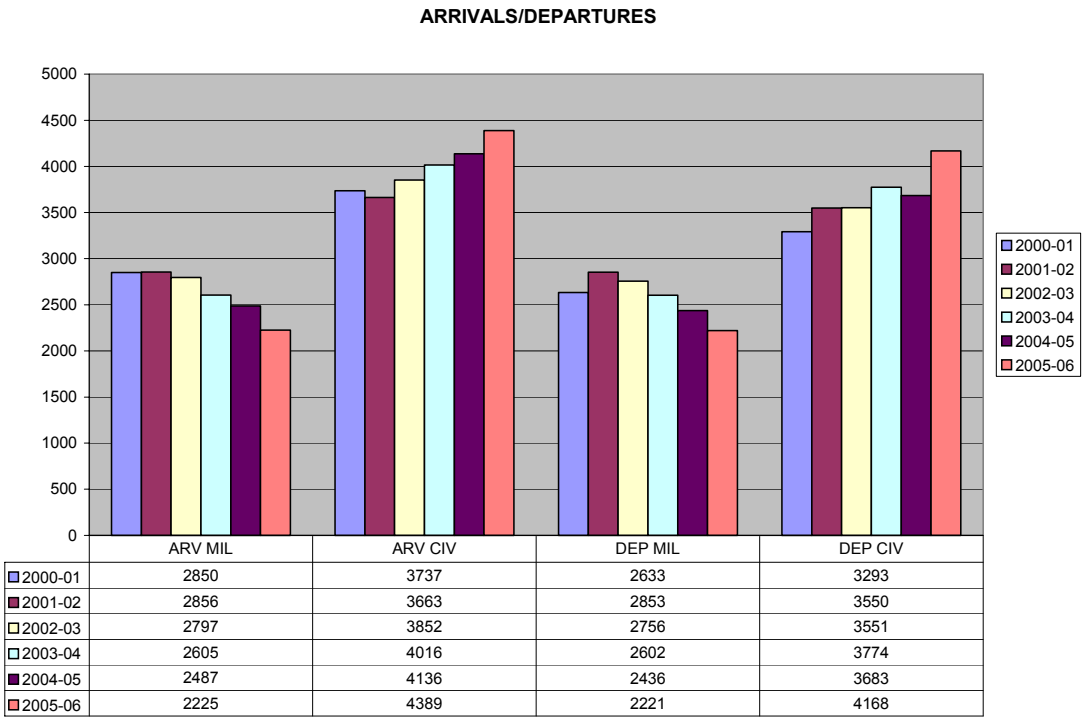
Terminal Operations continued to provide routine services in support of air operations. These included cargo and passenger processing, aircraft load planning, vessel support, AGE maintenance, and postal services. A high turnover among New Zealand Defense Force managers and supervisors created challenges for us and required additional supervision, but it did not detract from the level of support we provided. The deactivation of both Detachment 13 and AMC Flight Operations shifted additional tasking to us, including ramp management, air terminal services for deploying and redeploying aircraft, ground support coordination including liquid oxygen (LOX) management, and administrative support. However, our existing staff handled the additional workload in an efficient and professional manner. Finally, our good working relationship with the 304th Expeditionary Airlift Squadron (EAS) ensured the maximum use of airlift capacity due to their willingness to "go the extra mile." By maximizing airlift capacity, Terminal Operations was able to keep cargo backlogs to a minimum. (Note: Cargo statistics for Christchurch are included in the Logistics section of the AOR.)

Travel

The Travel Office operated seven days a week during the season and was open from 6AM until 10PM each day to support incoming and outgoing USAP participants. These hours (an increase over the previous season) were necessary to accommodate members of the 109th EAS, a new responsibility in KY06.

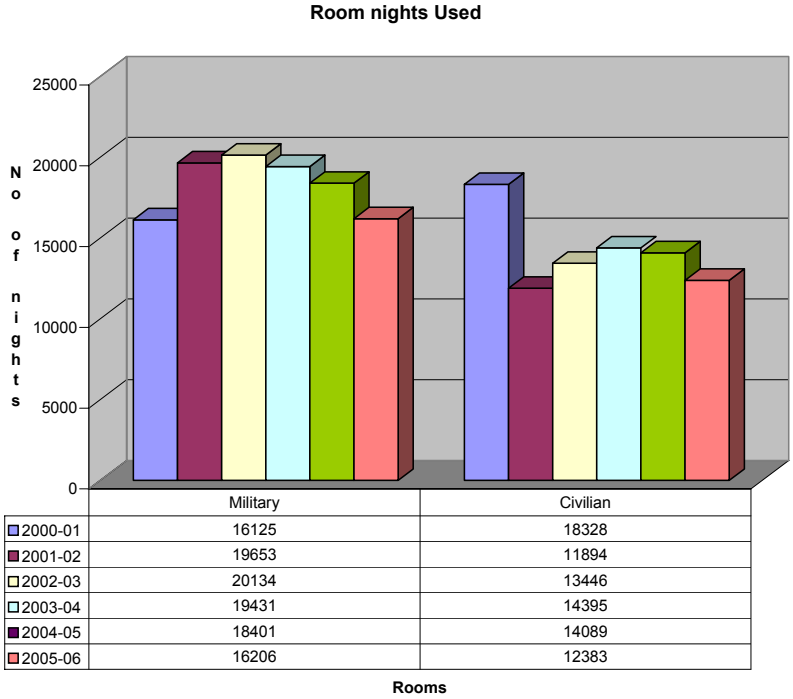
Clothing Distribution Center

CDC Warehouse staff conducted 183 ECW fitting sessions for 2,115 deploying participants. In addition, the staff processed 21,975 pounds of excess baggage for grantees and Raytheon employees. In total, the CDC supported sixty three passenger flights during the operational season.



	ARV MIL	ARV CIV	DEP MIL	DEP CIV
2000-01	2850	3737	2633	3293
2001-02	2856	3663	2853	3550
2002-03	2797	3852	2756	3551
2003-04	2605	4016	2602	3774
2004-05	2487	4136	2436	3683
2005-06	2225	4389	2221	4168

Figure 9-2 Christchurch Arrivals and Departures



	Military	Civilian
2000-01	16125	18328
2001-02	19653	11894
2002-03	20134	13446
2003-04	19431	14395
2004-05	18401	14089
2005-06	16206	12383

Figure 9-3 Christchurch Room Nights Used

Procurement

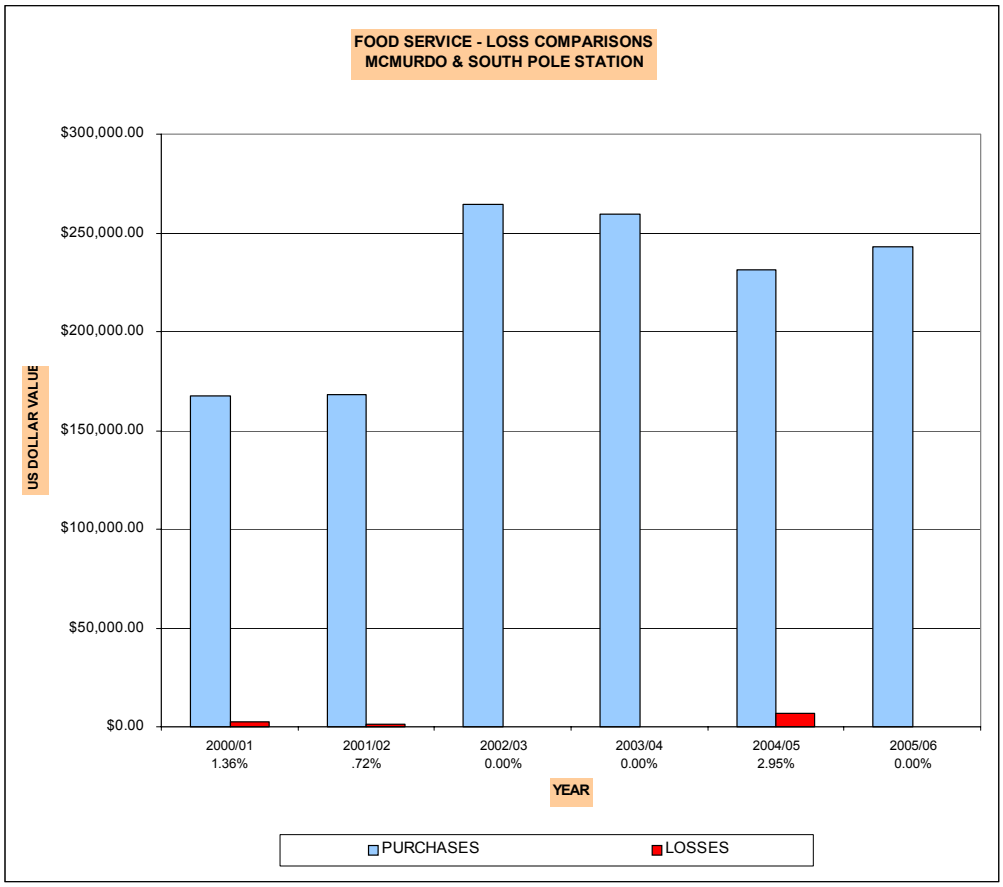


Figure 9-4 Food Service Loss Comparison - U.S. Dollars

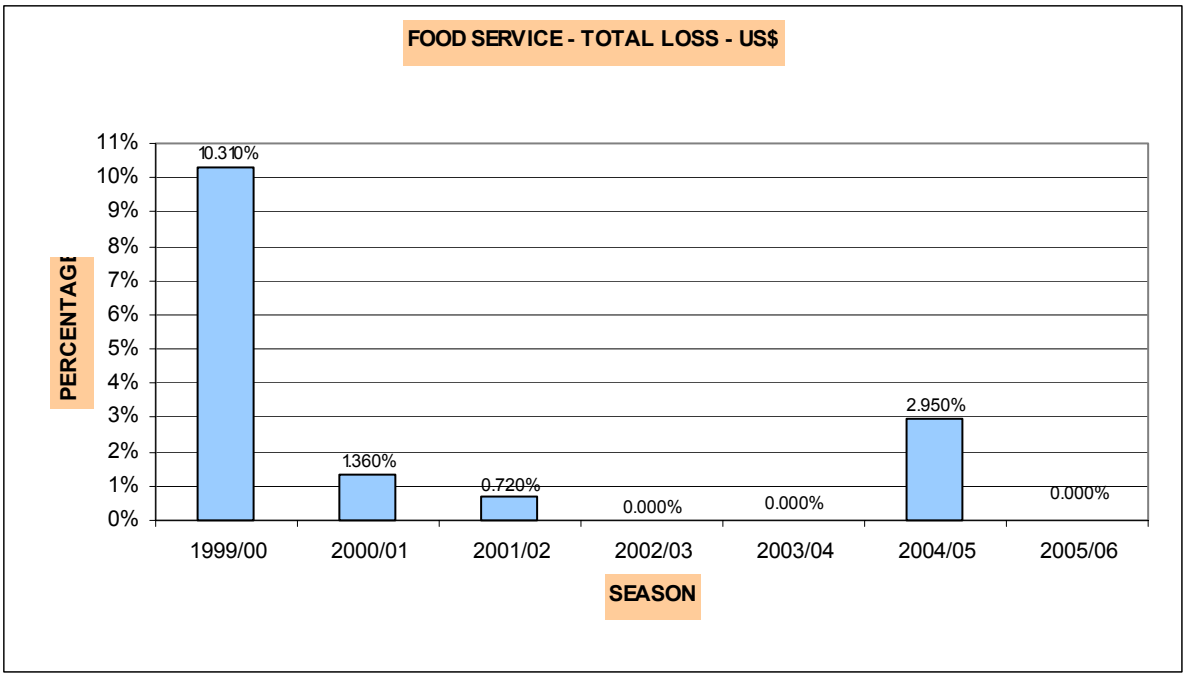


Figure 9-5 Food Service - Total Loss - U.S. Dollars

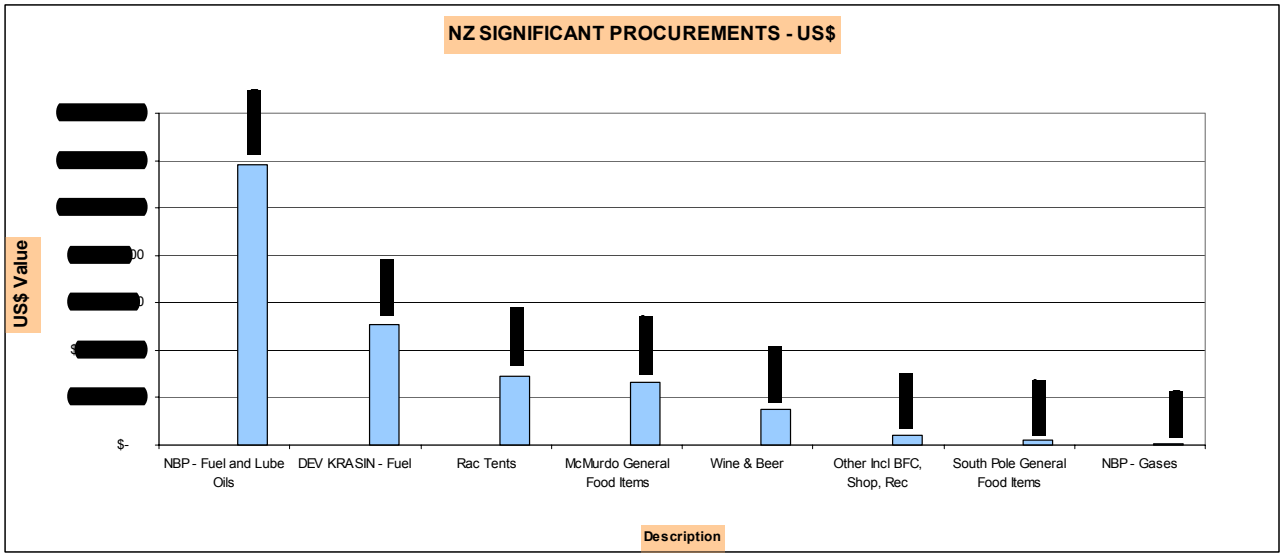


Figure 9-6 N.Z. Significant Procurements - U.S. Dollars

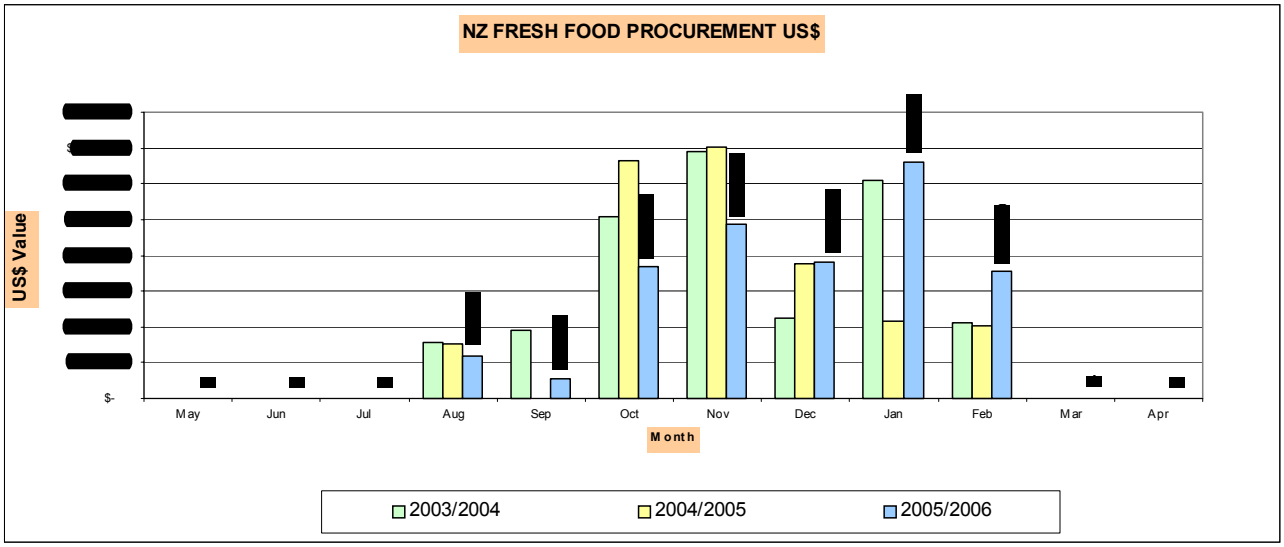


Figure 9-7 N.Z. Fresh Food Procurement - U.S. Dollars

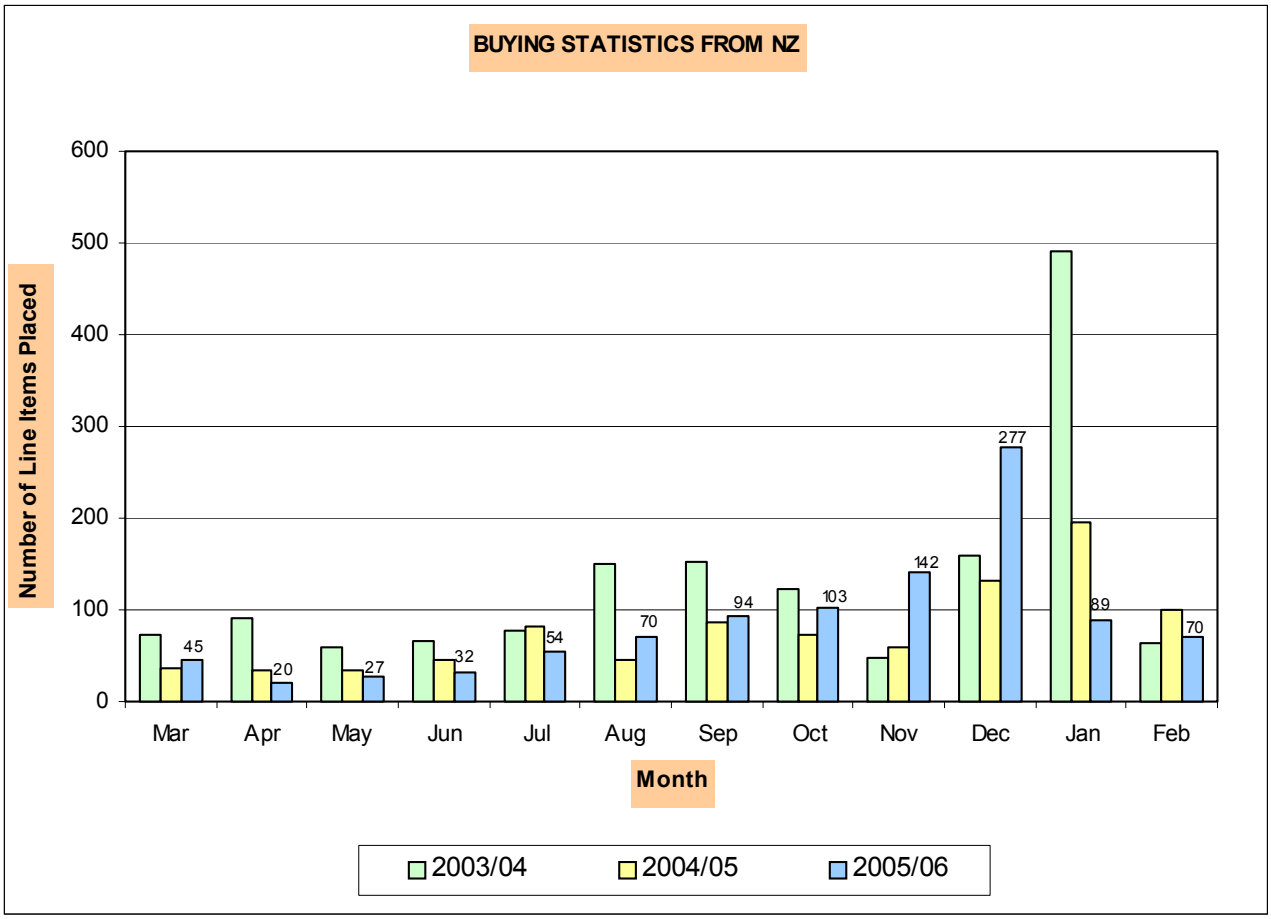


Figure 9-8 N.Z. Buying Statistics - Line Items

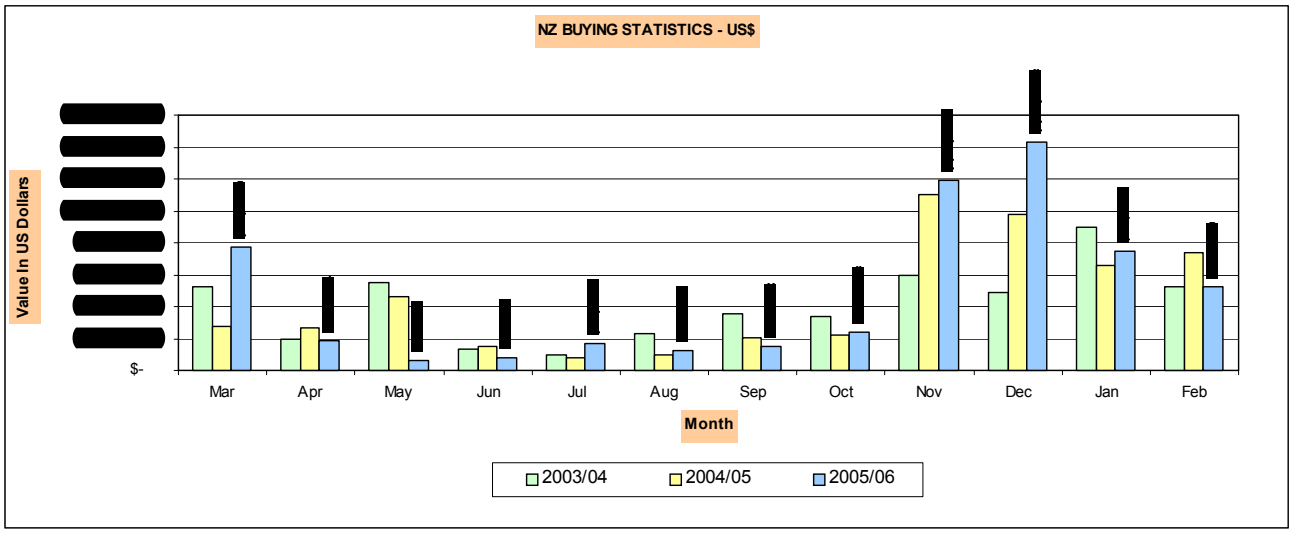


Figure 9-9 N.Z. Buying Statistics - U.S. Dollars

Section 2. Qualitative Performance

A. Project Management

General Management

Accomplishment: We returned unused Miscellaneous Charges Orders (Excess Baggage Coupons) every month for refund.

Benefit: Refunds are speedier when we return Charge Orders monthly. We returned a total of $37K (USD) in unused coupons, an $8K increase over KY05.

Accomplishment: We purchased a new 4,000 pound lift capacity forklift for the Air Cargo Yard and a second-hand light truck for the APO.

Benefit: A cost benefit analysis showed that purchasing a new forklift instead of leasing one resulted in long term savings to the USAP. The truck replaces an old one that was no longer usable.

Accomplishment: We procured a wide range of products and services to support the Antarctic Operation, including general food items, personnel safety equipment, anti-foaming agent for the Waste Water Treatment Plant, building and engineering materials, equipment spare parts, and service for specialist instruments and equipment. Such routine purchases would normally be made from Denver and would result in long delivery times.

Benefit: Savings in procurement time and transportation fees allowed us to deliver products and services sooner and at reduced cost.

Accomplishment: We arranged for the removal and disposal of the unused radio masts at the USAP Pound Road site.

Benefit: These units required annual inspection by antenna riggers redeploying from Antarctica. Their removal saves the Program yearly accommodation and per diem charges.

Accomplishment: On short notice, we procured fire fighting foam concentrate for shipment to McMurdo.

Benefit: This enabled the rapid commissioning of an additional fire fighting unit to support McMurdo airfield operations.

Accomplishment: We arranged both southbound and northbound port calls in Pusan, South Korea for the icebreaker *Krasin*. We also arranged for the procurement and loading of fuel for the *Krasin* in Lyttelton.

Benefit: The Korean port calls saved the NSF a significant amount of money by avoiding N.Z. VAT charges on cargo and charter. The efficient procurement and loading of fuel during the Lyttelton port call reduced vessel charter time.

Accomplishment: On short notice, we arranged for two mechanics to deploy to McMurdo to replace an engine on the WAIS Caterpillar 953 Loader.

Benefit: The expedited deployment allowed the WAIS Divide field camp to set up without major delay.

Customer Satisfaction

Accomplishment: When a science group found itself without a specific printer needed for field work, we sourced the required item and expedited shipment to McMurdo.

Benefit: The group was able to carry out its meteorite survey and print results in the field.

Accomplishment: The Travel Office provided crew transport for the 139th EAS this season.

Benefit: We provided the same level of service as the now-deactivated AMC Flight Operations, without any increase in staffing.

Accomplishment: We sent a customer satisfaction survey to all deploying USAP participants. The results show a high satisfaction rate.

Benefit: The survey validates the level of customer service we are delivering.

Accomplishment: Working with Immigration New Zealand (INZ), we developed an enhancement to the N.Z. Visitor Visa that allows us to

apply for visa extensions on behalf of USAP participants. Participants provide us with their passport information by e-mail, and we pass it on to INZ.

Benefit: This saved significant time for everyone. We've made further changes for next season, with all participants now accorded a nine-month visa on their arrival in New Zealand, provided they produce a letter from the USAP detailing their involvement in the program.

Accomplishment: We deployed a Christchurch APO Postal Worker to South Pole to process winter-over mail. In addition, we trained the three managers who would be responsible for summer operations at the South Pole APO.

Benefit: The Christchurch APO Postal Worker saw to it that all out-going packages were pre-processed, weighed, and ready for winter-over personnel when they came to post their mail. In the past, participants were forced to wait in line for an hour or more to process their mail, and a large portion of this was processed incorrectly. These errors increased the workload for McMurdo and Christchurch postal workers. Following are comments we received on the new procedure:

> "Just as an FYI...this was an AWESOME idea. Having the real P.O. guy come in and do the weighing, informing, etc., made things go very smoothly. It really made it easy on us getting our excess stuff out of here. I hope it becomes a trend so that all future winter-overs will have the same benefit . . . I never really thought of it, figured it was just a new RPSC thing that has always happened. ... DEFINITELY something that should happen every year!"

> "I can't say enough good things about [the Christchurch Postal Worker] and the service he provided to us at Pole. ... If possible please help his Raytheon boss understand what a valuable service he provided to the winter-over staff."

> "I just wanted to send you a quick note to be passed on to whom it may concern regarding [the Christchurch Postal Worker's] assistance with the post office. It was so wonderful having [him] here to help us with our outgoing mail. Leaving Pole after a long winter is very stressful, ... [he] was very helpful and patient with me when finding mistakes on how I filled out my customs forms. I greatly appreciated the service [he] gave to the South Pole community throughout the first week of station opening."

Cost Savings

Accomplishment: We resolved the ongoing issue with the N.Z. Inland Revenue Department over the reimbursement of GST in June 2005.

Benefit: The Inland Revenue Department refunded $3,607,123.27 (NZD), including $374,663.98 in interest. After deducting New Zealand Withholding Tax, we returned $3,454,374.60 (NZD) to the NSF.

Figure 9-10 Travel Fund Dollars Disbursed in Christchurch

B. Program Integration

Coordination Between WBS

Accomplishment: We worked with the WAIS Divide Project Manager to coordinate the construction of hard-walled buildings and sleds at WAIS. We procured RacTents and other related equipment in N.Z. for WAIS.

Benefit: Having the hard-walled buildings manufactured by the same vendor as the RacTents allows the units to be easily interconnected in the field.

Accomplishment: We provided support to the *NBP* during her two port calls at Lyttelton, procuring fuel and a number of scientific items and arranging for specialist technicians to repair the ship's equipment.

Benefit: The effort allowed the vessel to depart for its next science cruise with essential items in place and all equipment fully operational.

C. Innovation/Process Improvement

Innovative/Technological Solutions

Accomplishment: We intervened in the shipment of MICAP aircraft parts from CONUS to Christchurch for an unserviceable C-17.

Benefit: This direct intervention ensured delivery and repair two days ahead of military predictions, allowing inter-continental airlift to recommence and minimizing impact the on the USAP.

Accomplishment: In conjunction with Christchurch IT, we developed and implemented an electronic Clothing Issue Form.

Benefit: Before this, CDC staff had to print the Clothing Issue Form, log into PTS, locate the participant's clothing size information, and transfer the size information from the screen to the Clothing Issue Form. It was a time-consuming and laborious process. The electronic Clothing Issue Form now includes the participant's clothing sizes, which eliminates all those steps. In addition, the CDC can now print the Clothing Issue Form and the parka name label as one function instead of two.

Accomplishment: During the off-season, we replaced old, non-functional shelving with new shelving. At the same time, we used the opportunity to improve warehouse layout.

Benefit: The new layout brings the warehouse in line with the newly-developed Clothing Issue Form, creating a better workflow around the racks. The reduced depth and height of the new racks make items more accessible and improves the ergonomics of the warehouse, avoiding potential injuries.

Responsiveness to Challenge and Change

Accomplishment: We contracted a technician to screen laptops in Christchurch, before participants deployed. The technician screened over 800 laptops, of which 85 were tagged for cleaning.

Benefit: This effort resulted in a significant workload reduction for technicians at McMurdo and South Pole.

Identified Issues

Issue: The trans-shipment of genetically-modified organisms (GMOs) through New Zealand became an issue.

Response: As directed by the NSF, we worked with Science Support personnel to clarify grantee requirements for trans-shipping these items. Following discussions with MAF staff, we convened a series of teleconferences with NSF representatives to clarify N.Z. biosecurity regulations and procedures. As a result, GMO trans-shipment procedures will be incorporated into the next version of POLAR ICE.

Issue: We found that the personnel projections supplied by the NYANG were not accurate. This season there was a 22% under-projection, which resulted in our inability to provide airport hotel rooms during peak times.

Response: Ultimately, we were able to secure accommodation, though not at the hotel of choice

Lessons Learned

A movement of Class 1 explosives (dynamite) through Christchurch Airport caused significant disruption to the airport and to commercial operators. We were forced to spend considerable effort liaising and coordinating with airport officials to accommodate the dynamite off-load from inbound CONUS aircraft, and again for reloading the shipment to McMurdo. Because of legislated "clear zones" required around aircraft in such circumstances, and because the Net Explosive Quantity (NEQ) of this consignment was so large (11,000 kilograms), the transfer caused the closure of the airport's main runway.

As a result, airport officials have prohibited any movement of explosives larger than 400 kilograms NEQ when loose or on pallets, or 3,000 kilograms when loaded (and flown) in standard ISO shipping containers.

Section 3. Plans for KY07

We plan on expanding our customer satisfaction survey to cover other areas of Christchurch operations.

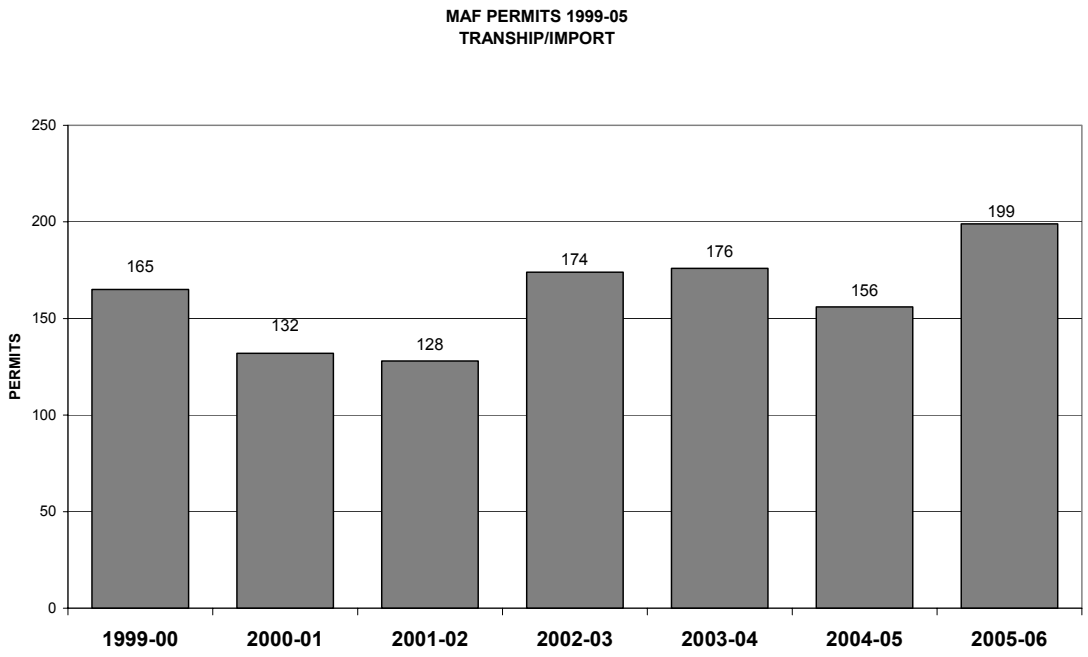


Figure 9-11 N.Z. MAF Permits

AREA DIRECTORATE - MCMURDO

The McMurdo Area Directorate continued to provide excellent support and services to the NSF during KY06, as evidenced by our quantitative performance metrics score of 99.44.

An NSF Representative visited the RPSC Centennial office in early April to discuss McMurdo operations, logistics support for WAIS Divide, and construction of the sea ice runway at WINFLY. Because of the poor condition of the sea ice, we were particularly concerned about where we would locate the runway. The NSF provided valuable input, and the meetings helped set the stage for a successful season.

WINFLY began August 20, 2005, supported by four C-17 flights. During the WINFLY period, we contracted a professional moving team to replace the old furniture in the "Hotel California" dorm with new furniture that had arrived on the February resupply vessel. They completed the project safely and efficiently.

We also began work on the sea ice runway, especially difficult this year because of multi-year ice conditions. With no other options, we located it on last year's icebreaker channel and turning basin. Ice conditions prevented us from building a crosswind runway, which further complicated the airfield's design because we still needed to meet the FAA's Terminal Instruction Procedures (TERPS) for safe approaches and departures. We completed the runway on schedule for the first Mainbody flight on October 4, 2005.

The Vehicle Maintenance Facility (VMF) improved their equipment maintenance and service, which greatly assisted ice runway construction by making available more equipment than in years past. In addition, VMF personnel cleaned and improved the safety of several work areas, including the welding bay, the battery room, the oil room, the rebuild room and the shop bays. The VMF team also established an annual vehicle inspection program to identify safety items, upcoming maintenance issues, and vehicle damage.

In an effort to improve overall safety around McMurdo Station, we expanded the Labor Crew's duties to include inspection of the station's roads and walkways for slick or potentially hazardous areas. The Labor Crew established search patterns, identified potential hazards, and either eliminated the hazards or coordinated with Fleet Operations to do so. This process continued through the snowy and icy part of the season.

During KY06, we sponsored two major projects: the South Pole Traverse Proof of Concept and the Microwave Landing System. Both were successful and both will have lasting positive effects on Program support capabilities and flexibility. Further details on these projects are included below.

We also supported the bandwidth upgrade carried out at Black Island. This season-long project doubled the bandwidth for use by science groups and individual users at McMurdo Station and increased the number of outbound telephone lines from 18 to 26. We scheduled additional traverses to Black Island to support the extra personnel required to complete the project.

We supported two successful non-USAP MEDEVACs near the end of the austral summer season. Both originated near Cape Hallett and required air transport to McMurdo and then onward to New Zealand. This kind of emergency response to and support of non-USAP entities is made possible by the 24x7x365 communications coverage provided by Mac Ops. This season, Mac Ops improved its tracking capabilities by installing a large electronic display monitor connected to a computer console. This allows operators to make real-time status changes without leaving the operator console.

The Station Services team, lead by [redacted] worked hard to improve morale, despite the reduced number of morale trips as compared to previous seasons. They increased the basic daily food allowance (BDFA) to improve food quality. They also made it a priority to have fresh fruits and vegetables available in McMurdo continuously throughout the season, and they provided these "freshies" to field camps and the South Pole station. The Recreation Department sponsored more alcohol-free events and arranged the "Trip to Nowhere" morale trips away from the station. They also offered "Dinner and a Movie" on Saturday nights in the Dining Facility.

Under the leadership of a new [redacted] Food, Beverage, and Retail Manager, we developed a distribution management plan for alcoholic beverages at McMurdo and South Pole to ensure products would be available at all locations through the entire season. We also improved our management plan for available foodstuffs on-site and for those items arriving on the February resupply vessel.

As is usually the case, additional tasks arose throughout the season. For example, RPSC Chalet personnel accepted responsibility for the tourist ship support previously provided by the NSF. We accommodated approximately 90 tourists per visit, each of which ranged from 6½ to 8½ hours. We will need to review and update the Chalet staffing if this task becomes permanent, as it requires significant time and effort. Our NSF Administrative Assistant provided exceptional support for a number of Distinguished Visitor (DV) tours, including an important Congressional delegation. The NSF Polar Research Support Section Head remarked positively on this person's efforts.

Vessel operations required us to schedule the fuel tanker and cargo vessel for arrival earlier than normal. However, ice conditions and problems with the icebreaker's propulsion system caused delays. Fuel management became a critical issue because of these delays, especially regarding AN-8. We shuffled priorities until the fuel arrived without affecting operations at McMurdo or South Pole. In fact, we supported an extended season at Pole that included a record 377 flights.

We hired a new Station Manager to address the day-to-day operations at McMurdo. This allowed us to reassign the responsibilities of the McMurdo Area Director, who now oversees long-term strategic planning with the NSF.

Finally, we learned several lessons this year, as detailed in the following departmental sections. For the Directorate as a whole, we realize we require improved communications between the RPSC McMurdo Area Site Manager and the Area Director, especially with regard to seasonal planning. The site manager needs to be a part of the pre-season planning process to understand fully the issues involved, and the plans to mitigate them.

AIRFIELD MANAGEMENT

Section 1. Summary

The Airfield Management office had an outstanding season, successfully meeting the needs and expectations of the NSF. Seasonal high points included successful construction of the annual sea ice runway, completion of all scheduled C-130 and C-17 airlift flights, successful move from the sea ice runway to Williams Field, and in particular the installation, activation, and FAA Certification of the Microwave Landing System (MLS).

Section 2. Qualitative Performance

A. Project Management

General Management

Accomplishment: We successfully planned and managed operations at Williams Field, Pegasus, and the sea ice runway to maximize on-continent and intercontinental airlift.

Benefit: Aircraft operations proceeded on schedule through the austral summer.

Figure 10-1 C-17 on the Annual Sea Ice Runway

Accomplishment: We planned for and accomplished the early opening of the Pegasus white ice runway in December.

Benefit: The C-17 airlift remained on schedule.

Accomplishment: We planned and coordinated the successful Royal New Zealand Defense Forces (RNZDF) P-3 Orion test at the Pegasus runway. The aircraft is under evaluation for future use in Antarctica.

Benefit: This international cooperative effort provided familiarization training for RNZDF aircrew and USAP ground-handling personnel. Proving the feasibility of landing and launching P-3 aircraft at Pegasus opens the door to another means of emergency airlift should we ever need to MEDEVAC a patient when LC-130 aircraft are not available.

Figure 10-2 P-3 Orion on the Pegasus White Ice Runway

Accomplishment: We tested and evaluated C-17 engine-running off-loads and on-loads of cargo and passengers at Pegasus.

Benefit: Engine-running off-loads and on-loads reduce turn-around time to approximately half the previous requirement. This provides greater flexibility in passenger and cargo handling and flight scheduling.

Accomplishment: We coordinated with the NSF to eliminate refueling C-17 aircraft at Pegasus.

Benefit: This action significantly reduced the late-season depletion of a severely limited supply of AN-8 fuel.

Customer Satisfaction

Accomplishment: We worked with SFA and the NYANG to prepare for the USAF inspection of the NYANG's 109th Airlift Wing. We ensured

all RPSC airfield support was ready for the USAF inspection.

Benefit: The USAF team duly noted that contractor support on the airfield was excellent, and the inspection team identified no issues. We also received accolades from the NYANG for outstanding support during the USAF inspection.

B. Program Integration

Coordination Between WBS

Accomplishment: The USAP Airfield Manager and the Fleet Operations Supervisor worked closely throughout the season to coordinate daily maintenance of all airfield ramps, runways, and skiways.

Benefit: This coordination kept all airfields in top condition and prevented any infrastructure delays to airlift operations.

Accomplishment: We coordinated with Science Support to schedule the opening of the Odell Landing Site (Figure 10-3).

Figure 10-3 Odell Landing Site

Benefit: This site provides a critical emergency airfield for LC-130 aircraft.

Accomplishment: The Aerospace Ground Equipment (AGE) Department helped MLS project technicians set up distance measuring equipment antennas and generators on the airfields.

Benefit: Because of increased fall-protection requirements and limits on weight lifting, we could not have commissioned the MLS in a safe and timely manner without this invaluable assistance.

Accomplishment: Throughout the season, MLS technicians worked closely with IT and Operations during the setup and monitoring of the MLS.

Benefit: This close coordination ensured 24x7x365 coverage on this critical airfield landing navigation aid, in case of a power outage.

C. Innovation/Process Improvement

Innovative, Technological Solutions

Accomplishment: We successfully flight-tested and FAA-certified the Microwave Landing System (MLS-01) in December 2005 (Figure 10-4).

Figure 10-4 MLS-01 at the Williams Field Skiway

Benefit: This was a major milestone for the MLS Project and the USAP. FAA flight certification allows the USAP to use the MLS and eliminate the existing, outdated, maintenance-intensive Precision Approach Radar.

Responsiveness to Challenge and Change

Accomplishment: We coordinated with other RPSC departments and USAP agencies (the SPAWAR Polar Projects Office (SPPO), the United States Air Force (USAF), and the NSF) before and during the season to identify the best location for the annual sea ice runway and manage its construction. Because sea ice conditions were so poor elsewhere, we constructed the runway on the previous season's icebreaker channel. Even so, construction was an enormous challenge. We had to remove large undulations and waves in the sea ice to create a smooth sur-

face for aircraft operations (Figure 10-5). Fleet Operations' role in this effort was outstanding.

Figure 10-5 Undulations at Sea Ice Runway before Construction

Benefit: The annual sea ice runway opened on schedule and exceeded expectations, as recognized by the NSF. All wheeled C-130 and C-17 airlift was completed as scheduled.

Identified Issues

Issue: Transfer from the annual sea ice runway to Williams Field was seriously impacted by adverse weather conditions, aircraft mechanical problems, and weather diverts of LC-130s. It was extremely difficult to conduct flight operations during the move.

Response: We diverted inbound aircraft to field camps until weather conditions improved sufficiently to open Williams Field. We extended operations at the sea ice runway beyond planned closure so aircraft grounded there for mechanical problems could be repaired and launched. AGE shop managers expertly divided personnel and equipment resources to support simultaneous repair efforts and aircraft recovery at separate locations. We altered the building transfer schedule to maintain shelter and workspace at the sea ice runway until all aircraft had departed.

Figure 10-6 Sea Ice Runway on 12 Dec 2005

Lessons Learned

We learned flight operations should be suspended during the runway move to Williams Field. The move should be scheduled over a Saturday and Sunday to minimize impact on the air operations schedule. We recommend that normal flight operations be suspended after the last aircraft recovery on the Friday before the scheduled move and resumed only after the move is complete. The normal weekly rotator flight should fly north on the Friday before the scheduled move and return south on Sunday.

Figure 10-7 Moving the Sea Ice Runway

Personnel on the MLS project found it difficult to coordinate technical changes to the system because they had only the use of a snowmobile to transport themselves and their tools to the MLS modules at two airfields. Attempting to coordinate with shuttle schedules proved very difficult and at times very impractical. The lack of transportation cost them many productive hours. It may be necessary to plan dedicated transport for future projects of this nature.

Proper staffing, a properly organized workshop area, and relatively new equipment allowed the AGE Department to go another year without a recordable injury.

The AGE Department had electrical problems with the Hobart Carts that reduced their reliability. The electrical systems fault detection system failed to disconnect when it sensed a spike. AGE personnel will identify a T-event to come to McMurdo to evaluate the problem and assist in making repairs.

Section 3. Plans for KY07

We anticipate again building the annual sea ice runway on the sea ice channel during WINFLY 2006 (Figure 10-8). We expect that this will once again be a challenge, since the sea ice has not gone out.

Figure 10-8 Proposed Location of Ice Runway

FIRE DEPARTMENT

Section 1. Summary

The Fire Department responded to 209 calls between August 20, 2005 and Feb. 25, 2006. We extinguished a fire in a generator shack at Williams Field, assisted Scott Base personnel in putting out a fire in the SAR Haaglund, assisted EH&S personnel in cleaning up a large fuel spill near the ice runway, and responded quickly to a fuel leak in the wing of an LC-130 to prevent a large spill at Williams Field.

We enhanced our Aircraft Rescue Fire Fighting (ARFF) capability at the South Pole with a new Compressed Air Foam System (CAFS). The unit (Figure 10-9) replaces the former dry chemical system with a system that uses 150 gallons of Aqueous Film-Forming Foam and 500 pounds of dry chemical and is capable of expressing both agents through the nozzle simultaneously. The new system is the standard in the ARFF industry, and it increases our fire suppression capability without increasing staff.

Figure 10-9 South Pole CAFS System

Section 2. Qualitative Performance

A. Project Management

General Management

Accomplishment: We improved fire brigade training for South Pole and Palmer stations by contracting Red Rocks Community College. The school provides specific training on the fire suppression equipment available at Palmer and South Pole. Students learn basic fire suppression and incident command through a combination of classroom work and hands-on training.

Benefit: Brigade members learn and practice real skills under controlled conditions and work together to form a cohesive team, increasing their effectiveness.

Accomplishment: We upgraded our software to track personnel and equipment more effectively.

Benefit: The software allows us to integrate our statistical reports into RPSC formats used for scheduling, labor reporting, and equipment tracking, making all of these functions more efficient.

Customer Satisfaction

Accomplishment: We helped deliver 50,000 gallons of potable water to the icebreaker *Krasin* by laying 1,500 feet of two-inch hose from the pier hydrant to the ship's water storage tank.

Benefit: Our assistance promoted goodwill between the USAP and an important international contractor.

B. Program Integration

Coordination Between WBS

Accomplishment: We performed more than 1,000 hours of community service, providing emergency labor to Food Services, Recreation, Station Services, Fleet Operations, Dive Services, and the Microwave Landing System Project.

Benefit: Our assistance was crucial when labor was critically short and no other alternatives were available. Microwave Landing System personnel specifically cited our assistance as crucial to the system's successful certification by the Federal Aviation Administration (FAA).

C. Innovation/Process Improvement

Innovative, Technological Solutions

Accomplishment: We enhanced the Aircraft Rescue Fire Fighting capability at the South Pole with the CAFS.

Benefit: This cutting-edge technology, only recently approved by the FAA, greatly augments South Pole fire suppression capabilities without increasing staff.

Section 3. Plans for KY07

Nothing to report.

FLEET OPERATIONS

Section 1. Summary

KY06 presented Fleet Operations with several challenges. Poor sea ice conditions forced changes in ice runway construction and in cargo delivery to Marble Point. At the same time, we supported busy airfield schedules and new projects, such as the Long Duration Balloon (LDB) facility move, while maintaining roads in harsh conditions.

Because the heat-damaged, multi-year sea ice elsewhere would not support heavy, wheeled aircraft, we were forced to build the sea ice runway in the shipping channel and turning basin. Doing so required us to modify equipment and develop new methods and techniques. Despite the challenges, we completed a fully functional, high-quality airfield on schedule.

Warm temperatures in November and early December stressed the snow pavements of roads, transitions, and airfields. All required constant vigilance and maintenance. Meanwhile, we supported the largest planned airlift in the program's history. The aggressive flight schedule required us to open the Williams and Pegasus airfields earlier than normal.

We transported the new LDB buildings from the Scott Base Transition construction area and safely positioned them at the LDB site near Williams Field. We also supported unscheduled construction on these buildings during Mainbody, with approximately 800 hours of cargo delivery and on-site heavy equipment support.

Poor route conditions on the multi-year sea ice prevented us from using Deltas for cargo delivery to Marble Point. Instead, we used our limited fleet of Challengers and rubber-tracked trailers. The route proved to be entirely too rough and will require extensive road building to support any future traverses. The damaged multi-year sea ice also forced us to close the Williams Field Road to the sea ice runway. Instead, we shuttled all equipment and buildings back and forth on the Pegasus road system, which doubled distance and travel time. We supported several unscheduled flights at Pegasus, including an operational test by a P3 Orion.

We took advantage of exceptionally good weather all season to improve and upgrade drainage, culverts, roads, transitions, and fuel containment berms. We also completed several cleanup projects, improved rear access to building 140, and made significant progress leveling Fortress Rocks.

Section 2. Qualitative Performance

A. Project Management

General Management

Accomplishment: Exceptional weather and the increased availability of two bulldozers allowed us to gather nearly four times the normal amount of rock material. We collected 3,500 cubic yards of new grey rock with high "fines" content and 4,000 cubic yards with a high content of medium-coarse material. We produced approximately 3,000 cubic yards of screened red "fines" from 4,000 cubic yards of gathered material.

Benefit: We met the high demand for fill material used in infrastructure projects.

Customer Satisfaction

Accomplishment: We provided approximately 48,350 hours of heavy equipment operation, with 100% compliance to the NSF's Preventive Maintenance Metrics.

Benefit: We met client expectations and supported several important, high-profile projects. Effective preventative maintenance extends equipment life and saves money.

B. Program Integration

Coordination Between WBS

Accomplishment: We maintained open communication with the USAP Airfield Manager to make certain we were continuously apprised of airfield needs.

Benefit: We responded quickly to airfield maintenance requirements and flight operations proceeded without interruption.

Accomplishment: We assisted with the Microwave Landing System (MLS) Project. MLS project team members cited our rapid response to several unexpected events – as well as the safe and timely movement of the prototype MLS from the annual sea ice runway to Williams Field – as pivotal factors in their successful season.

Benefit: Our assistance helped to bring MLS online as scheduled. The NSF expects to save more than $10 million over the next ten years with the MLS. (The Federal Aviation Administration certified the system this season for use as a precision landing navigation aid in Antarctica.)

Integration of Environment, Health, and Safety Objectives Across Corporate Activities

Accomplishment: We developed an innovative method for covering and protecting fuel tank containment liners. We now protect the fines material on the containment liner from wind erosion by covering it with an overlay of coarse material.

Benefit: This method eliminates the need to constantly replace the fines and reduces the amount of dirt blowing through McMurdo from the Pass.

C. Innovation/Process Improvement

Innovative, Technological Solutions

Accomplishment: We purchased four new adjustable rock-screening grizzlies.

Benefit: The new grizzlies improve screening efficiency, allowing us to produce several classifications of products and tailor rock material for the first time. One of these tailored products is the medium course material we use to protect the fuel containment liners. The grizzlies also delivered an immediate safety benefit by eliminating soft-ball-sized "ankle twister" rocks from material used to mitigate icy surfaces.

Visionary Management

Accomplishment: We pioneered and constructed the 18-mile glacier segment of the first-ever front route to Black Island. As we continue on to the island, we are protecting the glacier road from melt-pooling by using snow mining and maintenance techniques to raise its albedo.

Benefit: This route, once complete, will greatly enhance the safety and decrease the expense of all future traverses to Black Island.

Responsiveness to Challenge and Change

Accomplishment: We constructed the annual sea ice runway on aggregate ice in the shipping channel and turning basin. The aggregate ice was severely wrinkled and depressed, but inspection of the surrounding multi-year sea ice confirmed that it could not support heavy wheeled loads. We worked closely with all stakeholders and modified our methods, equipment, and techniques to build this challenging ice runway on schedule.

Benefit: The innovative methods we developed are now available for other ice-engineering projects, and to build similar ice runways in future seasons, if necessary.

Identified Issues

Issue: The cargo vessel damaged the bridge ramp when it docked.

Response: We rebuilt the bridge in 8½ hours to a 100,000 pound maximum capacity, minimizing the incident's effect on the vessel off-load schedule.

Issue: Because of extremely poor ice conditions and melt damage from previous seasons, the ice runway road had considerable flaws.

Response: We used a combination of extensive grading, patching, and filling with a slurry ice/water mix to maintain the road in excellent condition for airfield operations.

Issue: Wind erosion removed a large amount of the fines material protecting the containment liners of several fuel tanks, and the liner fabric was

at risk of wind damage. We required a large amount of gravel product to re-cover the berm liners with fines, and then cover that with heavy, coarse grey rock to prevent future erosion.

Response: We recycled roughly 3,000 cubic yards of various rocks from other projects to meet this unusually high demand for material.

Lessons Learned

We need to revise the ship docking procedures, as the current practice of driving into the wharf under full power seriously threatens to damage the wharf and bridge, as it did this season. The cargo vessel pushed the wharf so close to the shore that the wharf is now in danger of breaking if a low tide brings it to rest on the shallow sea floor under the mote.

Fleet Ops scheduled the clearing of the wharf area for earlier in the season. That proved very beneficial to Waste Operations, as they were able to fill, tag and move milvans to the wharf earlier. When vessel back-load began, the ready availability of retrograde items reduced vessel time at the ice wharf.

Communication with (and within) some science events can present challenges, particularly international events where language is a problem. For example, the French science event, VORCORE, did not have a single point of contact for the event. As a consequence, several members of the event made identical and simultaneous requests of several Fleet Ops personnel, leading us to duplicate work. Designating a single point of contact for interfacing with support personnel would solve this problem.

The Mattrack component of the ARFF vehicles is unreliable. The Fleet Ops Manager will research replacements or work with the current vendor to improve these components.

Section 3. Plans for KY07

In KY07, we plan to build an ice road over the extremely rough and damaged multi-year sea ice to Marble Point. This road is needed to transport aviation fuel to the camp's storage depot for Dry Valley helicopter operations. Traditionally, the Coast Guard cutter refueled Marble Point, but this is no longer possible.

FUEL OPERATIONS

Section 1. Summary

The Fuel Operations Department delivered a combined total of 5,431,286 gallons of AN-8, JP-5 and MOGAS fuels between August 2005 and February 2006 (Table 10-1). Monthly deliveries varied from a low of 258,033 gallons in August to a high of 1.4 million gallons in January. Average monthly deliveries, by fuel type, were 525,413 gallons of AN-8, 273,423 gallons of JP-5, and 13,061 gallons of MOGAS.

Table 10-1 Total McMurdo Fuel Issues

MONTH	AN-8	JP-5	MOGAS
August 2005	17,199	229,364	11,470
September 2005	42,797	241,137	3,184
October 2005	313,673	245,459	14,675
November 2005	1,007,373	200,322	32,279
December 2005	622,740	178,694	7,105
January 2006	1,187,332	202,789	17,301
February 2006	486,780	364,200	5,413
Total	3,677,894	1,661,965	91,427
Based on the inventory of McMurdo bulk fuel tanks each month			

We employed 21 people at McMurdo. Most of them had previous Ice experience and nearly half were returnees to the Fuels Ops. We added two dedicated operators to South Pole staff and further augmented that department with a rotating operator drawn from McMurdo Fuels staff. We also rotated McMurdo staff through the operator position at Marble Point throughout the season.

During the season, we took an aggressive approach to safety. Each employee completed the Job Specific Training Checklist on the first day of work. We held weekly safety meetings and discussed safety topics daily, and employees were encouraged to present safety concerns or suggestions. Workers stretched daily, at the beginning of each shift. We met with the Physical Therapist at the start of the season to discuss ergonomics and stretching routines, and we focused our reviews on repetitive motion injuries and strains.

Section 2. Qualitative Performance

A. Project Management

General Management

Accomplishment: We replaced the last remaining section of flanged pipeline with welded line in December. We also added an air vent and drop valve to help drain the pipeline.

Benefit: This eliminates a major potential for environmental contamination from fuel leaks at flanged connections.

Accomplishment: We replaced the hose line from valve M-7 on the MOGAS pipeline to the MOGAS drum-filling sump with a section of two-inch pipe.

Benefit: This important action eliminates the likelihood of a spill from that connection.

Accomplishment: We created detailed working procedures for aircraft refueling and de-fueling, fuel cache testing, Fuel Mule operation, hazardous waste disposal, Heliport fueling system setup, ice runway hose lay notes, ice runway hose pick-up, opening runway fuel pits, and strapping six-inch hose line.

Benefit: These procedures will improve safety and efficiency by standardizing operations.

Accomplishment: We purchased a new fuel delivery truck.

Benefit: The new vehicle replaces an increasingly unreliable vehicle (the Fuel Mule) and should deliver fuel reliably for many years. As the fuel truck represents a single point of failure in heating oil delivery, this was an important acquisition.

B. Program Integration

Coordination Between WBS

Accomplishment: We provided fuel for the South Pole Traverse and helped plumb its two 2,000 gallon fuel bladders. In addition, our mechanic trained Traverse team members on changing filters and on dry-break valve servicing.

Benefit: These efforts reduced the likelihood of fuel spillage (and the unfavorable publicity that would result) on this sensitive, high-profile project.

C. Innovation/Process Improvement

Visionary Management

Accomplishment: We spent an enormous amount of time developing an across-the-ice fuel tanker off-load contingency plan in case the vessel could not reach the McMurdo Wharf.

Benefit: This contingency plan is now in place in case it is ever needed.

Responsiveness to Challenge and Change

Accomplishment: Because the fuel tanker was late in arriving, our supply of AN-8 aircraft fuel became extremely short. After consulting with Petroleum Helicopters International and the NSF, we switched the heliport to JP-5.

Benefit: This prompt action conserved the limited, remaining stock of AN-8 for LC-130 and South Pole use, both of which use AN-8 fuel exclusively.

Accomplishment: When unsafe sea ice conditions prevented us from filling the aviation fuel tanks at the sea ice runway, we made daily fuel transfer runs to the airfield to meet operational demands.

Benefit: Fuel was not a limiting factor in flight operations.

Identified Issues

Issue: A tracked vehicle from another department punctured a hose at the sea ice runway, causing a 2,200 gallon fuel spill. (One of our operators discovered the spill during a routine inspection of the hose and notified the Fire Department.)

Response: We doubled the amount of flags marking the fuel hose. In addition, we blocked the old ice runway road with numerous flags (the fuel hose crossed the old road), preventing anyone from driving on it.

Issue: A coupling came loose from a two-inch hose used to fuel Twin Otter aircraft at Williams Field, releasing approximately six gallons of fuel. We worked with Fleet Ops to clean up the spill.

Response: We removed all similar hoses from service at the airfields. We also compiled a report documenting the manufacturing deficiency to ensure we do not purchase any more hoses with the same configuration.

Issue: Up to five gallons of fuel spilled from the bonnet on valve D-6 because of fuel thermal expansion in the JP-5 pipeline near the ice wharf. We detected the spill after a post-tanker pipeline inspection. We are waiting to remove the contaminated soil until we decide how best to support the valves.

Response: We submitted a Corrective Change Request to FEMC to run the pipelines beneath the Hut Point Road through a utilidoor. This will move the poorly-supported valves from a steep slope (which makes them hazardous to work on) to a flat area on the ice wharf side of the road, where we can safely access them.

Issue: The quality of the phenolic-lined fuel drums appears to have declined from last season. We discovered leaks around the bottom seam of several drums.

Response: We immediately transferred the fuel into new drums. No spills occurred because we fill the drums over containment sumps.

Lessons Learned

Prudent coordination with the NSF and other agencies allowed the Fuels Department to meet Program needs without any interruption to operations. We carried out daily meetings and made sure everyone involved was fully informed so they could be part of the process.

Section 3. Plans for KY07

Nothing to report.

MAC OPS

Section 1. Summary

McMurdo Operations, or Mac Ops, runs 24 hours a day, seven days a week during the austral summer, providing daily communication support to personnel in the field and at South Pole. Field parties rely on us to pass along resupply requests, obtain flight information, discuss air operations, track passenger and cargo movement, and relay advice and/or instruction from various departments in McMurdo. In our daily communications, we use VHF and HF radio, UHF radiotelephones, the Internet, and iridium satellite phones. We supported 58 field camps this past season. See Table 10-2.

Table 10-2 Seasonal Trends in Field Camp and Regional Travel Activity

Activity	1997-1998	1998-1999	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006
Daily Field Camp Check-Ins	1429	----	----	1798	1704	1919	1960	1987	1783
Regional Travel Checkouts	861	865	900	1190	1138	1250	1171	1233	975
Traverses *	----	----	12	11	18	8	10	7	4
Field Camp Locations **	64	51	54	72	64	67	70	71	58
Chalet Inbriefs	----	37	45	61	48	60	74	65	21
Mac Ops Communications Briefs	----	----	----	63	55	57	71	69	65
SARMC Notifications	24	19	23	43	15	27	17	14	7

Notes:
*** Traverses include Black Island, Marble Point, and Shear Zone Camp (02-03).**
**** Field Camp Locations does not include day-trip sites; they are overnight campsites at a minimum.**
---- Indicates data not available

We also provide communication assistance to the NYANG LC-130 aircraft, Twin Otter aircraft, non-USAP stations, and vessels operating in local waters (Table 10-3). We continuously monitor eight VHF channels, with a "Mac Ops" channel as the primary frequency for regional travel checkouts. Two other departments share this frequency, which caused some problems for science events because of the extensive traffic on this frequency. On occasion, the Fire Department used recordings of our VHF traffic because their equipment does not have this capability.

We worked closely with members of each science event to advise them of our policies and procedures, and to ensure our operators understood each event's needs for the season. Our Communications Supervisor created and presented a PowerPoint presentation for two sessions of the Biology class (B-301-M) to discuss radio protocols for McMurdo and the field.

The last fixed wing-supported field camp pulled out on February 3, and helicopter operations ended on February 11. We supported the extended season at South Pole station through February 21.

Table 10-3 Supported Stations and Vessels

Antarctic Stations	Vessels
Mario Zucchelli Station	I/B *Krasin*
Patriot Hills	USNS *Lawrence H. Gianella*
Gondwana Station	M/V *American Tern*
Scott Base	I/B *Kapitan Khlebnikov*
Rothera	R/V *Nathaniel B. Palmer*
	M/V *Marina Svetayva*
	F/V *Paloma V*
	USCGC *Polar Star*

Section 2. Qualitative Performance

A. Project Management

General Management

Accomplishment: Our staff began training as early as WINFLY and continued through station opening.

Benefit: We had a highly qualified team in place to meet the demands of a high-tempo season.

Customer Satisfaction

Accomplishment: We provided work center tours to numerous DVs, including the National Science Board, the Congressional Delegation, the House Appropriations Committee, the U.S. Embassy to New Zealand, the NSF Environmental, Health and Safety Department, and the acting Director of the U.S. Geological Survey. We also briefed the Scott Base Communications staff, the Operations Manager of Mario Zucchelli Station, *USCGC Polar Star* communications staff, and members of the *Kapitan Khlebnikov* tourist vessel.

Benefit: Tours demonstrate the complexity of science support, especially to visitors who can affect the program in positive ways.

Accomplishment: We trained all of our operators to set up the Emergency Operations Center (EOC) in building 165. We conducted this drill several times to familiarize our operators with procedures and to verify equipment was functioning properly.

Benefit: The ability of any operator to set up the EOC quickly is essential for a rapid response in case of an emergency.

Cost Savings

Accomplishment: We eliminated one position in FY06 in a continuing effort to streamline our operation. We have reduced our staff from 11 to seven since 2003, when we combined Mac Ops and Mac Relay.

Benefit: The FY06 change saves approximately $15K in Labor and Fringe.

B. Program Integration

Integration of Environment, Health, and Safety Objectives Across Corporate Activities

Accomplishment: We processed 1,783 daily check-ins from field camps during the 2005-2006 austral summer, and we monitored 975 regional day trips, including traverses to Marble Point and Black Island. We serve as the primary contact in the case of an emergency by a field party or camp, or when a USAP-registered beacon is set off, or if we receive a distress call through one of several rescue coordination centers. This season we notified the Search and Rescue Mission Coordinator (SARMC) seven times.

Benefit: Our central role as the primary point of contact eliminates confusion and allows rescue operations to commence quickly.

C. Innovation/Process Improvement

Innovative, Technological Solutions

Accomplishment: We replaced a manual field camp tracking system with a 42-inch plasma screen display.

Benefit: The electronic display board reduces the number of tracking locations from four to two, eliminating the chance for error. It also saved us considerable time compared to using grease pencils.

Accomplishment: Mac Ops worked closely with the IT Web design team to enhance the eFoot Plan website.

Benefit: People were able to file foot plans electronically, which allows the USAP to track them in an electronic database and develop statistics on route usage.

Responsiveness to Challenge and Change

Accomplishment: We operated the EOC during two MEDEVACs involving vessels (a Uruguayan fishing ship and a tourist vessel) in local waters. We also assisted in the EOC during the Mass Casualty Drill on December 7 and worked there on December 30 in response to a fuel spill at the Williams Field Runway.

Benefit: Assisting non-USAP personnel in emergencies strengthens ties with other Antarctic stations and potentially saves lives. Assisting other RPSC departments during emergencies and emergency preparedness drills increases interdepartmental communication and hones our ability to respond appropriately in a crisis.

Identified Issues

Issue: Mac Ops shares a frequency with the Waste Management and Supply work centers. The combined radio traffic often interferes when regional travelers are trying to reach Mac Ops.

Response: We requested IT to upgrade a simplex frequency to a repeated frequency and provide a dedicated frequency to Waste Management and Supply, one separate from Mac Ops.

Issue: We did not receive numerous VHF transmissions while using the Zetron console on Channel 3 (Mac Ops). Our TEAC recorders indicated the transmissions did come through, but the messages did not transmit through the "unselect" speaker of the Zetron.

Response: We traced the problem to a bad cable pair. We replaced the cable and the equipment now works properly.

Issue: Problems exist with the VHF phone patching system. For example, during some VHF phone patches, the phone caller and Mac Ops can receive the transmissions from the field party, but the field party is unable to receive transmissions from the phone caller, even though the phone caller's transmissions are loud and clear in Mac Ops.

Response: We have referred this to management for resolution.

Issue: We were unable to change transmit frequencies at Mac Ops for two transmitters, even though they could be changed at Bldg. 221 (T-Site).

Response: Investigation revealed the problem was caused by open cable pairs. A technician switched the cable pairs and resolved the problem.

Issue: Mac Ops Position 1 lost all ability to transmit on all frequencies and phones for about 10 minutes in early January. This happened a second time before SPAWAR Comms Techs traced the problem to a faulty handset. This alerted us to a related problem: there are no extra handsets on station compatible with the HF system. If one malfunctions, we cannot replace it.

Response: The techs cleaned the handset and returned it to service. We have informed management of the need for new handsets.

Issue: The Voice Communications Control and Routing (VCCR) continued to experience glitches this season. For example, the frequency display would often show a different frequency than the one selected at the transmitter. To find the right frequency was time consuming (and sometimes impossible). The problem reduced confidence that the screen was displaying true information. Sometimes, frequency indicators would disappear from the display screen. In addition, a phone extension through the VCCR stopped working.

Response: Re-setting the electronics would temporarily solve the problem of disappearing indicators, though it would also cause a phone to malfunction. To prevent a recurrence, we have requested technician support to resolve this and other problems we have identified. We are investigating ways to set up maintenance and support agreements.

Issue: We discovered the Bix punch-down blocks for the VCCR units installed by the SPAWAR are not standard equipment in McMurdo. We do not even have the correct punch-down tool to service this block.

Response: We recommended replacing this block with standard equipment. RPSC, under the direction of the SPAWAR, will perform the work during the winter.

Issue: SPAWAR Comms Techs are extremely responsive to problems that we experience with the VCCR. However, there still seems to be some confusion as to who is responsible for various equipment components. There is also confusion over which organization maintains the Technical Control Screen (TCS) located in the Ops Remote room. This becomes problematic when we are trying to get equipment issues addressed in a timely fashion.

Response: NSF, RPSC and SPAWAR representatives met in McMurdo in January to address these and other long-standing issues with the VCCR/TCS. SPAWAR was tasked with drafting a maintenance and support agreement.

Issue: Field camps reported frequent problems accessing the Mac Ops DID line due to the heavy volume of incoming calls to the station by mid-season. This was inconvenient and frustrating for field camps. Additionally, it was difficult to access outgoing lines when attempting to make off-continent calls, due to the heavy volume of outgoing calls

Response: We showed that the number of DID lines out of McMurdo is inadequate and reported this to RPSC IT. We recommended to IT that Mac Ops be provided with dedicated outbound DID line.

Lessons Learned

Many of the difficulties we experienced this year made it clear that RPSC and SPAWAR need a consistent service agreement to address problems with the VCCR and HF equipment. This will make it easier for operators to report equipment problems and get them fixed.

We suggest that equipment standardization between different agencies will avoid issues like the BIX punch down block problems.

Shuttle traffic on the I-Net has increased tremendously as a result of the Shuttle Department's changing structure. It is difficult for other departments to use the I-Net because of the constant shuttle traffic. It seems clear that the Shuttle Department needs its own VHF frequency or maybe another form of communication for some operations. We suggest a review of VHF frequency assignments on an annual basis.

Our HVAC system needs repair. The current air handling system is noisy, and there is no temperature control. During the middle of the season, temperatures become unbearably hot. This is debilitating for our operators, especially when they have to perform under stress.

Our operators would benefit from trips to field camps and repeater locations to help them understand the challenges faced by field parties, which in turn will help them provide better support. Trips to the Dry Valleys to see repeater sites will give them a better feel for line-of-site communications for each repeater.

Difficulties with making calls this season make it clear that Mac Ops requires a dedicated outbound DID phone line. Many times when we tried to access an outbound line for a priority call, we couldn't. Once we had to resort to Telecom N.Z. to make an important call. An inability to make an off-continent call is a serious problem during emergencies. A dedicated line for Mac Ops would enhance efficiency and safety.

Section 3. Plans for KY07

We will continue to seek funding for the McMurdo Communications Integration Project. This critical project will locate the Firehouse Dispatch group and Mac Ops in Bldg. 165, which will enhance safety by providing a centralized location to conduct all emergency response.

SOUTH POLE TRAVERSE PROOF-OF-CONCEPT PROJECT

Section 1. Summary

The South Pole Traverse Proof-of-Concept team completed an historic overland trip in its fourth and final year, successfully finishing its mission to travel from McMurdo to the South Pole and back in one season. We worked in an extreme environment, adapted to unforeseen terrain challenges, and maintained a perfect safety and environmental record over four seasons.

We left a 1,000-mile marked trail between McMurdo and South Pole, across 300 miles of previously unexplored territory on the Polar Plateau, proving that a repeatable overland traverse using heavy cargo tractors is feasible. We delivered more than 218,000 pounds of cargo (tractors, trailers, implements and spare parts) to South Pole – the equivalent of 11 LC-130 flights.

Section 2. Qualitative Performance

A. Project Management

Nothing to report.

B. Program Integration

Nothing to report.

C. Innovation/Process Improvement

Innovative, Technological Solutions

Accomplishment: We collaborated with the National Geospatial Intelligence Agency (NGA) to use classified national assets to evaluate terrain and detect hidden crevasses for route planning.

Benefit: The information we received helped the project proceed safely and efficiently. The NSF and the NGA may work together on future projects.

Accomplishment: We developed and pioneered a prototype system to transport 2,000 gallon fuel bladders secured to Ultra High Molecular Weight Polyethylene (UHMW plastic) mono-skis, in lieu of using costly (and heavy) steel fuel tanks sleds.

Benefit: We can pull four times as much fuel for the same investment in draw bar pull. But this benefit reaches beyond the Traverse. The USAP may adopt this method for fueling remote field camps and other sites where a mobile fuel tank may be advantageous.

Visionary Management

Accomplishment: We collaborated with engineers from the CRREL in Mobility Workshops and on field-testing equipment.

Benefit: This collaboration may develop new technologies for future traverses.

Responsiveness to Challenge and Change

Accomplishment: We responded to a change in project scope by delivering more than 218K pounds of cargo to South Pole, including a valuable new tractor and much-needed snow haul trailer.

Benefit: Our delivery offset the equivalent of 11 LC-130 flights to South Pole.

Lessons Learned

Using a Pisten-Bully for long duration traverses is unacceptable. The relatively short wheel base on this vehicle causes it to “porpoise” constantly and subjects the occupants to excessive whiplash

Section 3. Plans for KY07

Nothing to report.

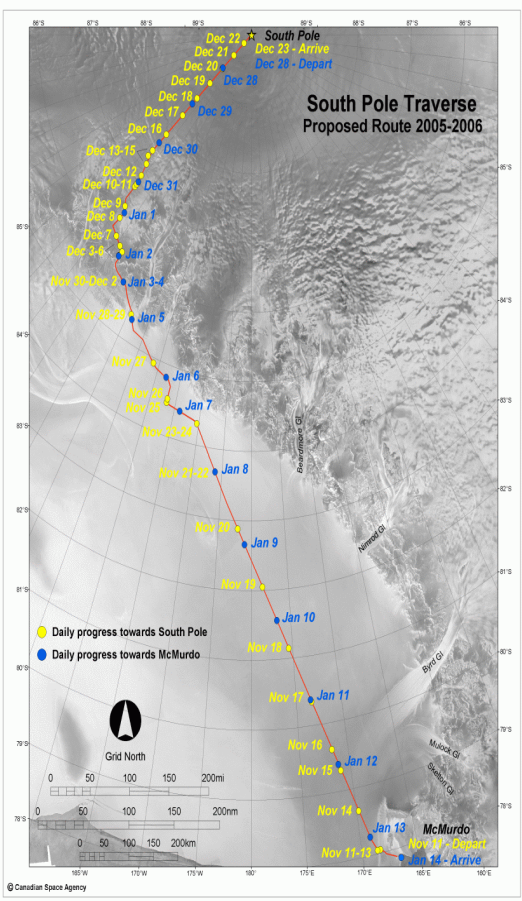


Figure 10-10 South Pole Traverse

STATION SERVICES

Section 1. Summary

McMurdo Food Services continued to provide quality meals, despite an increase in population and supporting the WAIS Divide field camp. We initiated new food inventory management practices that anticipated potential shortfalls in time for us to address them, avoiding airlift resupply requests.

We focused on the need for ergonomic improvements in the Dining Facility to address high injury rates, especially soft tissue injuries caused by repetitive motion. We made a number of administrative and physical improvements but will continue to collaborate with EH&S and FEMC to further reduce risk.

McMurdo Housing managed a summer season of peak or near-peak population and completed a number of furniture exchanges. McMurdo Beverage Services focused on promoting responsible consumption through strategic stocking, training, policy implementation, and direct management. McMurdo Retail Services supported the South Pole store during its transition from a staffed retail operation to a volunteer-based operation.

Again this season, McMurdo Recreation focused on offering activities that do not feature alcohol, e.g., "Dinner and a Movie" on Saturday nights in the Dining Facility.

Section 2. Qualitative Performance

A. Project Management

General Management

Accomplishment: Food Services worked with Supply to develop a comprehensive storage plan for the frozen food warehouse during vessel offload.

Benefit: We can better manage food inventory and addresses the chronic problems of inaccessibility and inadequate space.

Accomplishment: Food Services developed an internal tool to monitor food consumption by categories.

Benefit: This new tracking tool anticipates potential shortfalls so we can adjust the menu based on available inventory. This eliminates the need to request airlifts for food resupply.

Accomplishment: Beverage Services recruited and trained a volunteer bartending staff to promote responsible consumption and enforce club policies. We hired a night supervisor to provide additional oversight.

Benefit: Patrons consuming alcoholic beverages followed accepted standards of conduct. There were fewer problems.

Table 10-4 McMurdo Dining Facility Year-to-Date Comparison

		Population*					
KY05	**Oct-Feb**	133,734					
KY06	**Oct-Feb**	143,073					
		Flight Lunches	**Breakfast**	**Lunch**	**Dinner**	**Midrats**	**Total Meals**
KY05	**Oct-Feb**	13,991	99,476	119,351	119,351	19,896	372,065
KY06	**Oct-Feb**	13,602	105,839	126,988	126,988	21,167	394,584

*For comparison purposes only. Population is a cumulative total of daily population for the target time period. It an estimate based on the Town Muster List and is not comprehensive, as it does not capture transients.

Accomplishment: Beverage Services simplified the Party Packs paperwork for community events while emphasizing the host's responsibility to moderate consumption of alcoholic beverages.

Benefit: Clearly-defined responsibilities helped to moderate irresponsible behavior associated with overindulgence.

Accomplishment: Food Services expanded the use of rolling carts for service ware.

Benefit: This reduces the lifting and handling of service ware, which will reduce the risk of repetitive motion and other soft tissue injuries.

Accomplishment: Food Services developed an internal tracking tool to monitor the physical well-being of staff.

Benefit: By regularly monitoring the staff, we anticipate injuries, revise tasking as needed, and offer appropriate first aid measures before injuries become more severe. This concern by management improved employee morale.

Customer Satisfaction

Accomplishment: Food Services supported the WAIS Divide field camp from the McMurdo Food Inventory.

Benefit: We received positive feedback for our help in this high-profile initiative. (However, the costs were excessively high and the procedure must be reassessed before next season.)

Accomplishment: Housing replaced the furniture in Hotel California, the mattresses in Dorms 201, 209, and the 203 series, and selected office furniture throughout the station.

Benefit: The new furniture restores living conditions to acceptable standards. New and better mattresses may reduce back injuries, and the higher quality furniture we purchased reduces or eliminates maintenance costs.

Accomplishment: Retail Services supported South Pole's store during its transition from a permanent staff to a volunteer-based operation.

Benefit: The transition was seamless. We continued to provide good customer service, even in the absence of fulltime support.

Accomplishment: Retail Services opened the McMurdo store at midnight to service night shift staff.

Benefit: The night shift community greatly appreciated this service, which helped ameliorate the perception that night shift workers receive fewer services.

Human Resources

Accomplishment: Food Services requested and received funding for additional Dining Attendants.

Benefit: We anticipate that spreading out tasks to more people will reduce repetitive motion injuries.

Accomplishment: Housing contributed labor for the Dining Facility work rotation and cross-trained personnel from other departments to help with work center cleaning.

Benefit: Cross-training produces a more versatile and multi-functional work force that is better able to respond to changing circumstances.

B. Program Integration

Coordination Between WBS

Accomplishment: Station Services worked with EH&S, FEMC, and other departments to address the issue of repetitive motion and other soft tissue injuries in the Food Service operation. EH&S hired ergonomics experts to review the Dining Facility and our procedures, and we reviewed their reports to prepare action items for KY07.

Benefit: Implementing the recommendations of the experts should reduce or eliminate soft tissue injuries in the Dining Facility.

C. Innovation/Process Improvement

Innovative, Technological Solutions

Accomplishment: Food Services had FEMC install foot-pedal-operated, suspended sprayers in the pre-rinse dishwashing area of the Dining Facility.

Benefit: This configuration change eliminates a serious ergonomic problem in the dishwashing operation and reduces the risk of repetitive injury.

Responsiveness to Challenge and Change

Accomplishment: In the face of serious inventory shortfalls, Beverage Services revamped management of the beverage stock, budgeted carefully, and enforced purchasing limits.

Benefit: This reduced the impact of shortfalls and assured equitable distribution.

Accomplishment: When South Pole lost its full-time retail staff position, Retail Services developed a new support structure for the retail operation that maintained the same service level.

Benefit: The transition was seamless from a customer perspective.

Lessons Learned

Our implementation of new tools and policies for managing food inventory have made it clear that a more detailed tracking of food use by category will make annual food orders more efficient and more effective.

Working with Supply to develop a comprehensive, frozen-food storage plan opened a better communication line between our two departments, which we believe will improve menu planning and execution.

Section 3. Plans for KY07

We will develop and implement a controlled menu cycle to deliver a more consistent product. We will continue our efforts to make ergonomic improvements and reduce injuries, and we will continue to emphasize responsible consumption of alcohol.

VEHICLE MAINTENANCE FACILITY

Section I. Summary

The Vehicle Maintenance Facility (VMF) focused on safety throughout the season by making our audit performance and overall safety record a source of pride within the department. The effort paid off. Not only did this most significant industrial shop in Antarctica experience no deficiencies in the Raytheon corporate safety audit, its Mainbody crew did not suffer a single recordable safety incident.

The VMF stocks some 40,000 line items, estimated at more than $12 million, the most extensive and expensive revolving inventory in Antarctica. We are striving for world class management of that inventory. For example, we have developed a "zero fill/zero quantity" database system to identify over 600 necessary items that were out of stock. We generate a report from that system and link it, through a new process we have developed, to a stock-usage evaluation report. We then use that report to calculate our vessel resupply needs. In this way, we are working around the limitations of MAPCON to automate the bulk of the resupply process. We also reviewed an additional 15,000 under-used or unused parts and updated the MAPCON records to help us find those parts when needed.

In the process of this comprehensive inventory review, we retrograded more than 100 tons of material and deleted some 2,000 line items from MAPCON inventory (Table 10-5).

Table 10-5 Weekly Retrograde Totals

VMF	Weekly L/I	Weekly Units	Retro Weight (pounds)	Retro Cube	Comments
11/4/2005	425	5,062	13,245	1,482	
11/11/2005	23	174	8921	533	
11/18/2005	21	151	16,771	516	1,188 lbs. HM
11/25/2005	2	5	30	6	
12/2/2005	33	57	2654	285	714 lbs. HM
12/9/2005	37	67	17,669	2,439	13,030 lbs. HM
12/16/2005	15	24	7,725	270	
12/23/2005	415	1,015	12,149	510	300 lbs. HM
12/30/2005	3	62	2,400	50	
1/6/2006	9	73	13,320	2,797	180 lbs. HM
1/13/2006	29	477	6,220	155	2,200 lbs. HM
Nodwell Trailer	1	1	15,060	1,000	
931 CAT	1	1	16,040	800	
Clyster Case (HM)	1	1	2,640	100	2,640 lbs. HM
Uncle Buck	1	1	10,140	1,280	
Patty	1	1	25,460	1,000	
Red 5	1	1	37,000	2,000	
1/20/2006	942	5,124	19,252	810	
Total	1,960	12,297	226,696	16,033	
Tonnage			113.348		

Section 2. Qualitative Performance

A. Project Management

General Management

Accomplishment: The VMF provided critical support to many areas of the Program. For example, our machine shop and welding bay provided machining, welding, and tooling support to the Russian icebreaker *Krasin* when a blade dropped off one of its screws. In another example, we deployed mechanics to support South Pole and many area traverses.

Benefit: Our efforts helped return the *Krasin* to service, allowing the fuel tanker and resupply vessel to reach McMurdo. Our efforts made possible the Black Island resupply and power generation at Marble Point, Williams Field and other outlying sites. We were instrumental in restoring South Pole's heavy equipment capability.

Accomplishment: We streamlined the MAPCON/parts system interface and matched parts to specific equipment.

Benefit: MAPCON is critical to our department, as we manage hundreds of work orders and thousands of parts each year. Eliminating data errors and inaccuracies improves management of the overall program and helps us make the right resupply decisions.

Accomplishment: We improved our Preventive Maintenance (PM) Work Order system by adding "good maintenance practice" steps and specifying required parts.

Benefit: The improvements help ensure mechanics get the parts they need more quickly, create less paperwork by reducing the need to open separate "repair" work orders, and make it easier to follow the work order sequence, all with less potential for error.

Customer Satisfaction

Accomplishment: We kept seven snowblasts up and running for sea ice runway construction by Fleet Operations. We use these snowblasts for conditions beyond their design (ice versus snow), and it is difficult to maintain the structure and rotating components.

Benefit: Fleet Ops personnel said they could not have built this year's runway without this unprecedented equipment reliability.

Accomplishment: We kept a record six Caterpillar Challengers up and running for the longer-than-usual ice runway move via the runway road (rather than the shortcut road).

Benefit: Fleet ops moved the equivalent of a small town across 17 miles of ice in a single weekend. The move is dependent largely on the Challengers. Our customers' successes reflect our accomplishments.

Accomplishment: We kept a record number of Science Support vehicles on the road.

Benefit: Science Support was able to offer its users an unprecedented number of Mattracks and Pisten-Bullys to meet their needs. None of these maintenance-intensive vehicles experienced any significant downtime during the season. We received specific compliments from the Science Support community that this has been the best support they have ever received from our department.

Accomplishment: We made significant modifications to the safety, reliability and comfort of several vehicle classes, including Fleet Ops tractors, Supply forklifts, and ATO people movers.

Benefit: These improvements made it clear there was a culture change in the VMF. Customers' needs (and wants) are an important part of our maintenance program. We received customer accolades, both formally and informally, throughout the season, which improved crew morale.

Human Resources

Accomplishment: We implemented a new internal technical training program, in addition to all the required safety training and the technical schools we normally offer. Though it was difficult to find time for an extra training session

each week, this critical investment in our people showed immediate benefits.

Benefit: The main benefit we realized was professional growth and personal satisfaction in our employees. In re-emphasizing important procedures and methods, such as a proper track inspection program and correct electronic and mechanical testing techniques, our training sessions improved preventive maintenance practices overall.

Accomplishment: During WINFLY, we worked a five-day shift schedule with the primary day and night crews. During the austral summer, we worked in three overlapping shifts, using all three lead mechanics in leadership roles. We did this based partly on a safety analysis that found a stronger correlation between incidents in our shop and time of week versus time of day (Figure 10-11 and Figure 10-12).

Benefit: This sent an early message to employees that we were serious about changing our culture. We saw greater productivity with a longer work day. By starting earlier, we matched the12-hour day of our largest WINFLY customer (Fleet Ops). Starting one-half hour before anyone else also gave us a head start on the heavy Fleet Ops workload, increased communication between shifts, and improved safety and morale by giving employees a two-day weekend to rest.

Cost Savings

Accomplishment: We initiated an oil analysis program using an inexpensive oil analyzer that measures for several potential problems.

Benefit: This analyzer allows us to establish a baseline for each piece of equipment and spot potential problems. By catching irregular results early, we improve our chances of avoiding catastrophic failures, thus reducing equipment downtime and saving considerable money.

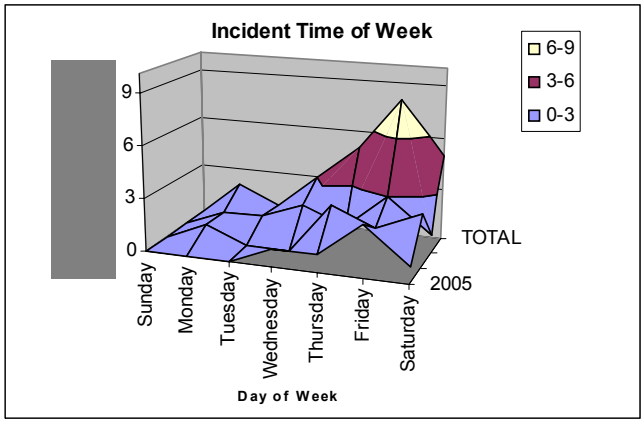


Figure 10-11 Incident Days

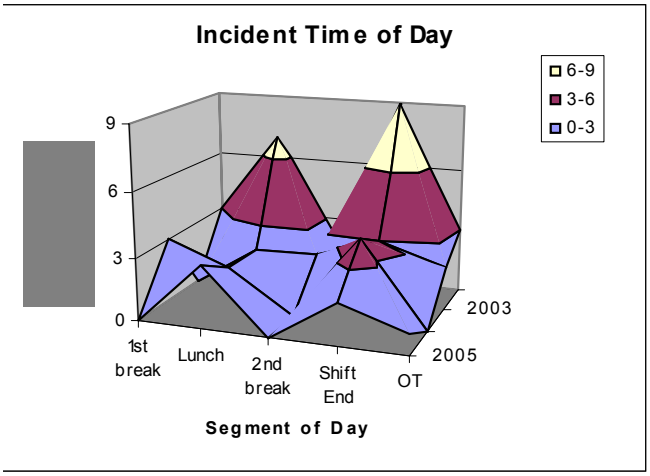


Figure 10-12 Incident Times

B. Program Integration

Coordination Between WBS

Accomplishment: The Pisten-Bullys have poor technical documentation and are particularly complicated to work on. We scheduled a visit by the Pisten-Bully vendor to address these issues, and we worked with other departments, particularly Science Support, before and during the visit.

Benefit: The payoff to this visit was improved maintenance, an increase in the time the vehicles spent in the field and not in the shop, and improved communication between VMF and Science Support.

Accomplishment: We supported many departments this season, notably Science Support and the South Pole Traverse. We provided work-

space, technical assistance, and the use of manuals, tools and parts.

Benefit: We enjoyed a very successful reciprocal relationship with the South Pole Traverse team. The two South Pole Traverse mechanics worked in our department throughout WINFLY, contributing to our efforts while also maintaining their own equipment. During the Traverse, we provided parts and technical support – as we did with several field camps, including WAIS Divide.

C. Innovation/Process Improvement

Innovative/Technological Solutions

Accomplishment: We implemented a new failure coding system that adds data collection capabilities. We also began using a new major category of work code ("S-Service") for various maintenance checks that had previously been lumped in with "R-Repairs," such as pre/post-season checks and pre-event checks.

Benefit: This allowed more accurate tracking of our vehicle maintenance program, and we have already seen a dramatic improvement in the level of cost allocated toward repairs as compared to maintenance and service – less than 80% for repairs versus more than 90% last year. We will continue to adjust the code system to improve our analysis of maintenance problems (e.g., the second-largest category of failure this season after normal wear was misuse/abuse).

Accomplishment: We have exerted greater control of our inventory and reigned in our ordering process. We linked a newly-developed a "zero fill/zero quantity" database system to a stock-usage evaluation report from which we calculate our vessel resupply needs. This system moves us toward demand-based ordering and helps automate the process.

Benefit: Our ordering process is now faster, more accurate, more complete, and less susceptible to over-ordering. It increases efficiency, reduces or eliminates equipment downtime due to unavailable parts, and increases productivity.

Visionary Management

Accomplishment: We effected a dramatic culture change at the VMF this season, and this was visible to anyone who visited McMurdo. The shop actually looks different than it did last year, with tons of material removed and the rest much more organized. The improved attitude of our employees and our emphasis on customer service was equally as obvious. We practically eliminated equipment downtime and promptly addressed customer needs. These accomplishments represent a tremendous amount of work.

Benefit: The VMF led the community toward a more organized, well-kept station and a reduced footprint. The unprecedented reliability of equipment we provided allowed grantees and other RPSC departments to plan and execute missions without being forced to deal with equipment downtime, and even without the need to factor downtime into their plans.

Responsiveness to Challenge and Change

Accomplishment: Juggling bays and other resources to accommodate Science Support, the South Pole Traverse, and some 100 McMurdo work orders every week is a daunting task. Yet we were able to schedule and support all of this (even through several weeks when one of our shop bays was down) by coordinating with our customers and other RPSC departments.

Benefit: The direct result of our achievement was dramatically reduced downtime for equipment, higher productivity for work centers that depend on the equipment we maintain, and greater customer satisfaction.

Lessons Learned

Some departments purchase equipment that we must maintain without consulting us before procurement. When the equipment needs repair, we may not have replacement parts on station, resulting in unnecessary down time and costly shipping. We must develop a system that involves our department in the procurement process so we can meet long-term maintenance needs.

The remarkable reliability of equipment this season was not easy to deliver and cannot be taken for granted. With improved scheduling and other world-class tools and methods, we will be able to provide this high level of support in the future, as long as inventory remains at current levels. Any significant growth in the amount of equipment we must maintain will make delivering such high reliability difficult or impossible without increases in staff and space. If a serious South Pole traverse program is undertaken, we estimate the VMF will need six additional heavy bays (and associated support space) to handle the additional equipment load.

Section 3. Plans for KY07

We will continue our emphasis on safety, further streamline our parts inventory system, and broaden the knowledge base of our personnel.

AREA DIRECTORATE - SOUTH POLE

In KY06, the South Pole Area Directorate continued to oversee construction related to the South Pole Station Modernization (SPSM) project. We worked with the NSF to support ongoing science projects and major science initiatives, such as the IceCube neutrino observatory and South Pole Telescope. Safety remained a key concern throughout the year.

Winter operations began February 15, 2005, with the focus on science support and interior construction of the Elevated Station. Winter station population was 86, compared to 75 the year before. All personnel stayed in the Elevated Station and the Dome. Winter fuel reserves, which include an emergency supply for the following summer, consisted of 431,715 gallons of AN-8.

At Denver HQ, we attended planning conferences for IceCube, the NSF partnering session, and the Annual Planning Conference. We consulted with the NSF on flights and population numbers to determine constraints on funding new science events. We hired a 2007 Winter Site Manager who has extensive USAP experience, particularly at South Pole.

Transition from winter to summer proceeded smoothly. Early season work included aerial photography, setup of the seasonal IceCube equipment, the Cold Regions Research and Engineering Laboratory (CRREL) Infrared study, and fire inspections – all completed on schedule.

The major summer season successes included conditional occupancy of the remaining wings of the Elevated Station, the Emergency Fueling Module, the Vehicle Fueling Module and the Dark Sector Laboratory (DSL). We supported the IceCube and IceTop projects, which completed eight string deployments and twelve tank stations, respectively. The BICEP (Background Imaging of Cosmic Extragalactic Polarization) telescope began operations on schedule. In addition, we completed the work necessary to make the South Pole Telescope and IceCube Laboratory ready for winter construction. We received an additional 1.3 million pounds over the planned cargo/fuel delivery for the season, with flights continuing through February 21.

Insufficient personnel (due to attrition and unexpected difficulties with late-season PQs) forced us to delay several projects. We postponed jacking and leveling the Elevated Station and exterior demolition of the AST/RO building until KY07. The CRREL Infrared study found heat loss problems, forcing us to delay installation of Elevated Station siding.

Section 1. Summary

Environmental, Health and Safety

Safety was a station priority, but a number of minor injuries occurred, resulting in a TRIR of 10.76 for the 2005 calendar year. To address this, we have taken several actions:

- We developed a safety spreadsheet that lists problems and action plans and is open to all personnel for review and comment.
- We established an employee-run safety committee that meets bi-weekly, makes recommendations, and distributes minutes to the community.
- We mandated weekly work center safety “walk-throughs” for all areas of the station, the results of which are submitted to the Safety Department for review and action. At least once a month, the Safety Engineer inspects every work center and science building.
- We conducted a job hazard analysis of the Bio-Med arch raise project with the NSF before attempting the arch lift. We identified specific hazards and then mitigated them through task-specific briefings and mock drills.

- We wrote a Supervisor's Safety Manual and distributed it to all South Pole Supervisors.
- We identified equipment necessary for the safe handling of materials (e.g., power lifts and accordion conveyors), purchased the items, and marked them for delivery before the austral winter.

The Safety Engineer has reviewed our safety SOPs and made recommendations that we are implementing. Initial evidence indicates all these measures are having a positive effect; so far, in 2006, the TRIR is declining.

In other improvements, we selected a new fire-protection training agency that can address our specific needs, as well as provide National Fire Protection Association (NFPA) instruction for managers and supervisors. Managers participated in an external safety review for the IceCube project and tabletop drills with IceCube personnel in preparation for the austral summer season. Raytheon corporate personnel performed an audit that helped identify areas for improvement, and we followed up on as many of their suggestions for action as we could during the austral summer.

EH&S helped neutralize a hazardous chemical generated by a science event. NSF approved the remediation plan before any action took place.

Station Operations Center

We successfully moved Communications from under the Dome to the Station Operations Center (SOC) in the Elevated Station without disrupting critical operations. We received a record 377 NYANG flights, along with several non-government activity flights, and we hosted the British Antarctic Survey.

Fleet Operations

Fleet Operations supported several high-profile scientific events this season, including

IceCube, IceTop, South Pole Telescope, and BICEP. IceCube's successful season is partly due to careful coordination and planning by RPSC and IceCube personnel.

We completed the pad for the South Pole Telescope and provided crane support install footings, structural steel, and stressed-skin panels on both the main building and the elevated walkway between the laboratory and the DSL. We also used the crane to install base plates, a pedestal and the telescope itself for BICEP, and for lifting furniture into the DSL.

Vehicle Maintenance

The Vehicle Maintenance Facility (VMF) maintains 30 pieces of heavy machinery, 25 snowmobiles, and 8 light vehicles. Keeping aging equipment up and running continues to challenge our mechanics and stress the shop's capacity. Despite these challenges, both winter and summer mechanics successfully rebuilt or replaced several pieces of machinery (or their major components), allowing the equipment to keep pace with station operations and deadlines.

Skiway and Fueling Operations

Early season flights delivered more than 500,000 pounds of driftable cargo. The NYANG also began delivering fuel during the second week of operations. Throughout the season, we maintained the 12,000-foot skiway, which received a record 377 LC-130 flights delivering almost 10 million pounds of cargo and fuel.

We used emergency storage tanks to allow aircraft to deliver fuel during the extremely cold, early summer season, and we continued to use a boost pump to off-load fuel into Pit #1 and Pit #2 simultaneously. Fuel transfers during the winter and early summer are a difficult but necessary part of station operations. However, constant training and improved procedures make this operation as safe as possible. We had few spills during fueling operations.

Table 11-1 USAP Refueling at South Pole

Agency	Aircraft Type	# of Refuelings	Total Gallons
USAF NYANG	LC-130	6	19,761
KENN BOREK	Twin Otter	5	2,028
BAS	Twin Otter	26	11,517
PLANNED/RECEIVED AN-8 gallons 645,557 gallons planned, 651,609 gallons delivered.			
Note: "Planned fuel" represents fuel planned in the South Pole Planning summary. During the season, the NSF Representative, Area Director and Station Operations Support Supervisor reviewed this number. Planned fuel delivery is a product of available aircraft for the season and does not reflect projected requirements. We revise this number as conditions change. The actual amount of fuel at closing was 49,720 gallons more than required for winter. This was due to delivery of more fuel than required and less fuel use than planned during the summer.			

Table 11-2 South Pole Fuel Usage

Winter Usage			
Total Inventory 2/19/05	**Fuel Delivered**	**Total Inventory 10/15/05**	**Total Usage**
423,623	0	110,798	312,825
Summer Usage			
Total Inventory 10/15/05	**Fuel Delivered**	**Total Inventory 2/22/06**	**Total Usage**
110,798	651,609	426,865	335,542
Total Usage 2/15/04-2/15/05			648,367

Table 11-3 South Pole MOGAS Usage

Fuel Type	Number of Barrels	Total Gallons
MOGAS and Prremix	**131**	**6550**

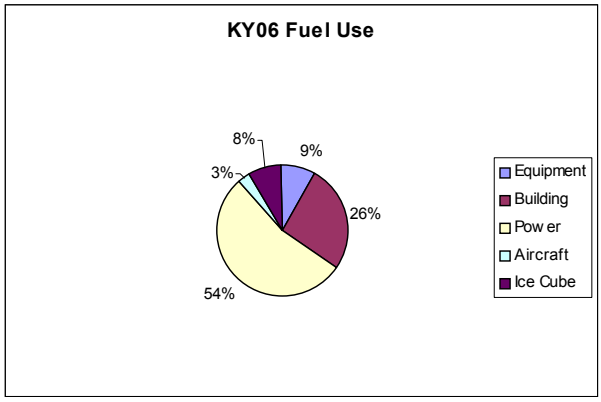


Figure 11-1 South Pole Fuel Use

Power Plant and Utility Operations

The Power Plant produced 5,454,021kw/hrs between February 12, 2005 and February 18, 2006, using a total of 416,907 gallons of fuel. This represents a ratio of 13.08 kw/hrs per gallon of fuel, which is consistent with predictions from previous seasons. We will continue to monitor fuel efficiencies.

Science Support

Science Support worked with the Science Planning Managers to identify the core group of funded science events. Because of limited resources, we had to adjust timelines of many science events to avoid conflict with construction (e.g., SPSM) and operations. We juggled the heavy equipment, construction, and logistics needs for several large science experiments (e.g., BICEP, South Pole Telescope, and IceCube) to ensure we remained on schedule.

We completed the transfer of science functions from SkyLab to the Elevated Station science wing and ARO without affecting research. We also supported unscheduled projects, like the "Beyond Einstein" webcast. The BICEP project team received permission to begin installing equipment in DSL, which required us to provide them with specific safety training because of ongoing construction at the facility.

Operations, FEMC, and Logistics personnel relocated the Cargo office and DNF building to a temporary location in order to complete pad development and exterior construction for the Cryogenics Facility.

Station Services

Managing station population and housing continues to be a challenge. The target population was 245 people per day. During the 123 days of the summer season, the population was over the 245-person goal on 40 days and over 250 people on 21 days. Including double deployments, 728 passengers arrived and 722 departed via LC-130.

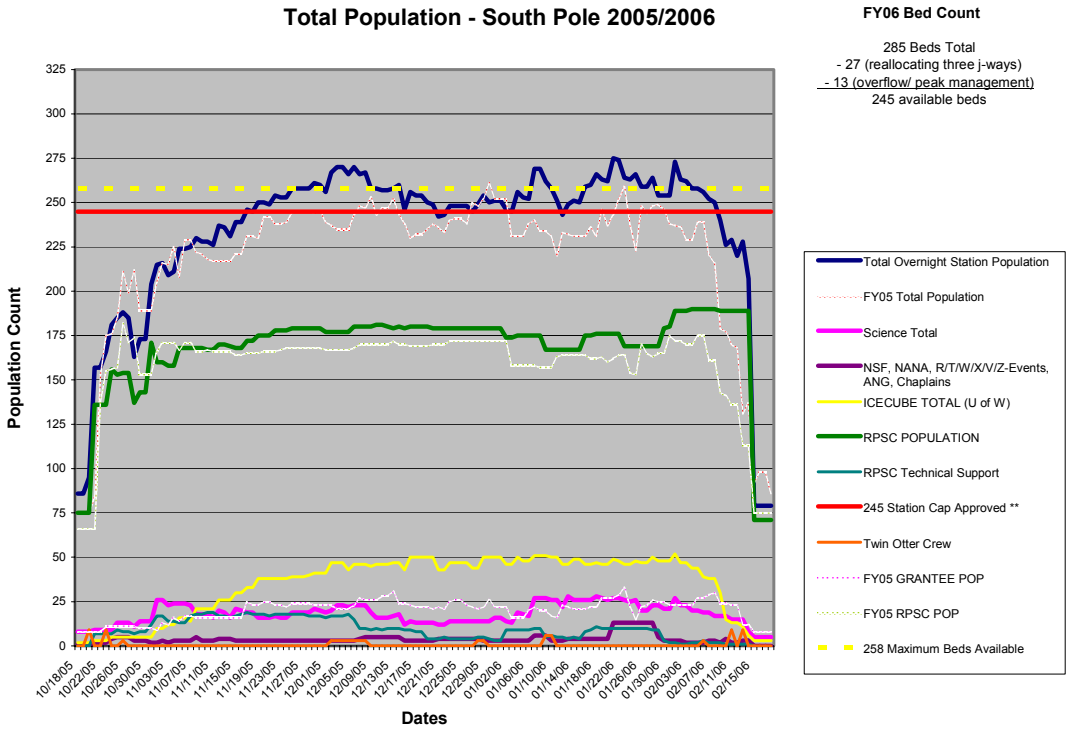


Figure 11-2 Target South Pole Population

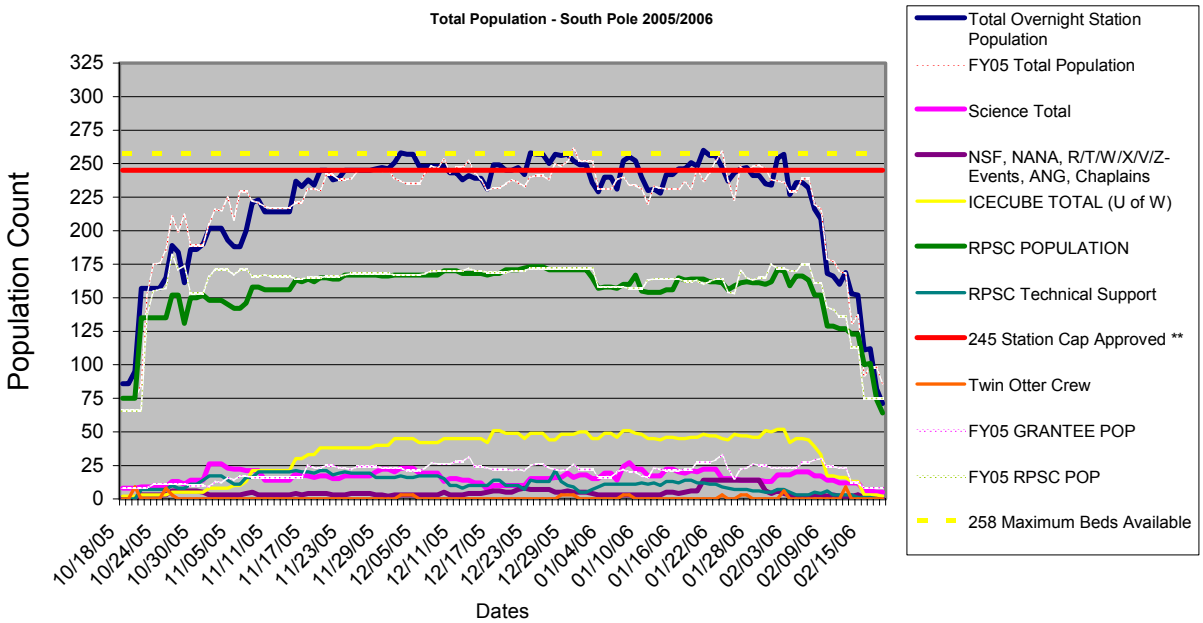


Figure 11-3 Actual South Pole Population

Average population was lower than our estimate because we did not fill all RPSC positions. Operations was short a mechanic, and FEMC lost 12 positions during the season though attrition and because candidates did not PQ. The NSF canceled one science event (A-136-S) with four participants. Several grantees finished their work early and left. We also had 10 USAP participants, both RPSC and grantee, leave early because of family emergencies. (Three later returned to finish the season.)

Table 11-4 South Pole Population Statistics

	Pre-Season Estimate	Actual
Average Population **	251	238
Peak Population	275	260
Total Deployments	725	728
** Average population is based on the 101 peak working days of the summer season (31 Oct - 8 Feb) and does not include the opening and closing weeks.		

The total number of deployments is greater than might be expected, considering the unfilled RPSC positions. However, several departments in McMurdo sent trades people to assist us for short times. Twenty-two engineers, general assistants, electricians, waste operators, mechanics, equipment operators, crane operators, and dining attendants deployed to South Pole for a total of 222 person-days. We managed other support requests as space became available. Other additions to the population included *Antarctic Sun* journalists, safety auditors, and an increased number of chaplain visits. Further, several of the scheduled DV events changed in number. For example, we expected five visitors for the Congressional visit (V-004), but received 31 instead. For these reasons, total deployments were higher than our pre-season estimate.

In an effort to mitigate population pressure, we worked with SFA to reduce the number of Joint Inspector trips from 32 to 14. We also reduced the number of Greenhouse technician visits from nine to five.

To further control population, we eliminated the Retail and Recreation position and replaced it with employees already on station, working part-time. We removed the Point of Sale (POS) system and now track all retail inventory from McMurdo. Part-time managers handle cashier training, stocking duties, and documentation. We arranged training in Christchurch and McMurdo for employees to staff the South Pole APO part-time. To comply with USPS regulations and to make processing mail simpler, we leased a postage meter.

The Food Growth Chamber is now under the control of Operations. We worked with the NSF and the University of Arizona to correct technical problems identified during the winter and set future goals. The Growth Chamber averaged 44.12 pounds of produce per week during the winter season, for a total of 1,412 pounds. During the summer season, the average weekly production increased to 48.5 pounds per week, for a total of 874 pounds for the season.

In mid-season, the NANA Food Service Supervisor resigned, and an on-site staff member took over the position.

Section 2. Qualitative Performance

A. Project Management

General Management

Accomplishment: We installed the BICEP telescope in the DSL.

Benefit: The new telescope collected “first light” in late January 2006, a first step in this important experiment’s study of the cosmic microwave background (CMB).

Accomplishment: FEMC and fleet operations excavated, raised and relocated the Bio-Med arch as part of the SPSM project. We set the arch on the new pony-walls, installed bulkheads, and backfilled the entire site.

Benefit: Arch modification is part of the SPSM plan for fuel arch and logistics facility improvements. This keeps the project on schedule.

Accomplishment: We completed construction of the new Cryogenic facility, which required the

removal of the old Cryogenics facility and relocation of the Cargo facility, the DNF Jamesway, the 321 Shack, the Flammables Milvan, dewars, as well as construction of two building pads. We cut a trench and installed new power and communications cables between Bldg. 68 and the new Cargo location, and between the new Power Plant and the new Cryogenics facility.

Benefit: The new Cryogenics facility is a great improvement. The increased electrical capacity allowed us to install two additional pulse tube refrigerators, which significantly slow liquid helium loss.

Accomplishment: We relocated the Cargo and DNF buildings to a more central location, closer to the flight line. The move required a great deal of logistics coordination: we relocated the waste lines, moved the Cargo building temporarily to the Dome, and moved DNF material to another warm building on station.

Benefit: The new location should need far less snow maintenance during the course of the year.

Accomplishment: We installed five new communications antennas at the southern end of the station and communication cables from each antenna to the RF building.

Benefit: This created a seamless transition during the Communications Department's move from the Dome to the SOC.

Accomplishment: The new Power Plant operated throughout the season with normal maintenance to the engines. Staffing in the Power Plant remained at the level of one Mechanic and one Technician operator, while the Facility Engineer supervises all maintenance and operations.

Benefit: Having the Facilities Engineer in charge is particularly important for coordinating maintenance to the Plant, especially as it involves multiple departments, and ensures the station always has sufficient generators on line. Additionally, the incident reporting system implemented last season remains in place to keep RPSC management and the NSF promptly informed of any out-of-normal failures.

Accomplishment: We made significant progress cleaning the contaminated glycol system. A filtration unit took samples during the course of the summer, which Dow and an independent lab tested at the end of the season.

Benefit: Initial results show very low levels of contamination, but we continued filtration and testing. The results of the secondary tests are pending, and we will notify NSF when they become available.

Accomplishment: The Power Plant mechanics supported maintenance and operation of the IceCube power generation systems this season, with no major problems.

Benefit: IceCube was able to generate dependable power without increasing RPSC labor costs or station population.

Accomplishment: We completed the science component of SPSM by transferring all equipment from SkyLab to the science wing of the Elevated Station. This work required man-hauling equipment in early November 2005, when temperatures are still very cold. Grantees rotated through the limited beds until late January 2006, when we completed the transition. Coordination by the Science Coordinator, the Science Construction Coordinator and several grantees helped make this transition a success.

Benefit: All science now takes place in modern, state-of-the-art facilities.

Accomplishment: We excavated a 4160-volt power cable at the upwind end of the new Power Plant and connected it to an existing cable running to Bldg. 61.This project involved coordinating the Bio-Med arch excavation with logistics to avoid disrupting other services or projects.

Benefit: This connection represents one of the final steps in transitioning from the old station power system to the new.

Accomplishment: We built a trench thousands of feet long that crossed under the skiway to connect required communication cables from the

Elevated Station Emergency Power Plant to Bldg. 61. Through close coordination with other departments, Fleet Operations completed this task in twenty-four hours, split between two nights when planes were not flying.

Benefit: We were able to install the cables without interrupting flight operations. New fleet equipment allowed us to complete the task with minimal surface disturbance.

Accomplishment: The Fuels crew supported a record 377 LC-130 missions this season, re-routed fuel lines for the Bio-Med arch project, and met fuel requirements for IceCube drilling.

Benefit: Despite a heavy season, our Fuels crew received fuel from a record number of aircraft while still supporting the added requirements of the station, including SPSM construction and major science projects. We conducted all fuel transfers safely.

Accomplishment: We developed long-range planning for fuel requirements during the year and provided revisions and updates to the NSF.

Benefit: This plan defines constraints and efficiently allocates resources before conflicts occur.

Accomplishment: Because of the large amount of material we required, we promptly identified driftable cargo to Logistics, allowing them to maximize the amount of material that could be loaded and delivered early in the season, when low temperatures prevent aircraft off-load by forklift. Additionally, we put a drift plan into place for the end of the season, along with a contingent drift plan for the next season.

Benefit: Identifying driftable cargo early allowed us to utilize airlift more efficiently, and it resulted in the delivery of far more cargo than would otherwise have been possible.

Accomplishment: We created a contingency plan for end-of-season cargo and fuel needs that identified what pre-stage material we could bring in to ease the flight requirements for KY07 and KY08. The plan took into account the potential for an extended season and additional flights.

Benefit: This contingency planning identified critical cargo that was ultimately delivered on the additional flights.

Customer Satisfaction

Accomplishment: Fleet operations personnel attended the planning conferences for IceCube and South Pole Telescope, which allowed them to coordinate their schedules with the requirements of these two major science events.

Benefit: We avoided resource conflicts and kept on schedule.

Accomplishment: We excavated the South Pole Telescope to finish grade and used the crane to install footings, structural steel, and stressed-skin panels for the main building and the elevated walkway running between the laboratory and DSL. We also used the crane to lift the BICEP telescope into the DSL, along with accompanying base plates, pedestal, and furniture.

Benefit: Construction stayed on schedule for these two important projects, thanks to reliable heavy equipment support.

Accomplishment: We conducted DV tours for a variety of groups, including a 31-person Congressional delegation led by Senator John McCain.

Benefit: Escorting congressional visitors, Air Force brass, and important persons from other agencies allows us to explain and demonstrate the importance of the USAP to those directly involved in funding and supporting the Program.

Accomplishment: The transition to the SOC went smoothly, with no disruption to the 24x7 support provided to the station and the USAP by Communications.

Benefit: Because the Communications Center plays a critical role in emergency response and the safe operation of the station, this aspect of the transition planning was critical. The NSF

noted the successful move in correspondence and congratulated the staff on the operational support during transition:

-----Original Message-----
From: Chiang, Erick
Sent: Saturday, December 31, 2005 9:59 AM
To: Marty, Jerry
Subject: RE: SPSM milestone achieved - Formal transition from Dome Communications to the B3 SOC

Jerry,

Great advancement and it's nice to see something that was once in
my mind's eye become reality. Are we posting a picture of the old in the new for the benefit of our visitors next week?

Erick

Human Resources

Accomplishment: The SOC transition required staffing two locations simultaneously during testing of the newly installed equipment. In order to staff appropriately and allow time for additional training on the new systems, we hired an operator experienced with the Dome Communications Center for a one-month period to provide backup coverage. This allowed training and testing to proceed without interrupting normal operations. The SOC enjoys a high employee retention rate, and the Supervisor has held the position for the length of this contract. This is indicative of the dedication felt by the staff, and their belief in the importance of their contribution to the USAP.

Benefit: A highly trained and motivated staff in this department is crucial to safe operations across the station.

Accomplishment: Retention of a large percentage of the fleet operations staff resulted in a highly experienced group of equipment operators.

Benefit: Operator experience with South Pole equipment and conditions is especially helpful during a high-tempo construction season.

Cost Savings

Accomplishment: We received the latest generation in snow removal equipment this season thanks to the South Pole Traverse: a Snow-Haul Trailer and a Caterpillar D-8 dozer. We assembled and tested the trailer and prepared it for full use in KY07.

Benefit: The new trailer will dramatically reduce the amount of time required to remove snow from around the station. The D-8 will increase operator productivity. We anticipate saving 10,000 gallons of fuel and 50% of the labor that we typically dedicate to snow removal.

B. Program Integration

Coordination Between WBS

Accomplishment: Working in concert with the NSF, several departments (Area Directorate, FEMC, Science Support) created a management plan and procedures to support the proposed Antarctic Specially Managed Area (ASMA) at South Pole, which participants in the Antarctic Treaty Consultative Meeting discussed in June 2005.

Benefit: The ASMA management plan and its associated procedures define the scientific, environmental, and historical values protected by the ASMA, and they provide guidance for USAP and non-governmental activities near the South Pole.

Accomplishment: The Communications Supervisor, SPSM personnel, and SPAWAR coordinated planning and training for the SOC transition.

Benefit: This integrated effort prepared the operational staff and provided feedback on the new systems. The move took place during a period of minimal flight activity to ensure no disruption occurred during flight support.

Accomplishment: Coordination and planning by RPSC and IceCube personnel contributed significantly to a smooth season. We supported IceCube with drill camp setup/breakdown; fuel transfers; trenching, cable pulling and backfilling; road building; erection of drilling towers; and construction of a permanent laboratory. We supported IceTop with trenching and roadway

construction, tank placement, and water transport.

Benefit: The IceCube project deployed eight strings this season. IceTop installed 12 tank stations.

Accomplishment: The janitorial staff now reports directly to the Maintenance Foreman.

Benefit: Since the janitorial staff works daily with the Maintenance Foreman anyway, combining these two groups is more efficient. It also offers better training for the janitors and promotes employee retention by allowing the janitorial staff to learn new skills.

Integration of Environmental, Health, and Safety Objectives Across Corporate Activities

Accomplishment: We shipped 1,182,000 pounds of waste and demolition cargo off station, more than 50% of total station retrograde. This includes 80 Air Force pallets of material left over from the previous season's demolition.

Benefit: We met NSF goals and Antarctic Treaty obligations and made great strides in cleaning up the station.

Accomplishment: We treated only ten cases of altitude sickness this summer, a low number compared to other seasons. Altitude training helped identify altitude sickness before it became disabling.

Benefit: Training and rapid intervention improved productivity and eliminated the need for costly medical evacuations.

C. Innovation/Process Improvement

Innovative/Technological Solutions

Accomplishment: We developed a procedure to raise arch sections more efficiently and safely by breaking the arch into moveable segments and then slightly shifting each one to the side of its final location.

Benefit: This allowed construction personnel to work next to the arch while fabricating foundations and pony walls, rather than working under arch segments elevated by jacks.

Accomplishment: We researched and purchased accordion conveyors to move materials from loading docks on the Elevated Station to final storage areas.

Benefit: We can now move materials much more efficiently and safely.

Accomplishment: We installed pulse tube technology on the LHe dewars.

Benefit: The pulse tube refrigerators reduce LHe boiloff rates and allow more efficient use of our cryogenic resources in support of astrophysical observations.

Visionary Management

Accomplishment: After a successful trial run in KY05, the VMF now operates a small pool of snowmobiles.

Benefit: This has increased snowmobile availability to users without affecting transportation needs for individual departments. It also allows for more flexibility in the maintenance of individual machines. The transportation pool is a more efficient allocation of resources versus departmental "ownership."

Accomplishment: We added a Caterpillar 277 multi-terrain loader to the equipment fleet. It is more effective than the larger Cat 953 loader for many tasks because it is smaller and can work in confined spaces.

Benefit: Waste Management, Cargo operations, and Logistics can use this loader for picking up trash and pallets, as well as for clearing and organizing berms. Because of its small size and excellent maneuverability, the 277 can also operate inside the Dome. With the 277, we were able to put away 90% of vessel material before the end of the summer season. Normally, this job stretches several weeks into the winter.

Accomplishment: We narrowed the skiway width from 300 to 220 feet.

Benefit: Narrowing the skiway by more than 25% reduces fuel consumption, equipment use, and labor. A narrowed skiway also meets NYANG requirements.

Accomplishment: We held long-range planning meetings between RPSC, NSF, and grantees to discuss resources, and we formed working groups to address the most critical areas.

Benefit: These meetings identified resource limits that may affect station operations and research for the next few years. Stakeholders agreed on realistic expectations and goals. Such interagency communication results in better coordination.

Responsiveness to Challenge and Change

Accomplishment: We began cycled maintenance of the fuel storage tanks. This task, while routine in warmer temperatures, poses special problems in our extremely cold environment. We developed a procedure for cleaning tanks that the safety officer reviewed and approved.

Benefit: We can now perform preventative maintenance on fuel tanks at South Pole.

Accomplishment: We identified and appointed a project lead to work with the NSF and the University of Arizona on the operation of the Food Growth Chamber. We have now moved from running a hobby greenhouse under the dome to a highly technical operation, one that is used not only for food production but also for research by the NSF and the University of Arizona. Finding an appropriate person with the experience and expertise to start and sustain this operation was a significant accomplishment.

Benefit: With high-quality management, the Food Growth Chamber is operating as designed, and the project lead is developing procedures to maximize production. This individual has previous experience with the project from the university, and is familiar with the operations and conditions on the Ice. The Growth Chamber operates as intended.

Identified Issues

Issue: The new HF system developed hardware and software problems that required frequent attention from technicians. The antenna for backing up the HF system sustained damage and could not be repaired during the season.

Response: We made SPAWAR aware of the problems, and we are in constant communications with them to identify solutions. In order to provide an emergency HF system for the winter, we installed an alternative antenna on the Elevated Station.

Issue: The road crossing the skiway between the station and the Dark Sector causes increased snow compaction and a small rise in the skiway.

Response: Creating multiple crossing routes minimizes the problems. We submitted a project proposal to the NSF to eliminate road crossings in KY07by moving the skiway.

Issue: In the new Power Plant, an exhaust heat exchangers on multiple units needed replacement. This is an item outside of normal maintenance.

Response: We are still investigating the cause of the failures and working with the manufacturer on solutions. Currently, the Power Plant has two functional exhaust heat exchangers. We are pursuing the purchase of additional spares.

Issue: Transient power spikes caused by the startup of the liquid nitrogen plant located within MAPO cause disruptions to AMANDA's high-voltage power supplies.

Response: Following a technical visit from the liquid nitrogen plant manufacturer, we installed a "soft start" power buffer device that mitigates the large startup current draw, allowing the equipment and the experiment to run simultaneously.

Issue: Food storage space is inadequate for a summer population of 250.

Response: We modified available storage to maximize space, which required following

administrative controls to avoid cross-contaminating foods. We submitted a white paper to the NSF detailing the storage changes and attendant risks.

Issue: Winter storage space for beverages is inadequate. Moving the beverages into the new station required between 10 and 20 people per delivery. Each delivery took approximately 1½ hours to unload, and every individual case must be lifted and moved at least twice.

Response: We are using the Elevated Station berthing rooms for beverage storage, but we need another solution until the SPSM Logistics facility becomes available.

Issue: A persistent problem for the VMF is the disposal of water from drains contaminated with oil. The labor required for running this water through an oil/water separator and disposing of the filtered water is substantial and hazardous. Workers must transport 55 gallon drums of wastewater across slick snow and ice, exposing them to unnecessary risk.

Response: We are investigating a solution for next season because the current disposal facility, the old Power Plant, is undergoing demolition. We have developed a project proposal to submit with the FY07 APP.

Issue: Flagging policy is not consistent between RPSC and science projects, resulting in difficulty understanding what some flags mean and what hazards are being marked.

Response: We will publish a standard use policy and provide it to science events before they deploy.

Lessons Learned

Chronic supply shortfalls in the VMF often require last-minute orders from McMurdo Station, Christchurch, or stateside vendors. Tighter controls of inventory tracking and material usage, in addition to careful spending, are part of a broader plan to bring this situation under control in the near future. Currently, mechanics are responsible for managing and replenishing the vehicle parts inventory, but this takes time away from these highly trained professionals that they could better spend on maintaining and repairing vehicles. We are looking for a way to have a dedicated materialsperson manage the parts inventory.

Communication breakdowns over patient transports upset at least one NSF Representative and several NYANG personnel. To help fix this problem, we educated key personnel, added several people to the e-mail notice distribution lists, and incorporated receipt procedures for verification. We refined the SP MEDEVAC-PT Checklist and added boxes to record the time tasks are completed.

Processing the winter-over mail has traditionally been a very slow and haphazard operation. In the past, the Retail Coordinator performed this job. Hours of operation were limited and many mistakes occurred because this person received minimal training but had to process large quantities of mail. A Christchurch APO postal worker came to Pole at opening for one week and held postal hours all day to accommodate a variety of schedules. He processed the mail properly, eliminating extra work for McMurdo and Christchurch postal staffs. We found that this was a much more efficient process, and we will repeat it annually.

We need to improve the process whereby completed projects are handed over from construction crew to operational staff. This was particularly evident in the transition of some SPSM systems. We are developing a process to correct the problem.

We need to manage power requirements at South Pole through a formalized process that reviews impacts and documents changes. In the past, the NSF representative on site has approved small changes. We will review and modify this process, based on NSF and FEMC input.

Winter temperatures continue to make material handling a challenge. Some equipment

installed as part of the SPSM project has not functioned well during this period. We have redesigned hoists to overcome problems with icing and cold failure of parts and have put a new, replacement hoist in operation for the KY07 winter. We will evaluate its performance to determine if we can use this design for other applications, such as on science facilities.

The current South Pole fuel storage facility is comprised of 45 10,000 gallon tanks. At present, we can access 95% of the fuel in the tanks. However, during evaluations of storage capacity and fuel requirements based on out-year power needs, we have learned that we need the full capacity of the tanks. We plan to lower the suction tubes in each during the cleaning process, allowing us to access the full amount of fuel. We will modify approximately 10 tanks per year using this process.

The Fuels Foreman at South Pole is a permanent position, but Fuels staff members rotate from McMurdo to South Pole. This allows us to develop a pool of experienced and knowledgeable personnel for both stations. However, because of acclimation and training requirements, it would be much more efficient to have two Fuels personnel dedicated to South Pole and only rotate one.

Section 3. Plans for KY07

We will continue to fine-tune the SOC over the winter and next season, especially as the scope, duties and responsibility of the SOC increase with the addition of several new systems (e.g., Land Mobile Radio, DDC and LAN/Satellite monitoring and operation).

We will continue fuel tank maintenance and cleaning.

We will include drift planning for both early- and late-season cargo deliveries as part of the KY07 flight schedule. All functional areas will provide information regarding available cargo.

Planning for the dedication of the new South Pole Station will continue.

AREA DIRECTORATE - PALMER

Section 1. Summary

Palmer Station began KY06 with an ambitious winter schedule. Summer science teams remained on station into April, and we supported preliminary work on the PRIMO project (B-390-P) from April to May. Cruises LMG05-05 (May) and LMG05-06 (June) supported station-based research for B-036-P (Sidell). We also supported several fishing outings and other on-site research during this period. The deployed science season came to a close in June.

Operational activities during the austral winter included the biennial hazardous waste retrograde project, which entails removing accumulated waste from the station for shipment to CONUS, and construction of the IMS building (later renamed TerraLab) to replace the aging T-5 facilities. The latter was a significant project, which we completed on schedule with excellent attention to quality workmanship.

The austral summer season at Palmer Station opened with the arrival of LMG05-11 in September. As we conducted turnover with the winter crew and made preparations to support summer science events, a member of the winter crew developed a medical condition that required a MEDEVAC to Punta Arenas. We accomplished this with the assistance of the British Antarctic Survey (BAS).

The *LMG* developed engine problems on the northbound leg of the LMG05-11 cruise and had to enter dry dock for repairs. This required adjustments to the vessel schedule, and the ship brought the first summer science events to Palmer Station on October 29. The ship developed further engine problems during LMG05-14, the scheduled LTER Site Review visit to the station. Ultimately, ice conditions prevented the vessel from reaching the station and we arranged to move passengers north and south via tour ships.

Palmer Station's population remained near maximum levels for much of the austral summer season, peaking at 45 in January. We supported seven deployed science events during this period and a very busy tour ship schedule. Throughout the austral summer, operations went smoothly, science teams were well supported, and morale in the community remained high.

Section 2. Qualitative Performance

A. Project Management

General Management

Accomplishment: We implemented the IMS and began collecting labor allocation data for all work centers.

Benefit: These data will allow more accurate labor planning and better assessment of position requirements.

Customer Satisfaction

Accomplishment: We gave presentations on the USAP to 4,525 visitors from tour ships and other national programs during the austral summer, and we gave tours of Palmer Station to 1,925 of those visitors.

Benefit: Significant educational outreach and goodwill results from these visits. Feedback from visitors is overwhelmingly positive, with many remarking how proud they are to have their tax dollars fund the USAP.

Accomplishment: We supported the visit of an NSF-sanctioned documentary crew in January. The group was able to collect a variety of material for use in their DVD and theatrical release projects.

Benefit: Their work will result in positive media exposure for the NSF and the USAP.

Human Resources

Accomplishment: The support staff at Palmer consisted of 88% returning USAP employees (from all stations). Of the summer staff, 64% were returning Palmer employees. Morale for both summer and winter crews was high.

Benefit: A high rate of return for experienced employees helps retain institutional knowledge and results in high productivity. Morale is increased by having a mix of experienced Palmer personnel, people with USAP experience at other stations, and new employees.

B. Program Integration

Coordination Between WBS

Accomplishment: Palmer management coordinated well with on-site work centers through the winter and summer seasons.

Benefit: During the winter season, we were tasked with constructing the new IMS building, supporting B-036-P (Sidell), and conducting general station maintenance. Station-wide cooperation and communication allowed us to adequately cover these sometimes competing needs.

Integration of Environment, Health, and Safety Objectives Across Corporate Activities

Accomplishment: The EH&S Lead spent two months at Palmer training personnel and evaluating safety and health conditions at the station.

Benefit: The training and evaluation increased our safety awareness and increased community involvement in safety and health initiatives.

C. Innovation/Process Improvement

Innovative, Technological Solutions

Accomplishment: We replaced all 2-stroke outboard motors with new 4-stroke motors.

Benefit: The 4-stroke motors are far more reliable and generate less pollution.

Responsiveness to Challenge and Change

Accomplishment: When the *LMG* was unable to reach the station because of heavy ice, we worked with the NSF to arrange transportation aboard tour ships for both northbound and southbound USAP participants.

Benefit: Seven northbound and five southbound participants reached their destinations at times closely corresponding to their original itineraries. Pressure on the *LMG* was relieved, and the vessel schedule and shipboard science activities remained relatively unaffected.

Accomplishment: Exceptional teamwork at Palmer, combined with assistance from BAS aircraft crew and other personnel from Rothera Base, resulted in the successful MEDEVAC of an RPSC employee.

Benefit: The patient is recovering fully. The MEDEVAC cemented the USAP's excellent cooperative relationship with the BAS.

Identified Issues

Issue: The failure of a bypass switch allowed salt water to enter the fresh water storage tanks at Palmer.

Response: We provided bottled water for drinking and activated the backup RO system while the storage tanks were drained and refilled. We repaired and tested the faulty switch and are investigating alarm systems and redundant bypasses for future installation.

Section 3. Plans for KY07

We expect that KY07 operations will be similar to those of KY06. Science deployments will continue to keep the station near its maximum population through the summer season and will continue into June. There are no major construction projects currently funded, however a number of maintenance projects have been proposed.

FACILITIES, ENGINEERING, MAINTENANCE, and CONSTRUCTION

Facilities, Engineering, Maintenance, and Construction (FEMC) saw the completion of several major projects during KY06 with conditional occupancy of the new Long Duration Balloon (LDB) facility and International Monitoring Station (IMS) and installation of the BICEP Telescope in the Dark Sector Laboratory (DSL).

We overcame some major challenges during the year. The LDB project required extensive design and material procurement on an accelerated schedule to meet the vessel shipping deadline for construction in the 2005 winter season. We also had to provide a substantial labor boost to complete the project in time for NASA's scheduled balloon launch. As work progressed on the Water Plant/Power Plant Upgrade project, we discovered serious site deficiencies and developed plans to correct them.

We were proactive in outsourcing design work that is beyond the expertise of our engineering pool. For example, we obtained the services of a design firm, experienced in fuels storage and distribution, for the MOGAS project and the services of a Fire Protection engineering firm for third-party review of fire suppression system designs.

Adequately staffing both McMurdo and South Pole this year brought its own challenges. We used the Integrated Master Schedule (IMS) to coordinate our needs with those of other major RPSC projects, such as WAIS Divide, IceCube, and MLS. Working collaboratively, integrating the needs of other divisions, and assigning workers where they were needed most allowed us to complete all top-priority construction work at McMurdo, South Pole, and Palmer.

We began assessing the condition of all facilities at McMurdo, per NSF direction. The information collected will become the baseline for planning future maintenance. Also, as directed by the NSF, we gave increased attention to aesthetic work orders, as opposed to concentrating solely on maintaining heat, lights, and water. The result is improved station appearance and livability – and many positive comments from USAP participants.

The Life Cycle Replacement Program (LCRP), in its second year, experienced some growing pains. During the first few months of the program, we found that in order to replace a piece of equipment, existing systems had to be reconfigured more than anticipated and considerable effort was required to bring systems and areas up to code at the same time we were installing new equipment. Several major equipment failures further compounded problems. However, the LCRP gained a dedicated Project Manager in KY06, and his careful coordination of procurement and work contributed to a smoother season.

We went through some significant personnel changes this past year. We have a new Director, a new Engineering Manager, and new SPSM/PMO Manager. They have brought to FEMC a wealth of new ideas and an increased focus on project management. As a result, the program has seen dramatic improvement in project execution and accountability. We expect to see this trend continue.

MCMURDO STATION

Section 1. Summary

FEMC was extremely busy at McMurdo during KY06. Personnel worked through the bitter winter to construct the new Long Duration Balloon (LDB) facility, began a major upgrade to the Power and Water Plants, and initiated a long-term management plan for energy conservation. We also tackled many small projects, continued to maintain facilities well past their prime, and worked to create a safe environment for our employees and the community.

LDB Facility Upgrade

We played the primary role in the design and construction of the LDB buildings and camp. Despite significant challenges, we completed this 16½-month project in time for NASA's 2005-2006 summer balloon season. Crews worked outside during the winter, under artificial lighting and at ambient temperatures as low as -60°F with wind chills of -100°F. Though we lost many days to adverse weather conditions, conditional occupancy was granted on November 15, 2005. NASA officials praised these buildings (Figure 13-1), saying they were as nice as anything NASA has at its Wallops Island facility.

The LDB structures are the largest and tallest mobile buildings ever built for the USAP. They were built on heated skis so they could be moved to berms during the winter to avoid the expense and time of digging them out from snowdrifts at the start of each summer. Because the skis track straight and true, one D-8 tractor is adequate to pull even the largest building. The large cargo doors on the Payload Building can be closed while the payload remains outside. This reduces building heat loss and wasted energy when the scientists are working outside.

The buildings have many other innovations. When they are set up, they are connected by an overhead utility truss system that carries power cabling, glycol heating, fire alarm cabling, and telecommunication lines, with space for additional cables in the future. The truss is designed for easy removal to allow for rapid assembly and disassembly. A waste heat recovery system on the camp generator heats the buildings via glycol loops through radiant floor panels, eliminating substantial heating fuel costs.

Figure 13-1 LDB Camp

Power and Water Plant Upgrade

Foundation problems delayed the Power and Water Plants Upgrade project. An accidental water discharge contributed to premature settling of two generator pads at the Water Plant. Previously installed concrete footings also needed to be removed and foundation pedestals reworked. We submitted a rework schedule to the NSF to remove both generators, their associated concrete pedestals, and the foundation pedestals for repair. This rework caused the project schedule to slip one year.

Waste heat system outages associated with this project also presented challenges that required innovative solutions. For example, we used the redundant boilers in the Crary Engineering and Science Laboratory (CSEC) and Science Support Center (SSC) to ensure Bldg. 155 did not lose heat during the transition.

The project team put construction management tools in place to manage the project more effectively:

- Material Management Plan. Weekly tracking verifies that received materials are correct in quality, quantity, and functionality (if there has been a product substitution). We review statements of work and submittals as part of due diligence in investigating potential material shortages.

- Bi-Weekly Request for Information (RFI) Meetings. Meetings with NAVPAC expedite field issues and clarify drawing and design issues.
- Document Control. We use unique numbers to track each set of drawings and manage revisions and distributions to stakeholders. Specification updates are treated similarly.
- Daily Log. This log includes activity IDs and description, quality self-inspection reports, and daily progress photos.
- Weekly Construction Meetings. We hold meetings with the field manager and construction manager to discuss each week's daily logs.
- Issues Log. This log tracks any project issues that may arise in construction management software.

Energy Management Program

The Energy Management Program's (EMP) goals are to manage long-term energy use for the USAP, reduce Antarctic greenhouse emissions, and increase energy security for the USAP. Minimizing energy costs will stretch the budget, freeing money for science. We directed an annual budget into small projects for direct energy and cost savings. In addition, we assessed energy use for each building at McMurdo, and we are expanding energy monitoring ability to collect data in support of the EMP. We have also proposed to expand monitoring capabilities at South Pole. We are saving energy through conservation, alternative energy projects, long-term facilities planning, operating practice modifications, cultural awareness, and education.

With input from RPSC management, an outside consultant, and the NSF, we have nearly finished drafting the Long-Range Energy Management Program Strategic Plan and the Master Plan for South Pole Energy Management.

Project Support

At the beginning of the season, we supported two large construction projects, both of which needed temporary heat. We met this requirement by using all temporary heating equipment from the cargo lines and by gathering up and placing back into service some decommissioned furnaces. This successful effort required considerable resources, including sheet metal from the station maintenance stock.

We also worked with Fleet Ops on the Winter Quarters Bay drainage ditches, successfully finishing this team effort by using ingenuity to overcome problems with terrain and materials.

Science Support

WINFLY presented us with a large Science Support requirement: setting up the French VORCORE balloon launch facility at the ice transition. Prefabrication and installation phases went flawlessly and we completed all work well before scheduled deadlines. This event required significant support for many odd plugs, wiring configurations, and voltages, but our Maintenance shops worked closely with Science Support to identify needs and procure materials and equipment. At one point, a storm destroyed one of the buildings and severely damaged one of the event's two Jamesways. We worked aggressively to complete repairs so the researchers could continue with their experiments on schedule.

Catastrophic Equipment Failures

When the snowmelter at Williams Field failed at the end of the previous austral summer, we found that the budget did not have sufficient funds for a replacement. As an alternative, we purchased only a replacement boiler section, which we installed in time for the Williams Field opening. This well-coordinated effort between FEMC and Purchasing allowed us to resurrect a very important piece of equipment.

Early in the winter, one of the glycol heat exchangers in Bldg. 155 failed, and there were no replacement parts in McMurdo. This was a 35-year-old unit scheduled for life cycle replacement. Maintenance personnel transferred primary controls to the secondary exchanger to keep the system working. We ordered a replace-

ment tube bundle and head gaskets for WINFLY delivery and repaired the unit when they arrived.

Near the end of the austral summer, the overhead door for bay #3 in Bldg. 143 failed, with damage to panels, cable, drive chain and sprocket, tension springs, and cable spools. It was too late in the season to purchase and receive replacement parts before the station closed. We found what replacement parts we could and modified other parts to make repairs before winter.

Asbestos Issues

Poor documentation of Asbestos Containing Materials (ACMs) in previously generated reports created setbacks to the McMurdo Painting Project, as we discovered ACM areas incorrectly identified as in "good" condition. Maintenance crews also found some ACM floors in immediate need of repair, but the scope of the work was too large for maintenance alone.

We immediately conducted an internal survey of all ACM installations to verify the presence and condition of those materials. One office building (Bldg. 193) was closed until an abatement plan is revised to identify clear lines of authority. Other high-priority areas will require a third-party abatement contractor. We are using the internal survey, in conjunction with previous surveys and reports, to complete a comprehensive report regarding ACMs at all three stations.

Safety

We reviewed safety practices at all work sites, which led to improved hazard communication regarding chemicals, flammable storage, fall protection, and the lifting of heavy equipment in enclosed or hard to negotiate spaces. We improved hazardous material storage and health information in the shops, and we inspected safety harnesses and lanyards and removed suspect equipment.

We are improving methods for safe lifting, fall protection, and high-work access in all areas, including workspaces used by divisions other than FEMC. We added handrails and platforms to bulk fuel tanks and to several roofs and decks, and we eliminated trip hazards on steel floors in Bldgs. 182 and 143.

Inspectors checked, tested, and certified all overhead hoists and installed cranes on station, including their support structures, and prominently marked carrier beams with maximum capacities. We fixed many slip hazards in buildings and on equipment with non-skid paint, and we marked other areas with safety colors to maintain clear space, or to provide warning of potential hazards. In all, we used approximately 2,000 person-hours to address over 220 work orders directly related to safety.

In addition to those described above, we completed these other significant safety work orders:

- Installed roof hatches in the Crary Lab and Ice Core Storage (Bldg. 3) for safe roof access and for removing compressor equipment
- Re-welded metal flooring in the SSC to correct trip hazards
- Replaced non-conforming counter top in Bldg. 142 (Medical) with code compliant stainless steel
- Installed a metal cover on the ramp surface to Bldg. 142 to eliminate slipping hazard
- Repaired stair and hand rails on all MRSF facilities to reduce fall hazards
- Repaired fuel tank supports and filling platforms to MRSF facilities to reduce spill hazards
- Fabricated and installed numerous electric heater covers in MRSF buildings
- Installed foot-activated valves for Bldg. 155 scullery sprayers in the Dining Facility
- Installed emergency eye wash stations in Bldg. 155 boiler room near water chemical storage
- Repaired and welded metal flooring for Bldg. 155 loading dock to reduce trip hazards

- Changed out line voltage furnace thermostat in Bldg. 191 to 24V to reduce electrical hazard
- Hard-wired power strips on work benches in Bldg. 191, replacing temporary installations
- Installed safety valve on fuel system in Bldg. 125
- Installed door for acid locker room in Bldg. 174, to separate from flammable materials
- Replaced bowed metal flooring in 2nd floor of Bldg. 136 to remove trip hazard
- Installed separation walls in Bldg. 136 welding bay for oxygen and acetylene storage and use
- Sanded and varnished wooden handrails on stairs to Bldg. 136, Bldg. 210, Bldg. 211 to remove splinters
- Installed missing covers over exposed electrical devices throughout dorm mechanical areas to reduce electrical hazards
- Repaired uneven flooring, which had lifted throughout Bldg. 177, to eliminate tripping hazards
- Relocated the water heater from the furnace room in Bldg. 107 to correct code violation
- Installed new handrail sections and repaired existing sections for hoist access in Bldg. 121, 2nd floor
- Covered holes in platform for old freezer equipment on Bldg. 164 to minimize fall hazards
- Built a platform in Bldg. 170 to assist waste oil refueling without using MK-4 loader as a work lift
- Built platform and stairs for rear exit of Bldg. 159, to relocate fire exit from leading to pipe run
- Replaced plywood on back materials deck of Bldg. 191 to eliminate trip hazards
- Repaired all electrical code violations in the greenhouse (Bldg. 147) to eliminate electrical hazards
- Modified CO_2 bottle rack installations in Bldg. 147 to perform PM tasks more efficiently and safely
- Welded the catwalk on freezer platforms outside of Bldg. 164, eliminating trip hazards at height
- Conducted internal audit of all asbestos items from 1992 survey report for current condition
- Covered sharp edges in numerous places around town with insulation and padding
- Relocated power feed to Bldg. 166 to eliminate electrical hazard
- Repaired steel plating and in Heavy shop large truck bay (Bldg. 143) to remove tripping hazard
- Installed steel plating in VMF (Bldg. 143) welding bay to remove tripping hazard
- Installed one of two aluminum work platforms on top of the VMF (Bldg. 143) bridge cranes; the second to be installed soon
- Replaced ladder and platform for the fuel tank of Bldg. 140 by modifying spare parts
- Installed work platforms on bulk fuel tanks from spare platform pieces modified for use
- Removed snow and ice using bucket truck, which is now part of weekly preventive maintenance inspection to prevent accidents
- Used the bucket truck to assist other divisions in reducing climbing hazards
- Fabricated and installed covers for pulleys and shafts on air handlers in several buildings
- Installed or painted non-skid surfaces in several slippery areas, like the RADARSAT dome (Bldg. 71), and steel decking for some warehouses
- Improved work surfaces on South Pole Traverse sleds with non-skid surfaces on top
- Painted clearance markings on floors for electrical panels and fire extinguishers in many buildings

- Painted numerous railings and caution lines on floor hatch openings around town
- Purchased and installed fall protection eye bolts in many areas around town where needed
- Installed dolly ramp for chemical spill drums to eliminate heavy lifting hazard
- Modified dumpster lids with intermediate hinges to allow 40 pound weight compliance

Arrival Heights

There were two significant safety issues with the Arrival Heights Laboratory (Figure 13-2).

First, safety handrails at the facility were too low to prevent a fall. Both the handrails and the platform failed to meet OSHA specifications. However, we could not simply raise the handrails because that would adversely affect the viewing horizon for rooftop instruments. Also, construction could not interfere with instruments mounted on a box that is accessible from the platform.

Figure 13-2 Arrival Heights Platform before Reconstruction

Second, the science instruments require regular roof access, but no tie-off points existed (Figure 13-4). Tie-offs needed to be very low to avoid affecting instrument viewing horizons. Penetration from the exterior to the interior was not an option because grit and moisture could get inside and infiltrate instrument optics.

To solve the first problem, we lowered and expanded the platform and increased the handrail height without extending it above the building (Figure 13-3). Construction did not interfere with equipment. The reconstructed platform meets OSHA standards, provides fall protection, and gives better access to UV monitoring instruments on the side of the building, without affecting the viewing horizon of the instruments.

To solve the second problem, we laid C-channel along the roof between the instruments and access platform, with tie-off points spaced along it. We secured the channel with lag-bolts at the center and on the sidewalls with no interior penetration. The C-channel protrudes approximately 1½" above the roof, below the height of the instruments, and does not affect viewing horizons (Figures 13-5, 13-6). This allows the Research Associate to "harness up." It is rated to support more than 5000 pounds as required by OSHA.

Emergency Work Orders

The number of times maintenance personnel are called out to perform unplanned, emergency work is a strong indicator of the overall health of the maintenance program. The decline in the number of such work orders in the last several years shows we are making significant progress

Figure 13-3 Improved Arrival Heights Platform after Reconstruction

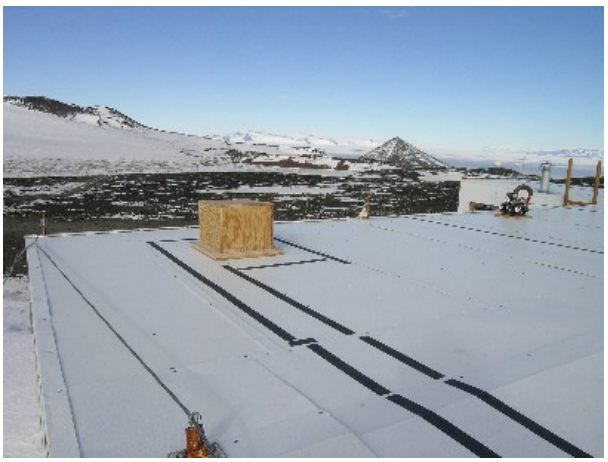


Figure 13-4 The Original Roof at Arrival Heights

Figure 13-5 C-Channel Attached to the Building

Figure 13-6 C-Channel with Tie-Offs in Place on the Roof

in that regard. We have put a lot of effort into reducing emergency calls for the Preventive Maintenance (PM), Electrical, Plumbing, and Fire Tech work centers over many seasons, including this one. Although we saw a jump in Fire Tech emergency calls early in the season, it was largely because of concentrated effort on the LDB project. After that bumpy beginning, we focused on high response areas to bring unplanned work under control, and numbers fell to 25 emergency work orders or less per month for the remainder of the season (Table 13-1, Figures 13-7, 13-8).

Table 13-1 Emergency Response Totals

	CY-1	CY-2	CY-3	CY-4	CY-5	CY-6	AVG	Change from CY-5	Change from Avg
Electricians	118	127	96	102	94	68	100.83	-27.66%	32.56%
Plumbers	112	104	94	88	90	74	93.67	-17.78%	21.00%
Utility Techs	495	522	689	592	483	354	522.50	-26.71%	32.25%
Fire Techs	296	225	271	224	232	252	250.00	+8.62%	0.80%
Totals	1021	978	1150	1006	899	748	967.00	16.80%	22.65%

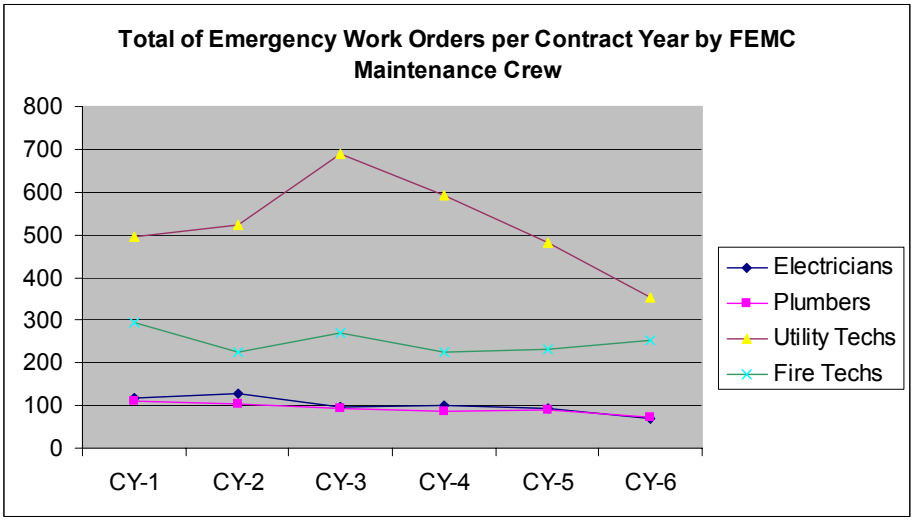


Figure 13-7 Emergency Work Orders by Crew

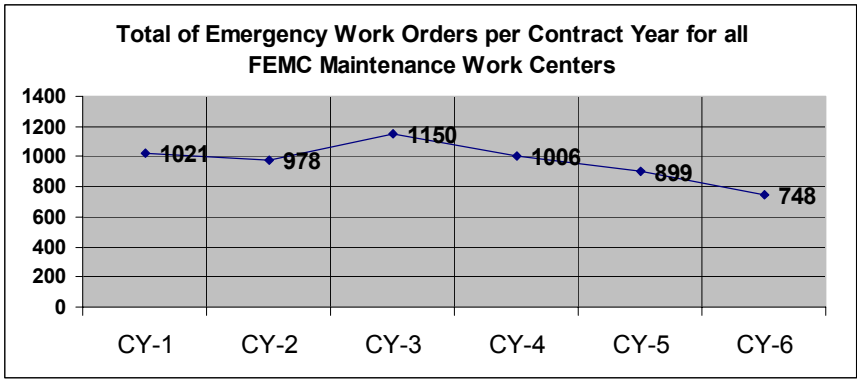


Figure 13-8 Emergency Work Order Totals

Much of the success we've seen in curbing unplanned responses for the Utility Mechanics, Boiler Mechanics, and Refrigeration Mechanics (UTs) is the result of equipment life-cycle replacements and setting up work zones for tradesmen to encourage familiarity with the equipment and a sense of pride in ownership. In-house cross training for all personnel also contributes. Emergency responses for this shop fell more than 26% between KY05 and KY06. This helps increase productivity, which in turn allows us to make equipment improvements to reduce emergency calls.

Many of the emergency calls for Electricians have involved heat trace failures on utility pipes. We made replacements in high response areas to help decrease the numbers. Further reductions will likely come from educating the community to not overload dorm circuit breakers. For plumbers, most of the emergency calls have involved frozen pipes. We anticipate improvements in this area as we proceed with repairing heat traces and replacing bondstrand piping in frequently serviced areas.

Other Organizations

Various FEMC shops provided significant assistance to other organizations this season. ANZ requested Refrigeration Mechanic help in commissioning a new system and recovering refrigerant from an old one. Our linemen assisted ANZ by moving power and communication cables on Arrival Heights to accommodate a new installation. This was a four person-day effort.

The sheet metal shop spent four person-days repairing the RADARSAT dish for NASA, and we troubleshot NASA equipment at the ice runway. We completed many work orders for SFA and SPAWAR in their runway facilities, and we did some work in the SFA dormitory.

The carpenter shop spent eight person-days assisting the Wells Fargo technicians with changing out the ATM machines in Bldg. 155. We completed this work under a tight schedule while avoiding damage to the hallway floors.

Section 2. Qualitative Performance

A. Project Management

General Management

Accomplishment: FEMC worked with personnel on station to re-establish the documented Configuration Change Request (CCR) process for making changes to permanently installed equipment and structures. We developed 104 CCRs and completed 25.

Benefit: This reaffirmed the change management system.

Accomplishment: We finished a three-year effort to validate core information related to all FEMC installed and maintained equipment in McMurdo. We used this information to update our 10-year life cycle equipment replacement plan. The forecast now defines all commodity replacement costs, associated labor Level of Effort (LOE), and annual budget requirements to install equipment for all three stations over the next 10 years.

Benefit: Reliable long-term forecasting allows RPSC to budget accordingly.

Accomplishment: Our EMP engineer delivered an energy awareness presentation at the all-hands meeting in December.

Benefit: Energy management is a high priority for the NSF, with an emphasis on both energy conservation and alternative energies. This presentation targeted the general population as energy end-users and raised awareness.

Accomplishment: The EMP engineer developed the energy assessment program and audited 25 buildings.

Benefit: We wrote 88 work orders and 14 CCRs, and we identified 15 EMP tasks, 36 potential projects, and 37 other jobs needing further study. We are in the process of establishing priorities for these tasks.

Accomplishment: We sought NSF approval for funding small EMP projects using the annual energy conservation budget.

Benefit: This allows us to implement individual projects as quickly as the procurement cycle permits.

Accomplishment: We continued working with Science Support's MEC program for alternative energy at field camps.

Benefit: This constructive interaction allows energy engineers to leverage limited time and resources while encouraging Science Support to continue expanding its alternative energy work.

Accomplishment: The energy engineer continued working with the McMurdo Area Directorate on energy-saving winter building closures.

Benefit: This program optimizes winter building closures, with additional buildings considered on an ongoing basis.

Accomplishment: The Energy Engineer wrote a proposal for wind power at all three USAP stations.

Benefit: We have identified specific options with estimated costs. These options outline how the NSF can proceed with large-scale alternative energy programs for the USAP.

Accomplishment: We continued fitting all stations with new, higher efficiency materials and technologies. For example, we converted from T12 fluorescent lamps to T8 fluorescent lamps with matching ballasts. We also replaced incandescent exit signs with high-efficiency, long-life, LED signs.

Benefit: This process increases the energy efficiency of USAP stations and reduces stock by standardizing materials.

Accomplishment: We engineered a replacement for the obsolete CSEC DDC system to a more current, modern system, the Alerton BACtalk/Envision system. RPSC uses this system in all the other DDC-controlled buildings on station. NAVFACPAC and the NSF are reviewing the 80% drawings.

Benefit: Installing the new system in CSEC will allow us to put all DDC-controlled buildings at McMurdo on the same network – controlled, monitored, and programmed from the existing BACtalk workstations. This will enhance user interface, program features, and data logging over the obsolete Network 8000 system currently in place, as well as simplify training for personnel. This should also reduce storage space because we will no longer need spare parts from multiple vendors.

Accomplishment: We fixed several problems at the Science Support Center, including replacing a broken valve actuator for the domestic hot water heater, repairing a modulating valve for the waste heat exchanger so it would open and close as designed, and adjusting the heating valves on the air handling unit.

Benefit: The domestic hot water system can now maintain set-point. The waste heat system can now maintain temperature for the glycol loop so the boilers don't have to constantly run to maintain building temperature. This should allow for substantial energy savings. The air handlers can now regulate discharge temperature much more effectively.

Accomplishment: The LAN Systems Integrator (LSI) in Bldg. 155 had several problems, including failing to produce trend logs to identify systemic problems. The unit would no longer function after the backup battery was replaced. We replaced the global controller with a current model equipped with a BACtalk Integrator (BTI).

Benefit: The BTI is an upgrade over the older LSI, and it corrects the problems. The BTI also has an extended-life backup battery.

Accomplishment: We added the JSOC building control system to the DDC Network and adjusted the set points to help maintain building temperature in a comfortable range while conserving energy.

Benefit: Alarms in the JSOC building now reach all McMurdo DDC workstations so technicians can respond quickly instead of waiting for occupants to report problems.

Accomplishment: We updated the graphics on the BACtalk server in Bldg. 196, corrected poorly mapped graphical access buttons, and added new buttons. We also modified the filter alarm messages and updated alarm messages for all DDC buildings.

Benefit: All other BACtalk workstations are clients and access their graphics through this server. The alarm messages now indicate what the alarm is about and identify the type of technician to call, saving countless hours by allowing the system to assign the right technician right away, rather than sending several people to fix an unknown problem.

Accomplishment: We discovered someone had incorrectly installed the water meter at the Water Plant (Bldg. 198). We also found it is not the right meter for this application. We corrected some of the problems and are procuring a new water meter rated for this type of installation. We will install it in the early part of the KY07 summer season.

Benefit: The new meter will allow the DDC system to monitor and log the usage and instantaneous flow of domestic water, as well as display that information on a unit located at the meter.

Accomplishment: The differential pressure transducers on the dorm loop pumps (3 and 4) were incorrectly installed and programmed. Since they did not work the pumps have been running under manual control. We replaced the variable speed drives for the dorm loop and reconnected them to the DDC system.

Benefit: The dorm loop pumps now run correctly, which should result in energy savings.

Accomplishment: We corrected problems with exhaust heat exchangers for two air handling units (AHU-1 & 2) in the Waste Water Treatment Plant (WWTP, Bldg. 199) and added their control to the DDC system. The exhaust heat exchangers previously operated under stand-alone controls. We found that the damper actuators were installed incorrectly and the control action was incorrect. As a result, the AHU inlet had been freezing all the way to the filter bank or building ice all the way to the ground from the exhaust. We modified AHU control strategies to minimize freezing, reconnected intake air dampers, and added programming to cycle the dampers every hour to prevent freezing to the point of binding. We also modified the DDC graphics to reflect these enhanced control capabilities.

Benefit: Adding control of these exhaust-heat exchangers to DDC and setting control limits should minimize problems. We will evaluate the results over the winter and modify as required.

Accomplishment: We reprogrammed the air handling units in the 203 series dorms to increase energy savings and occupant comfort. We corrected numerous installation problems and adjusted the zero/span settings of the AHU heating valve actuators. We corrected DDC graphics to reflect the changes made to control strategies.

Benefit: The air handling units' fan speed was originally controlled by static pressure. We modified the control sequence so that fan speed is now controlled by return air temperature. As the building temperature approaches comfort level, the fan slows. The discharge air temperature for the unit was controlled based on an outside air temperature re-set schedule, which worked satisfactorily unless the conditions were windy or dark. We added an offset to this re-set schedule to take into account influences other than outside air temperature. The modifications are currently being evaluated but early indications are that energy savings and occupant comfort have increased.

Accomplishment: We repaired the 3-way glycol re-set valve and non-DDC controls in Dorm 208 and corrected problems with the DDC controls. Because the re-set valve wasn't working, the linkages were bent and the system couldn't control temperature. That has been corrected, and we calibrated the stand-alone controller.

Benefit: The system now maintains the glycol at the proper temperature.

Accomplishment: We changed batteries on LSI Module and inspected communication wiring. The manufacturer recommends changing batteries in LSI global controllers every 18 months. We recommend changing batteries every 12 months, given the harsh temperature swings here.

Benefit: Changing the battery every 12 months will increase reliability, and the DDC engineer will be able to do it while he is on station, in case any problems arise.

Accomplishment: We diagnosed and repaired a problem with the LDB generators – they would spike to over 300 volts whenever the radiator fan cycled. (The radiator fan cycles to maintain generator temperature when a waste heat system is in use.) The DDC Engineer traced the problem back to a missing ground wire, forgotten at the Caterpillar factory.

Benefit: Output voltage now remains constant at 208 volts. We plan to remove the original thermostat and install a three-way valve to regulate temperature. This should allow us to reclaim more heat from the waste heat loop and run the boilers less frequently.

Accomplishment: We installed 15 fuel day tanks in and around McMurdo.

Benefit: The replaced day tanks were single-walled and well past their lifecycle replacement date. The new tanks are double walled and are installed with the proper valves and hardware to bring them up to code.

Accomplishment: We painted the exterior of Bldg. 144.

Benefit: The paint improves the building's appearance and protects the building's exterior.

Accomplishment: We installed a shower in the WWTP.

Benefit: WWTP operators can be more productive and spend more time in the plant, as they no longer need to walk to a dormitory to shower.

Accomplishment: We coated the exterior of the three new MOGAS tanks with epoxy paint.

Benefit: The MOGAS tanks look much better, and the epoxy paint protects them from corrosion.

Customer Satisfaction

Accomplishment: The NSF has recognized our efforts in planning and designing the SF1 and SF2 VFDs in the CSEC.

Benefit: The VFDs will promote energy savings by controlling airflow via motor speed instead of through dampers.

Accomplishment: We completed the VORCORE balloon launch site on a very tight schedule despite extreme weather conditions, darkness, and storm damage.

Benefit: The science event was able to perform all of its experiments in a short window of opportunity.

Accomplishment: We assisted with replacing the new ATM machines to conform to new policies and security procedures.

Benefit: The Wells Fargo technicians were able to complete their work on a tight deployment schedule without interrupting service to the community.

Accomplishment: We helped Scott Base personnel with refrigeration work at WINFLY, and we helped ANZ personnel correct power feed issues and relocate communication cables at Arrival Heights.

Benefit: This kind of cooperation and assistance maintains our excellent partnership with our New Zealand neighbors.

Accomplishment: We repaired a satellite dish at the NASA facility at Arrival Heights, a process that took four person-days to complete.

Benefit: The repair allowed NASA to complete a scheduled satellite-tracking project.

Accomplishment: We donated substantial resources to help wipe out a month of delays at the WAIS Divide field camp to get it back on schedule. The maintenance shops provided all support necessary to complete their work on schedule.

Benefit: The project got back on schedule and completed its work for the season.

Accomplishment: NSF recognized FEMC for comprehensive reporting on LCR equipment still in use past twice its expected life expectancy.

Benefit: We provided timely, accurate and comprehensive reporting to the NSF, which our customer appreciated.

Cost Savings

Accomplishment: Since October 2004, we have begun more than 100 small, energy-efficiency projects and identified more than 500 other possibilities. This year we completed 14 of the 100 in progress, and we document the savings associated with these projects whenever possible (proved or calculated).

Benefit: Since starting this program, we can document savings of more than $170K from 43 projects, through energy conservation, life cycle replacement, and reduced maintenance.

B. Program Integration

Coordination Between WBS

Accomplishment: We worked with Fleet Ops to install the Winter Quarters Bay culvert.

Benefit: This led to a strong team relationship that continued throughout the season.

Accomplishment: We worked closely with EH&S to develop procedures for fall protection, asbestos abatement, lock-out/tag-out, confined space entry, hot work permits, and lifting.

Benefit: This cooperation led to an excellent relationship with EH&S that will benefit the Program when we work to solve future safety issues.

Accomplishment: With the help of Fleet Ops personnel and equipment, we prepared the MOGAS tank site for a subcontract crew to install an Ortla berm liner. With this support, the crew completed its job ahead of schedule.

Benefit: The liner protects the environment by containing any spills.

Integration of Environment, Health, and Safety Objectives Across Corporate Activities

Accomplishment: We designed and installed significant safety improvements, particularly in the area of fall protection, including seven completed CCRs:

- MC-0104 Relocated hot water heater to allow fire exit access
- MC-0108 Added guardrails to Water Plant salt water tank
- MC-0112 Installed toe plates on the Crary Phase II access platform
- MC-0126 Installed fall protection on D2 fuel tank
- MC-0131 Installed 3-way light switch for safe 2nd floor access in Bldg. 120
- MC-0135 Corrected Greenhouse electrical to eliminate extension cords
- MC-0145 Installed fall protection on M3 fuel tank

In addition, the following CCRs are in progress:

- MC-0115 Install chain actuators for safe valve access in Bldg. 199
- MC-0117 Install hatches in the Crary Phase II roof
- MC-0140 Install tie-offs in Bldg. 164
- MC-0141 Install catwalks in Bldg. 155
- MC-0151 Install removable guardrails in Bldg. 191 loading dock

- MC-0152 Install removable guardrails in Bldg. 164 loading dock
- MC-0156 Modify Bldg. 197 roof access platform
- MC-0157 Install permanent power feed to Bldg. 170

Benefit: These actions dramatically improve site safety conditions.

Accomplishment: We performed partial facility assessments on many station structures, which generated more than 175 work orders to address deficiencies. We also wrote six proposals to address systemic issues that may need project funding.

Benefit: This effort reduced energy consumption, enhanced the condition of existing facilities, and improved the overall quality of life.

Accomplishment: We developed a work scope and cost estimate for SCAT machine installation in the WWTP.

Benefit: This cut down on storage and reduced costs for McMurdo-to-CONUS transportation of reclaimed waste.

Accomplishment: We took major steps to reconfigure the asbestos management program, which gave us a much greater understanding of the asbestos containing materials in our work sites.

Benefit: This will improve management of these materials for a safer and healthier work environment.

Accomplishment: We identified the need to reconfigure feeder distribution from the Power Plant to eliminate power poles directly behind the plant.

Benefit: Doing so will make maintenance in this very difficult-to-access site much safer.

Accomplishment: We educated all shop foremen on the need to identify hazardous conditions and to react proactively to find solutions for safety-related work orders. We also changed safety meetings to include interactive discussion.

Benefit: This led to a dramatic increase in safety-related work orders over the season (220 initiated and 175 completed).

Accomplishment: We replaced old, leaking bondstrand piping under roads at the Water Plant and Dorm 201 and installed bollards with safety yellow paint to mark driving hazards.

Benefit: These actions improve road safety.

Innovation/Process Improvement

Accomplishment: We designed and installed foot valves for Dining Facility dishwashing sprayers.

Benefit: This will help reduce repetitive motion injuries in this department.

Accomplishment: We replaced flex hose on D2 and M3 fuel tanks. Project completion is pending on parts delivery during WINFLY 2006.

Benefit: This reduces the risk of fuel spills.

Accomplishment: We developed LCR installation “kits” to list required installation material for specific equipment types, such as MRSF furnaces and overhead doors.

Benefit: This streamlined the LCR procurement process.

Accomplishment: We installed stronger gratings on two bridges at the SSC.

Benefit: The previous gratings were not strong enough to support the vehicles used to transport materials in and out of the building. Now vehicles can drive right into the building, greatly reducing the time it takes to move material and equipment.

Responsiveness to Challenge and Change

Accomplishment: Emphasis on safety issues this year brought challenges in how to properly address and manage the high volume of resulting work orders. Our maintenance crew completed more than 220 safety-related work orders in approximately 2,000 person-hours.

Benefit: This created a much safer work environment for everyone and contributed to a stronger safety culture.

Accomplishment: The major projects in construction and Science Support challenged our ability to supply resources and materials while sustaining regular services. We made do with available materials and personnel, meeting all objectives.

Benefit: Science and construction activities met their objectives, and we still completed our normal workload.

Accomplishment: The radiant heat system provided by the manufacturer for Bldg. 140 interfered with the overhead doors in the cargo bay. Our LCR team completely reconfigured the design on the Ice.

Benefit: The system is installed and running, preventing possible loss of building use and reactive equipment replacement if the old system failed.

Identified Issues

Issue: The inability to properly compact soil in the winter caused installed day tanks to settle when the ground began to thaw in late December. The resultant leaning stressed the piping.

Response: We evaluated all new day tank installations. Corrective action included ensuring proper ground preparation procedure and foundation design.

Issue: There are still areas that need improvement on the DDC system. For example, communication drain wires need grounding at one end and should be tied together at each unitary controller. A 120-ohm resistor is also required at both ends of the communication loop.

Response: We checked and corrected the communication wiring between the global controllers and unitary controllers in all the DDC buildings.

Issue: The snowmelter at Williams Field failed at the very end of the austral summer last year and needed replacement before the 2006 season, but a complete replacement was not affordable.

Response: We purchased and installed the boiler section in time for the Williams Field opening. Replacing this essential equipment followed a very well coordinated effort between FEMC and Purchasing.

Issue: A glycol heat exchanger failed in Bldg. 155 early in the austral winter and no replacement parts were available.

Response: We made do with what we had to keep the building heated. We transferred primary control to a secondary heat exchanger to keep the system working until replacement parts arrived at WINFLY.

Issue: An overhead door for the Vehicle Maintenance Facility (VMF) failed, with damage to many component parts. This happened at the end of the summer season, so it was too late to purchase replacement parts and have them delivered by station close.

Response: The PM shop scavenged replacement parts and modified other parts to complete the repair before winter. We have developed a contingency plan in case of a similar problem this winter.

Lessons Learned

LDB

There were many lessons learned on the LDB project. This project was funded on June 30, 2004, which left less than six months to engineer, procure, fabricate, and deliver buildings and materials to Port Hueneme in time for the FY05 vessel. For a project of this complexity, this was insufficient time. Engineering, material take-offs, materials procurement, fabrication, and hiring of construction resources were rushed. Our ability to interface with other departments (such as logistics and operations) and the end-user (NASA) suffered.

There was insufficient time for comprehensive design and constructability reviews, ensuring that all stakeholders had the opportunity to review and comment and have their comments incorporated into the design. Constructability reviews help ensure that *all* materials and tools required for construction are procured.

LDB facilities were constructed out of town (at the Scott Transition and Williams Field). Insufficient allowances were made for lost productivity due to weather-related delays and travel to/from the job site.

A project of this magnitude and complexity, especially when accelerated, requires a materials management staff of two persons. One would begin tracking materials during the procurement phase, inspecting at vendor sites where appropriate, validating receipt at Port Hueneme where appropriate, and ensuring that all materials were en route to McMurdo. That person would be joined by a second materials expeditor at WINFLY, who would ensure that materials were properly kitted, stored and organized for construction. During construction, both would coordinate with the construction coordinator and foremen to hunt for and issue materials, freeing the construction leadership to supervise construction activities.

A project with this magnitude, complexity, and accelerated schedule should have a Construction Coordinator on-board from the start. This person would be directly involved in performing constructability reviews, composing construction schedules, reviewing equipment requirements and availability, reviewing material take-offs and procurement, identifying resource needs and hiring, establishing key work interfaces and relationships, and building teams.

Wherever possible, backup plans should be developed for construction activities on the critical path, e.g., if a vital piece of equipment is not available. As a corollary, all critical equipment or tools that represent single points of failure should be pre-identified, discussed with "owners" and made ready (early maintenance, overhaul, extra spare parts, etc.) for the project.

There should be identified options for acquiring additional resources when the schedule begins to fall behind, especially when there are follow-on activities dependent on a specific completion date.

Transportation was problematic. One pickup truck was assigned but was not sufficient to support a project of this size and complexity at locations far from "town." The diverse shuttle requirements of the station often meant that LDB crews had to wait on shuttle transportation to take them to/from the job.

We need to adequately consider the effects of warm weather on building skis. The LDB buildings began listing in December. We mitigated the effects by piling up snow and burying the skis. We will do this at the beginning of the season next year.

We need to adequately plan and schedule work so that projects are substantially complete before end-users move in, install equipment, and begin pre-occupation activities. We need to do a better job of identifying, defining, and scheduling inspection and closeout activities.

We need to ensure that projects have an adequate supply of special tools and equipment allocated to or purchased by and for them. They should not have to depend on station assets, which may be inadequate.

We need to make provisions for feeding construction crews at the job site when the project is located at a remote site. Productivity jumped markedly when we began serving meals at the LDB site. Similarly, break areas should be identified during the planning process before the project starts.

Assumptions were made about previously installed generators not included in the project. There should have been an activity in the schedule to ensure that generators were properly

installed, operating correctly, and ready for the project.

We need to keep designs simple, using basic technologies. As a case in point, the LDB project tried to marry three different technologies (mobile homes, no-sump basements, and environmentally friendly waste treatment) in the restroom facility and encountered a number of difficulties.

We need to do a better job of managing and documenting changes, whether they are a result of unforeseen conditions, design modifications or customer requests.

Ducts Leaking in Crary

We learned that leaking ducts in the CSEC were the result of excessive humidity in the system, caused by faulty feedback from instruments and improperly sized orifice plates in steam traps. The steam trap orifices were sized for the original 200 psi boiler and were never changed when a 15 psi humidity boiler replaced it. We changed out the orifice plates and re-calibrated the instruments, and we will do this on an annual basis.

The DDC System

All input and output hardware on the DDC system at McMurdo should be verified before making any programming changes. If this had been a course of action earlier in the life of the DDC system, most of the problems could have been corrected during the start-up phase. During our many repairs and adjustments to the system, we found that incorrectly modified programming and incorrect input configurations were the problems we found most often. We also discovered that the input transducers were installed incorrectly and had resistors missing or jumpers set wrong. Once we corrected these installation problems, we could also correct the programming. Once these things were done, it was amazing to see equipment operate as designed.

Work Zones for the PM Work Center

This is the third season our UTs worked in zones, a system that helped reduce total emergency calls by 32.25%. Working in these zones fosters a sense of ownership among the employees. However, some of our technicians have expressed interest in seeing other equipment, and boredom may become a factor in attitudes and performance. Even though the shop cross-trains all technicians, everyone has his or her own strengths – and equipment outside one expert's responsibility will not benefit from that expertise. We are investigating ways to mitigate these issues.

We also realized that because we were not providing shop personnel with trend analysis reports, they were unable to see work focus trends and consequently could not contribute their expertise and knowledge to management. We now post ongoing reports to encourage process and performance improvements.

Vessel Resupply

As part of our effort to improve management of vessel resupply, we have set a due date of April 28 for all vessel requisitions and are working with Purchasing to develop a workable delivery rate for these requisitions. Our proposal is to meter our delivery of requisitions so that buyers don't become overwhelmed.

On another materials issue, we are working with Logistics to refine the plan for central supply. Jointly, we have developed lists of materials for transfer to central supply and are reviewing them for accuracy. We also want to make certain the lists are comprehensive and that the materials on them will cover every contingency.

Section 3. Plans for KY07

We will complete outstanding minor project work, pending the receipt of materials, including SF1 and SF2 energy conservation work, inverter-duty motors and VFDs, and DDC programming for speed control.

We will continue with major construction work on the Power Plant, the MOGAS upgrade, Bldg. 136 and Bldg. 191 code compliance, and complete the day tank upgrade project.

We will complete outstanding CCR work, pending the receipt of materials.

We will compile and integrate building assessments from all disciplines.

We will continue to develop new work orders, CCRs, and Project Proposals to correct site deficiencies. CCRs under development include combustion air fan installations in Bldgs. 73, 140 and 191. We will also develop CCRs for repairing floor in Bldgs. 120 and 182, replacing domestic water supply piping to Bldgs. 206-209, evaluating and redesigning the B165 hydronic heating system, evaluating and redesigning the Bldg. 199 HVAC system, and procuring stairs for the tire bay in Bldg. 143.

The DDC system at McMurdo has several problems:

1. The current BACtalk application runs on Windows 98 machines, which are no longer actively supported by IT.
2. The DDC is a stand-alone network using obsolete modems for Ethernet communication over phone wire. These modems can only operate at 10 Base T speeds, but the station network communicates at 100 Base T.
3. Currently, we can only access the DDC network from McMurdo, preventing us from diagnosing and correcting problems from Denver HQ.

We intend to correct these problems in KY07:

1. Upgrade the DDC software from BACtalk to Envision, which is the vendor's software designed for Windows XP.
2. Upgrade the DDC network to 100 Base T speed to prevent the DDC from dragging down the speed of the station network.
3. Add the DDC to the station network to allow communication to Denver HQ.
4. Create a VPN so the DDC network can use existing station network equipment but still remain separate.

We will post trend analysis reports of each shop's performance, hoping to inspire more improvements.

We will emphasize early-as-possible identification of vessel resupply needs. However, predictions become less accurate the farther into the future we make these prognostications. January is the earliest month we can gather information without adversely affecting costs and shipping.

SOUTH POLE STATION

Section 1. Summary

KY06 Winter

FEMC winter goals focused on punch list items and Dark Sector Lab (DSL) construction, all for austral summer conditional occupancy. We kept two engineers and one designer deployed for technical support, utility coordination, and as-built drawing maintenance. We also continued development and use of the P3e/c scheduling tool. Weekly meetings between South Pole, Denver HQ, and the NSF contributed to construction efficiency.

KY06 Summer

The tempo picked up in the summer, as we completed construction on the BICEP project and began construction on the South Pole Telescope project. A water line was set up for summer camp to help support the additional crew that was needed

Summer planning (March through October 2005) proved demanding, with many groups vying for the same resources. However, planning meetings, which included all stakeholders, and our use of the IMS to establish priorities allowed us to manage limited resources to best meet the NSF's goals. The enterprise-level scheduling system (Primavera P3e/c) proved invaluable to developing and managing the IMS. The schedule now includes resource-loaded tasking for SPSM, South Pole maintenance, science support, operations, and minor projects.

10 Meter Telescope

We completed all 10 Meter Telescope summer construction on schedule. Work included building the timber foundation (footings) for the steel base, constructing the steel base itself, building the Control Room and Walkway foundation, constructing the Control Room, Walkway and Shield structures, and installing emergency egress and a temporary Walkway vestibule. Interior construction of the Control Room started after station close.

Originally, the only quote we received for the Shield was [redacted] However, in the October project status and review meeting, we identified a design that could save $[redacted] for the Shield and reduce construction time by 2,000 hours in the KY08 summer. The NSF and NAVFACPAC approved RPSC development of a value-engineered design, which we completed in early March 2006 and sent out for quotes. There are now four suppliers in the process of furnishing proposals.

BICEP Telescope

The original BICEP design showed the telescope housed in the penthouse of the DSL, but that would have been a code violation. We developed a new design to place the telescope on

Figure 13-9 DSL with BICEP Dish, 10 Meter Telescope Control Room, and Walkway

the west end of the second floor. We installed the telescope on a raised platform for the required offset between the telescope and the shield that will be mounted on the roof.

Construction started the first week in September 2005 with relocating mechanical and electrical systems. Major construction finished before the end of the calendar year, and BICEP moved in as the first science tenant in DSL. The telescope is operating for the winter.

There is an outstanding CCR for [redacted]. If it is approved, we will add it to the 2005 estimate of [redacted]. Currently, the CTD for BICEP is [redacted] With the CCR added to the CTD for a total of [redacted] the project will be completed on time and [redacted] under budget.

Section 2. Qualitative Performance

A. Project Management

General Management

Accomplishment: We developed a procedure for burning used oil at the Power Plant.

Benefit: Burning used oil reduces AN-8 fuel oil consumption and lowers costs. In addition, used oil no longer needs to be retrograded, further lowering costs. Adding used oil to the AN-8 improves lubrication, increasing GenSet lifespan while reducing chance of failure. Finally, using less AN-8 reduces the fuel airlift requirement, freeing up air cargo capacity for other needs.

Customer Satisfaction

Accomplishment: As SPSM continues, we continue to meet project milestones aligned with both NSF and science community objectives.

Benefit: Science operations are now conducted in the new station, eliminating the need to maintain the old Dome facilities. BICEP occupies the DSL, and we have tuned the HVAC controls to meet this science event's requirements.

Human Resources

Accomplishment: This year was challenging for us to fill all required positions. FEMC needs more seasonal employees than any other division, and this year there was an especially competitive market for skilled trades people. We filled positions with the most qualified applicants available and sometimes offered additional training to employees, giving them the skills and knowledge to make a lateral or upward move.

Benefit: We continue to meet project milestones.

B. Program Integration

Coordination Between WBS

Accomplishment: South Pole personnel used the IMS across all divisions to meet strategic goals. This was especially helpful in coordinating work between Science Support, Construction, and Operations.

Benefit: We finished moving several science experiments from existing facilities to the Elevated Station and ARO, with all experiments operational by the end of the summer season.

Accomplishment: We successfully installed the BICEP telescope. It was particularly challenging to install an experiment in a facility still under construction. We accomplished it, despite some delays in material deliveries and construction, because of detailed planning and constant communication with the grantees.

Benefit: We were given conditional occupancy of the facility, which allowed the grantees to begin their work on schedule.

Accomplishment: We successfully supported the IceCube project, thanks to detailed planning that included working with Science Support, Operations, Logistics, IT, and everyone else at the South Pole.

Benefit: The IceCube project has now reached the production drilling phase.

Integration of Environment, Health, and Safety Objectives Across Corporate Activities

Accomplishment: Our management team worked diligently with EH&S in several areas by:

- Modifying safety training and information to make them more relevant to Antarctic conditions.
- Identifying training requirements and making certain employees had the specified training before beginning work.
- Providing follow-up and refresher training throughout the summer.
- Investigating and reviewing all incidents, with follow-up discussions in all work centers.
- Conducting safety reviews of all facilities and job sites.

Benefit: We completed projects on schedule and with a renewed focus on safety. Additional benefits to this close attention to safety include being able to allocate resources to solve immediate problems and identify other problems for future resolution.

C. Innovation/Process Improvement

Visionary Management

Accomplishment: We investigated alternatives to our current preventative maintenance program and are considering the Reliability Centered Maintenance model.

Benefit: With state-of-the-art monitoring capabilities on parameters like vibration, temperature, and electrical current draw, this new model can reduce maintenance procedures and reduced unanticipated breakdowns. We would also be able to reduce inventories and warehouse space, producing savings in annual procurement and transportation costs. Implementing the new model will require new software, but this software would improve trending analysis and reporting capabilities over anything available from the current AREV system.

Responsiveness to Challenge and Change

Accomplishment: A design team inspection of the Elevated Station found a problem with electrical connections for the emergency generators that required replacing 3-pole transfer switches with 4-pole transfer switches. We immediately ordered the parts.

Benefit: Our quick response resulted in delivery of the new switches before station close, allowing us to replace the inappropriate switches this winter.

Accomplishment: Procurement problems delayed the delivery of a replacement cargo hoist for the new station, causing it to miss the planned date for station close. However, when station close was delayed a week, we immediately took the opportunity to work with the supplier, Procurement, and Logistics to get the equipment to the station.

Benefit: Our rapid response resulted in delivery of the hoist before station close, allowing us to replace a non-functional hoist so work could continue.

Identified Issues

Issue: The removal of a redundant boiler from the DSL design caused problems gaining conditional occupancy for that building. Design team inspectors determined that the redundant boiler was required.

Response: Our engineering team reviewed the technical issues and proposed modifications in the DSL mechanical room. The design team and the NSF approved the changes, and we installed the boiler.

Issue: Design team inspections of the Elevated Station found an issue with leading edge beveled soffit construction. RPSC had made several modifications from the original design but did not formally document them. This illustrates a breakdown in completely documenting significant changes.

Response: The design team recommended modifications after reviewing project details. Our project team implemented the recommendations.

Issue: In February 2005, the main sewer outfall for the Elevated Station stopped flowing. Ice had blocked the vertical pipe from the tunnel into the sewer bulb because the heat trace had been disconnected from the power source when the old Rodwell building was removed.

Response: We restored power and cleared the sewer line.

Issue: A quick review showed that the sewer outfall problem occurred because of poor communication between construction groups and facility groups.

Response: We now schedule regular meetings between all groups to discuss current activities, particularly those that impact station operations.

Issue: Surface freezing on the Rodwell building was making it difficult for the maintenance staff to take weekly depth readings. The pump was also in danger of sticking in the ice lens.

Response: We installed a fitting in the return line near the top of the pump with a hole drilled in it. Warm return water now sprays out horizontally near the surface, keeping ice from forming at the surface near the pump or hose bundle. This helps minimize the time needed to take weekly depth readings and creates a safer environment for the pump. (In order to maintain the well in the last years of its expected life span, we will have to ensure that proper water movement and heat are going down the hole. Allowing surface ice to develop could put the station's water supply at risk.)

Issue: Many of the exterior doors for the Elevated Station had inadequate sealing thresholds, allowing air infiltration and ice formation inside the doors during high winds and cold temperatures.

Response: We purchased brush seals to install on all doors. These seals reduce wind and ice infiltration and help improve energy efficiency.

Issue: Water had been escaping from gaps around the dishwasher in the Dining Facility and spilling onto floors, creating slip hazards.

Response: We installed rubber strips on the doors of the dishwasher to better seal it. This creates a safer work environment, protects staff from slips and falls, and improves energy efficiency and water conservation.

Issue: The steel flooring in the fuel module on the flight line was very slick and presented a slip and fall hazard.

Response: We installed floor matting, greatly improving traction.

Issue: The Peaking Generator did not have a fuel meter that allowed us to track fuel consumption. We monitor fuel consumption on all equipment for energy efficiency.

Response: The manufacturer recommended a Flow Scan fuel meter, which we procured and will install as soon as possible.

Issue: The UPS in the new Power Plant suffered a terminal failure during the winter, causing a power outage. This unit provided backup power to the PLC, which controls the generator. Vibration caused the connection to become loose, causing the unit to short out and melt a wire.

Response: We temporarily took a UPS from the Atmospheric Research Observatory (ARO) and installed it in place of the failed unit. We installed a new UPS during the following summer without incident. (This is an example where an infrared camera, used as a predictive maintenance tool, might have prevented the occurrence and subsequent power outage.)

Issue: Ambient temperatures under the new Power Plant arch rose above freezing during the summer. Melting snow dripped down the sides of the Power Plant and then refroze, damaging the building's finishing covers.

Response: We submitted a proposal to correct this problem as part of the Ventilated Thimble proposal, since new thimbles will introduce yet

another heat source under the arch. Our proposal recommends a ventilation system with electric fans run by thermostat, in addition to the already approved exhaust blanketing. We plan to install it in the summer of FY07 if it is approved and funded. (This project moved from the SPSM budget to an independent project, as monitoring arch temperatures will be a critical characteristic for comprehensive building management and protection.)

Issue: FY06 winter staffing goals were not met because of late season drops or candidates failing to PQ. The winter construction staff is short five positions.

Response: We have revised the winter schedule to minimize impacts to planned tasking.

Lessons Learned

Event: We received reports of white smoke and an odd smell coming from the exhaust stack at the Power Plant. The smell was glycol from the heat exchangers. Maintenance personnel immediately bypassed the exhaust gas heat exchanger and isolated the glycol loop from the rest of the system. No fluid had been visible in the site glass on the drain, and when the valve was opened, no fluid came out. Further inspection revealed that the drain was clogged above the site glass and there was a leak of the tube bundle. We removed the clog and drained the glycol. We isolated the exhaust gas loop and drained it completely to prevent the exchanger from filling and back flowing glycol into the engine.

Lesson Learned: This is a recurring problem caused by irreversible corrosion inside the heat exchangers. Continuing to drain condensate at each engine shutdown will prolong the life of the exchangers, but it is not a long-term solution. In the meantime, we are replacing failed heat exchangers. We have also returned a heat exchanger to the vendor for analysis. Until we see the results of that analysis, we need to keep close tabs on the existing heat exchangers and prepare for future tube failures. Staffing each watch with trained Power Plant employees, trained maintenance personnel, and trained engineers minimizes the potential for failure and ensures that data points collected on this issue are valid.

Section 3. Plans for FY07

The SPSM project team will develop and organize all pertinent information to perform final testing and acceptance of each system, facility, and the overall project. A station dedication is planned to showcase this milestone.

We plan to modify the Power Plant to fix current overheating problems.

We will complete the Cryogen facility and achieve conditional occupancy.

We will begin building the Cargo facility.

The project team will continue to complete punch list items with the goal of completing all outstanding items.

PALMER STATION

Section 1. Summary

The primary project for Palmer this year was completing the Palmer International Monitoring System (IMS) facility (later named TerraLab). The project was completed on schedule and within budget, and the inspectors commented on the excellent quality workmanship. The new facility replaces both the old T-5 science building and the Clean Air Hut and adds space for CTBT monitoring equipment. During construction there were no recordable injuries.

The station made good progress in energy conservation, dropping power consumption by 10% by replacing energy intensive systems with more efficient ones.

Section 2. Qualitative Performance

A. Project Management

General Management

Accomplishment: We modified the piping to the bulk fuel tanks. Temperature-induced pressure changes in the fuel oil transfer lines had strained the existing expansion joints. We replaced the joints and modified the system so that pressure is automatically equalized.

Benefit: The modification and repair significantly reduces the risk of fuel line leaks from the bulk tanks.

Accomplishment: To reduce electricity consumption, we replaced electric heaters in the Aquarium and the FEMC Building with glycol heaters, added automatic shutoff timers for lighting in the GWR storage area, installed more than 100 compact fluorescent lights in place of incandescent bulbs, and replaced more than 20 incandescent exit lights with LED units.

Benefit: In total, these changes reduced station energy consumption by 10% at a time when power demands were nearing the limit of the station's Power Plant.

Customer Satisfaction

Accomplishment: We worked diligently to support deployed science events. Our limited staff made science support a priority, and their efforts were very helpful.

Benefit: The result of this commitment is highly positive reviews from science events:

> "[The PI] is ecstatic about the Plexiglas chambers. They also fixed the washer/dryer right away – it was transparent to me."
>
> *B-048-P (Matrai)*

> "Both [redacted] were very good. They showed up to help and kept going until the project was done. They were very patient about where things needed to go. This has been about the smoothest RASA installation we've ever done."
>
> *T-998-P (Swanberg)*

Figure 13-10 Palmer Station International Monitoring System Facility

B. Program Integration

Coordination Between WBS

Accomplishment: We worked closely with Science Support, Logistics, IT, and station management to support the science transition from T-5 and the Clean Air Building to the new TerraLab building.

Benefit: Science events made the move smoothly and without undue disruption to research.

C. Innovation/Process Improvement

Innovative, Technological Solutions

Accomplishment: We replaced all incandescent bulbs with compact fluorescent bulbs, replaced all exit lights with LED versions, and installed glycol heaters instead of resistance heaters in two buildings.

Benefit: These changes resulted in a 10% drop in electrical demand on station.

Identified Issues

Issue: Palmer has a single person assigned to MAPCON-scheduled maintenance work orders and unplanned maintenance activities. In recent years, scheduled maintenance has increased from 82 PMs (KY03) to 124 PMs in KY06, with some work not completed.

Response: We have changed the schedule and will now perform annual and semi-annual PMs during personnel transitions, when additional people are available.

Lessons Learned

In reviewing the distribution of scheduled PMs, it became clear that the schedules should be adjusted. The current staffing of one Maintenance Specialist for each season is not sufficient to complete all tasks in a timely manner. An alternate deployment schedule or an additional staff member is required.

Section 3. Plans for KY07

For KY07, we plan to do the following:

- Evaluate the FEMC staff skill mix to improve maintenance work performance.
- Examine on-site storage needs to better utilize the warehouse in Punta Arenas and to eventually reduce excess materials stored at the station.
- Work with station management to give input to the NSF on a long-range plan for Palmer Station.

INFORMATION TECHNOLOGY/ COMMUNICATIONS

The Information Technology/Communications Division (IT/Comms) continued to work collaboratively in KY06 to improve its various processes and procedures. We focused on improving IT support to the NSF and the scientific community. Innovative solutions abounded this year, as we successfully met all customer expectations and continued our historically outstanding support to the science community. We showed particular acumen in our ability to respond quickly to changes prompted by internal and external factors. Swift and effective solutions ensured continued service and customer satisfaction.

We continued our focus on top-level customer service and on-time deliverables, achieving 100% of our metrics in KY06. User satisfaction measured [redacted]% for Q1, and improved to [redacted] y year's end.

INFORMATION SECURITY

Section 1. Summary

Information Security (InfoSec) is one of the newest IT departments, but we quickly and successfully established ourselves by launching new projects and integrating InfoSec into all facets of IT and other RPSC processes. We collaborated well with the NSF's InfoSec Division and with other RPSC divisions. Our efforts greatly contributed to the NSF's "A" score on the President's Management Agenda Scorecard.

We enhanced and developed many processes and procedures (e.g., Certification and Accreditation, Incident Response, Computer Screening), growing the InfoSec documentation base.

Section 2. Qualitative Performance

A. Project Management

General Management

Accomplishment: We developed a FY06 comprehensive InfoSec Work Plan that details 21 sustaining activities, with scope, objectives, deliverables, and estimated cost.

Benefit: This plan allows the NSF to direct InfoSec support to the USAP, and coordinate USAP InfoSec efforts with its own NSF InfoSec team. It outlines required actions to meet federal Information Security Management Act (FISMA) reporting requirements.

Accomplishment: We completed 100% of the funded activities listed in the FY05 InfoSec Work Plan.

Benefit: Completion of Work Plan projects complies with FISMA reporting requirements and Office of Inspector General (OIG) requirements.

Accomplishment: We provided an annual review and report to the NSF Division of Information Systems (DIS) in order to meet FISMA reporting requirements.

Benefit: This report ensures the NSF meets all federal FISMA reporting requirements.

Accomplishment: We developed a FY05 Master Plan to schedule and track InfoSec progress and resources.

Benefit: The FY05 Master Plan enables us to effectively plan and establish priorities and resource needs.

Accomplishment: We developed USAP-wide procedures for computer screening, InfoSec awareness, and vulnerability assessments. In addition, we developed a detailed plan for policies, instructions, and procedures needed to meet National Institute of Standards and Technology (NIST) guidelines.

Benefit: These procedures ensure the USAP Enterprise is consistent at all sites, securing its

systems for availability, confidentiality, and integrity, and help the NSF meet federal requirements and standards.

Accomplishment: We completed and submitted 100% of the NSF-required procedures for FY05 identified through detailed gap analysis. We reviewed and updated the gap analysis in 1QFY06; we drafted and submitted another eight procedures to the NSF.

Benefit: This helped the NSF meet federal requirements and standards, and provided the USAP with specific guidance to implement current InfoSec policies.

Accomplishment: We translated the InfoSec Awareness Program into a formal training booklet, which includes the Enterprise Rules of Behavior (EntROB), and distributed the booklet with deployment packets. We achieved 97.5% compliance among RPSC employees and 99.7% compliance among grantees (Figure 14-1).

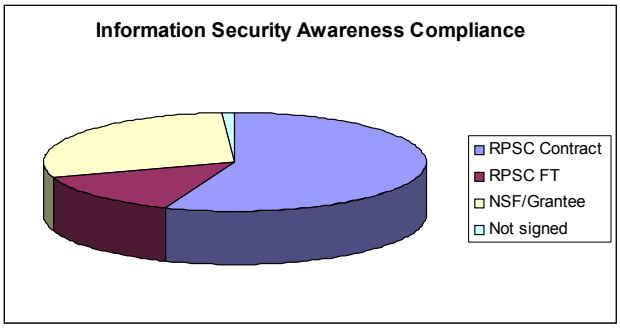


Figure 14-1 InfoSec Awareness Compliance

Benefit: Security awareness helps protect the USAP network by increasing user responsibility and understanding of potential threats. Distributing InfoSec awareness materials with the deployment packets helps users understand the role of InfoSec within the Program before they connect to the USAP network.

Accomplishment: We established an InfoSec Awareness Program for training all USAP participants. The expanded Awareness Program for USAP meets the educational requirements delineated by NIST and Office of Management and Budget (OMB) A-130. We completed Security Awareness training and obtained EntROB signatures acknowledging InfoSec policies.

Benefit: Establishing the InfoSec Awareness Program meets NIST and other federal requirements, and resolves FISMA finding 03-02 of the OIG.

Accomplishment: We redesigned Certification and Accreditation (C&A) packages to align with NIST guidelines, and to provide a clear picture of each site and major application's InfoSec posture.

Benefit: Future C&A package updates will be more efficient and comprehensive, and in compliance with revised federal guidelines.

Accomplishment: We completed the SPSM IT C&A.

Benefit: The SPSM complies with NIST and other federal guidelines, fulfilling a FY05 Work Plan deliverable.

Accomplishment: We completed and submitted the USAP Enterprise Network General Support Systems (GSS) C&A package self-assessment. We conducted risk assessments for all nine USAP locations to note security risks and requirements associated with the site or system operations.

Benefit: The USAP GSS complies with NIST, NSF InfoSec Handbook, and USAP InfoSec Policy 5000.16.

Accomplishment: We completed and tested the Notification Phase of the USAP GSS, Enterprise Business Systems (EBS) Major Application, and Enterprise Operations Systems (EOS) Major Application C&A package contingency plans using a tabletop test. The GSS, EOS, and EBS evaluations considered current security conditions.

Benefit: The contingency plan tabletop test fulfills the federal mandate on operational practices for computing systems in all government-funded programs, and validates information in the current contingency plans.

Accomplishment: We established a process and procedure to assist with the remediation of Plan of Action and Milestones (POAM) findings, including coordination with internal RPSC departments.

Benefit: It allows senior management to make informed resource decisions on how to resolve/close POAM items and OIG findings.

Accomplishment: We implemented interim incident response processes. This included assessing vulnerabilities and monitoring the threat alert system.

Benefit: This provides a planned response to computer incidents, ensuring rapid containment and mitigation of any threats to the USAP Enterprise, and provides a more secure computing environment to the science community.

Accomplishment: We created a centralized point of contact for InfoSec Incident Responses and published a notification matrix that outlines response times to various priority levels and event types.

Benefit: The notification matrix allows for better communication and sets proper expectations for Incident Response Team members.

Accomplishment: We established procedures for conducting independent vulnerability assessments and penetration testing, both on- and off-Ice, including science and operations systems.

Benefit: Vulnerability assessments protect the availability and integrity of USAP data. Regularly scheduled follow-up testing and analysis verifies continued and ongoing updates and configuration changes to address new requirements, as well as new vulnerabilities. This identifies security risks to USAP networks, systems, and data, allowing RPSC to develop solutions to mitigate these risks. Regularly scheduled vulnerability assessments provide host-specific feedback to the central management console for an accurate, up-to-date picture of risk.

Accomplishment: We improved the three existing USAP C&A packages in order to conduct a more robust security assessment of each system and site. We aligned USAP C&A packages with the new NIST 800-53 document through a new Risk Assessment and System Security Plan template. In addition, we are developing a new Security Test and Evaluation template.

Benefit: The NSF will be compliant with new NIST guidance and OMB directives once the new USAP C&A packages are developed.

Accomplishment: We conducted an independent, unbiased analysis of the vulnerability of RPSC systems and network resources on over 5,000 IP addresses, and reported our findings to the NSF.

Benefit: Such analysis improves the security of the USAP information infrastructure and complies with FISMA requirements.

Accomplishment: We compiled and reviewed all the current security configurations within RPSC.

Benefit: We established a baseline of configuration requirements and met FISMA reporting requirements.

Customer Satisfaction

Accomplishment: We implemented weekly teleconferences with NSF InfoSec staff to review issues of mutual interest, status InfoSec Work Plan actions, and raise InfoSec concerns that could potentially affect the USAP Enterprise.

Benefit: The teleconferences focus and coordinate actions between NSF, USAP and RPSC InfoSec staffs.

Cost Savings

Accomplishment: We provided security requirements to seven projects: Budget & Finance, Online Supply Chain Reporting (OSCR), POLAR ICE, SHIELD, Time Tracking, Black Island Wide Area Network (WAN) Project, and Terminal Server Upgrade. We now provide security requirements and tests to all IT projects during the appropriate phase.

Benefit: Integrating security into the early phases of a project allows us to test it and address any problems, usually at a lower cost.

B. Program Integration

Coordination Between WBS

Accomplishment: We conducted Privacy Impact Assessments for Budget & Finance, OSCR, POLAR ICE, SHIELD, and Time Tracking.

Benefit: These systems do not compromise Privacy Act data; neither the NSF nor RPSC will face sanctions in the event of a privacy breach. In addition, the NSF and the USAP are now compliant with Privacy Act mandates.

Integration of Environment, Health, and Safety Objectives Across Corporate Activities

Accomplishment: InfoSec staff experienced zero TRIR during KY06. In addition, we instituted a weekly safety reminder program.

Benefit: A zero injury rate improves productivity and morale. The safety reminder program supports RPSC's safety goals and treaty obligations.

C. Innovation/Process Improvement

Innovative, Technological Solutions

Accomplishment: We aligned USAP Policies with NIST 800-53, resulting in the development of six new policies that apply to Identification and Authentication, Maintenance, Media Protection, Planning, System and Services Acquisition, and System and Communications Protection.

Benefit: The NSF will be compliant with new NIST guidance once approved.

Visionary Management

Accomplishment: Our goal is complete integration of InfoSec functions within all aspects of RPSC IT operations.

Benefit: This effort will reduce project costs and improve information security in new projects.

Responsiveness to Challenge and Change

Accomplishment: The InfoSec team grew in KY06 with the hiring of a Senior Manager, Compliance Analyst, Security Network Engineer, Technical Writer, and Project Manager. We reorganized the team to highlight areas of expertise and clearly define roles.

Benefit: The team formed a cohesive bond and, with clearly defined roles, moved forward to develop an efficient and responsive InfoSec program.

Accomplishment: We resolved and closed 41 action items from April 2004 Science Applications International Corporation (SAIC) testing.

Benefit: Resolving and closing POAM items strengthens the InfoSec program.

Accomplishment: We resolved and closed a major OIG finding in the FY05 FISMA report. We addressed and completed all three recommendations:

- Formalize and implement necessary security procedures.
- Train all USAP participants on InfoSec Awareness.
- Minimize the accessibility of USAP internal network resources via the Internet.

Benefit: This complies with OMB and FISMA reporting.

Accomplishment: We enhanced the perception of InfoSec within the USAP and the NSF by integrating InfoSec into the USAP environment, and reorganizing and restructuring to be more efficient and effective when interacting with grantees, RPSC operations, and the NSF.

Benefit: InfoSec awareness, improved relationships within the USAP, and trust from the NSF contributes toward a productive work environment.

Accomplishment: We cultivated a closer relationship with the NSF InfoSec team.

Benefit: A closer relationship enhances alignment and communication between RPSC and the NSF regarding InfoSec issues.

Identified Issues

Issue: We discovered a USAP IP address attacking external systems on the Internet using Transfer Control Protocol (TCP).

Response: Our department, along with Denver Technical Operations and McMurdo IT, worked together to identify, isolate, and determine the sequence of events for the suspected compromised host. We immediately disconnected the identified device from the network. We also held a lessons-learned meeting; installed a centralized, MAC-filtering wireless authentication server; and responded to the Configuration Control Board (CCB) request to install network taps.

Recommendations from this event include developing an effective computer screening process; distributing the computer screening "toolkit" to all sites; CCB review of all wireless devices; developing a project to perform client-server authentication for connection to the USAP network; distributing NSF/USAP policy on wireless devices; and developing a training program for all IT personnel.

Issue: A Romanian data center reported activity similar to a Denial of Service (DOS) attack from a South Pole science computer.

Response: Log history revealed the offending PC connected to an Internet Relay Chat (IRC) Uniform Resource Locator (URL). The affected system was isolated from the USAP environment (firewall rules and switch port downed), and the on-site technician at South Pole inspected the equipment to evaluate the IPs/ports to which the machine was connected. The grantee worked with on-site South Pole technical staff to re-image that machine.

Issue: There was delay implementing the Network Intrusion Detection System (NIDS) project.

Response: Critical design will be completed in Q1FY06, or when funding is received from the NSF.

Lessons Learned

Not all technicians at all USAP locations have the necessary equipment to perform effective computer screening procedures. (The Computer Screening Kit includes jump drives, remediation CD, pass/fail labels, data collection spreadsheet, and computer screening policy/procedure/forms.) We will work with Technical Operations to obtain the necessary equipment for all applicable USAP locations (Denver, Christchurch, McMurdo, South Pole, Palmer, vessels).

Section 3. Plans for KY07

Next year we plan to revamp C&A Packages into a modular format, according to the schedule in Table 14-1.

Table 14-1 C&A Package Revamp Schedule

C&A Package	FY 2006	FY 2007	FY 2008
GSS	South Pole (SPSM) Palmer Vessels (2) Punta Arenas	Denver HQ USAP WAN Port Hueneme McMurdo Christchurch	
EBS	Budget and Finance SHIELD OSCR	POLAR ICE AREV (four subsystems) USAP Portal	Clinical Management Database E-Film Telemedical Video Conferencing TeleRadiology Systems Station DDC Systems Waste Management
EOS		Terascan AFTN	Black Island ATS Weather System

We will develop USAP Instructions, RPSC Procedures, and Templates for all 17 NIST-control objects.

We will integrate InfoSec into the RPSC Project Management Office (PMO).

We will continue working with IT and other RPSC departments to integrate InfoSec into new IT projects.

We will launch a Security Awareness Online Learning Center that includes an Awareness briefing and a short quiz.

For NIDS, we will complete the critical design by Q1FY06, or when funding is received from the NSF.

In FY06, we will implement the USAP Enterprise Edge DMZ, Public Access Network, and Remote Access Network, USAP Backbone (WAN connection points for McMurdo, Palmer, South Pole and Port Hueneme), Denver server farm, and South Pole (purchased through SPSM Network Management-Network Services [NM-NS]), along with the third-party monitoring service. The third-party monitoring service provides notification hooks into the USAP Enterprise Network Operations Center (NOC).

In FY07, Port Hueneme, McMurdo, and Christchurch will integrate the NIDS solution. We will purchase any necessary shelf spares for the first implementation phase of the project.

In FY08, Punta Arenas, Palmer Station, the *LMG* and the *NBP* will implement the NIDS solution. The project will cover setup fees and monthly recurring service fees for eight months of third-party monitoring services. In FY07, the monthly service fee becomes a sustaining activity within the InfoSec organization, and we will purchase any necessary shelf spares for the first implementation phase of the project.

MULTIMEDIA

Section 1. Summary

The Multimedia Department supports USAP by operating American Forces Radio and Television Services; through multimedia production; and developing web content. Service levels continue to expand through innovation and collaboration, despite a flat budget and stagnant staffing levels.

We completed and/or updated a variety of videos, and implemented a new R6σ-derived video production process that standardizes approach and documentation, which results in a controlled and repeatable production standard. The web group celebrated the go-live of www.usap.gov, along with several other derivative sites, all developed with a new Content Management System.

We continue to support IT, RPSC and NSF initiatives to improve program management, including the Integrated Master Schedule (IMS), increased security requirements, and configuration and version control upgrades. We embraced recent changes in IT management that focuses on collaboration, ethics, and customer service. Meetings with the NSF in Arlington and AFRTS staff at the Naval Media Center (NMC) improved planning and service levels.

AFRTS

AFRTS continues to provide USAP stations with informational and entertainment programming (Figure 14-2), with a sustained presence at all three Antarctic stations and Christchurch. McMurdo has nine television channels, three radio feeds, and a lively volunteer disc jockey program (Figure 14-3). The movie library offers more than 1,000 rotating titles. We provide television and radio feeds to U.S. military personnel in Christchurch. Palmer, McMurdo, and South Pole stations also enjoy a National Public Radio (NPR) streaming radio feed.

We made continual improvements to the NPR feed. We negotiated delivery of a commercial-grade FM transmitter from the NMC to Palmer Station and installed it at no cost to the Program. Due to limited satellite windows at South Pole, NPR uses a cache that is refreshed on a regular basis. We reserved a limited amount of satellite bandwidth for NPR at McMurdo, and improved signal reliability.

Figure 14-2 AFRTS McMurdo Operations

We continue to tape and telecast the Sunday Science Lectures at McMurdo, as well as stream and archive them as “on-demand” video via the station intranet. This was well received by the community.

Figure 14-3 McMurdo Volunteer DJ Plays Music

An innovative solution increases television programming at McMurdo via shared feeds with Scott Base. Antarctica New Zealand (ANZ) negotiated the use of excess Telecom New Zealand fiber at no charge, while we negotiated permissions from AFRTS to share Direct-to-Sailor (DTS) television feeds with Scott Base. In

return, McMurdo receives the BBC Worldwide feed from Scott Base. Operational information such as weather, flight, and emergency information normally posted on McMurdo TV channels will be available to Scott Base. ANZ and the USAP agreed to share the minimal costs of upgrading either end of the fiber feed.

We researched replacing the Naval Motion Picture Services (NMPS) at McMurdo with a commercial service. The expense of a commercial service [redacted] annually) does not justify potential improvements in NMPS, which is free.

The NSF approved the purchase and shipment of a replacement radome for the Black Island DTS satellite dish destroyed in a storm. We deferred actual replacement to next season because of heavy tasking at Black Island. We continue to downlink the DTS signal via the Black Island primary dish.

The NMC made its annual technical visit to McMurdo to perform standard infrastructure upgrades and preventative maintenance. NMC requested to receive its travel funds directly from the NSF, instead of routing through RPSC with the R-event. The NMC will make an official request to NSF .

Multimedia

Our multimedia staff scripted and shot a number of new video materials to replace outdated subjects such as Helicopter Safety, Outdoor Recreational Safety, Waste Management and the Dry Valleys Code of Conduct (Figure 14-4).

Figure 14-4 Production Work in the Dry Valleys

The Dry Valleys Code of Conduct video is a collaborative venture between EH&S and ANZ. Chapter I is complete; Chapters II-IV are in progress. The annual update of the South Pole Orientation video is complete. Work has begun on a similar orientation for McMurdo based on the success of the Pole video.

We are collecting a select reel of High Definition footage for a high-end public education and awareness video based on a direct request from NSF. Additional requests included WINFLY operational footage, WAIS Divide deep-field camp construction (Figure 14-5), the new LDB facilities and operations, inclement weather footage, and a variety of other science projects. Population pressures prevented us from gathering additional science project footage at South Pole, other than general footage from station opening.

Figure 14-5 Production Work at WAIS Divide

We participated in several planning sessions on the upcoming International Polar Year (IPY), including dedication ceremonies for the new South Pole Station in January 2007. We expect the IPY will have considerable impact upon multimedia production and web content.

Web

The most important highlight of the year was go-live of www.usap.gov (Figure 14-6). The new USAP Internet site debuted in September 2005 after several years of design and review. The USAP now has a dedicated web presence, clearly-branded and operated as an NSF/OPP site. More importantly, the site will serve as the central “portal” web environment for station

Figure 14-6 www.usap.gov

websites. We revised the Denver HQ and the *Antarctic Sun* sites in quick succession and added them to the centralized group of sites using a Content Management System (CMS). The CMS automates web content creation and maintenance, and centralizes web environment management to a single location at Denver HQ.

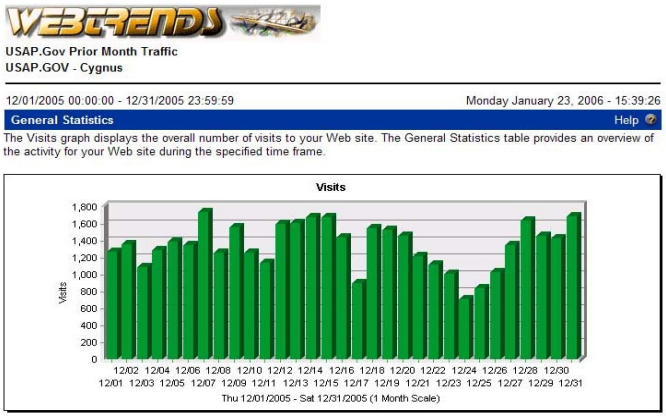
One of the benefits of the web portal is the reduction of web work order requests, even though web usage and the level of complexity have increased. For example, the content provider now enters content updates directly into the CMS, reviewed and posted with a click of the button. This eliminates the number of people involved and the manual intervention required by the web group to post each individual update. The approval process is transparent and allows for much greater control over content by the NSF, as required by federal guidelines.

RPSC business material from www.polar.org moved to www.rpsc.raytheon.com and www.polar.org was decommissioned. The McMurdo Station intranet is next in line for updating and inclusion into the central web environment. Initial research on site architecture and content owner requirements is complete. Figure 14-7 shows website activity for www.usap.gov during December 2005.

Paralleling these initiatives is the creation of detailed web user and web administrator manuals, and content provider training on the CMS. The www.usap.gov website fulfills others objectives, such as a more robust collaboration site, an online learning center, and a visible location to post key information and documents such as deployment packets. This saves the Program substantial resources over the more labor-intensive practices of the past.

The new site also creates a highly visible location for USAP/NSF news and general Program awareness. This provides a two-way interchange and direct linkage between NSF websites and www.usap.gov. We update news stories (Figure 14-8) weekly at NSF's direction. This site will serve as an excellent vehicle for IPY content.

Our group also developed two new pages for the McMurdo intranet: the Airfield Advisory and eFoot Plan (Figure 14-9). These pages replace manual processes and improve the depth, timeliness and accuracy of critical information



General Statistics		
Hits	Entire Site (Successful)	922,309
	Average Per Day	29,751
	Home Page	N/A
Page Views	Page Views (Impressions)	100,075
	Average Per Day	3,228
	Document Views	68,104
Visits	Visits	41,799
	Average Per Day	1,348
	Average Visit Length	00:00:43
	Median Visit Length	00:00:24
	International Visits	4.93%
	Visits of Unknown Origin	8.71%
	Visits from United States	86.35%
Visitors	Unique Visitors	12,866
	Visitors Who Visited Once	8,915
	Visitors Who Visited More Than Once	3,951

Figure 14-7 Web Usage Statistics for www.usap.gov

Figure 14-8 www.usap.gov News Page

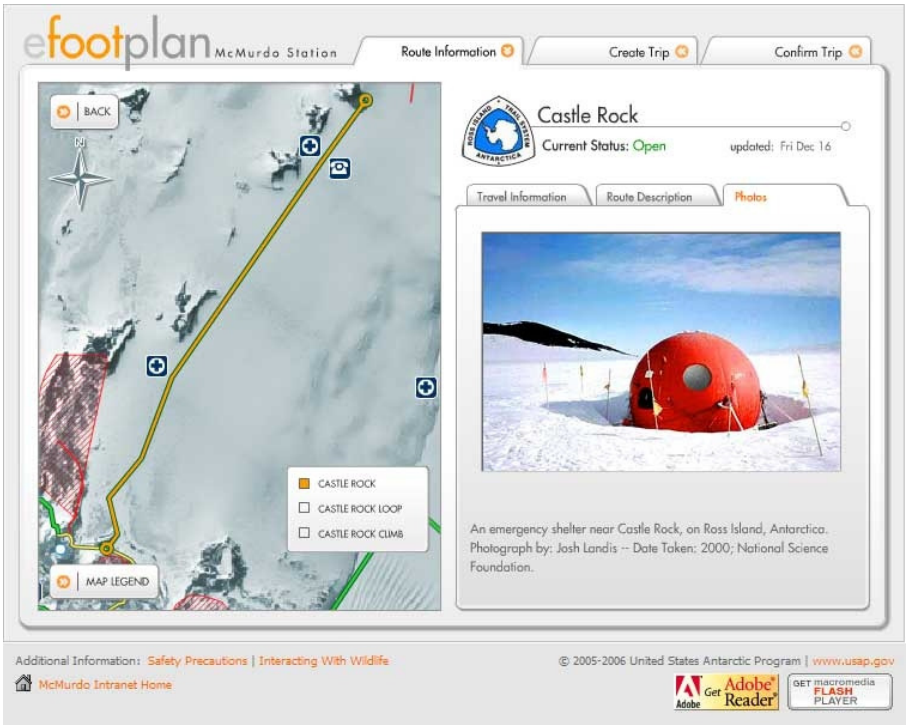


Figure 14-9 McMurdo eFoot Plan Web Page

SOUTH POLE STATION

Section 1. Summary

KY06 Winter

FEMC winter goals focused on punch list items and Dark Sector Lab (DSL) construction, all for austral summer conditional occupancy. We kept two engineers and one designer deployed for technical support, utility coordination, and as-built drawing maintenance. We also continued development and use of the P3e/c scheduling tool. Weekly meetings between South Pole, Denver HQ, and the NSF contributed to construction efficiency.

KY06 Summer

The tempo picked up in the summer, as we completed construction on the BICEP project and began construction on the South Pole Telescope project. A water line was set up for summer camp to help support the additional crew that was needed

Summer planning (March through October 2005) proved demanding, with many groups vying for the same resources. However, planning meetings, which included all stakeholders, and our use of the IMS to establish priorities allowed us to manage limited resources to best meet the NSF's goals. The enterprise-level scheduling system (Primavera P3e/c) proved invaluable to developing and managing the IMS. The schedule now includes resource-loaded tasking for SPSM, South Pole maintenance, science support, operations, and minor projects.

10 Meter Telescope

We completed all 10 Meter Telescope summer construction on schedule. Work included building the timber foundation (footings) for the steel base, constructing the steel base itself, building the Control Room and Walkway foundation, constructing the Control Room, Walkway and Shield structures, and installing emergency egress and a temporary Walkway vestibule. Interior construction of the Control Room started after station close.

Originally, the only quote we received for the Shield was $1 million over budget. However, in the October project status and review meeting, we identified a design that could save $500K for the Shield and reduce construction time by 2,000 hours in the KY08 summer. The NSF and NAVFACPAC approved RPSC development of a value-engineered design, which we completed in early March 2006 and sent out for quotes. There are now four suppliers in the process of furnishing proposals.

BICEP Telescope

The original BICEP design showed the telescope housed in the penthouse of the DSL, but that would have been a code violation. We developed a new design to place the telescope on

Figure 13-9 DSL with BICEP Dish, 10 Meter Telescope Control Room, and Walkway

especially significant with time-sensitive PQ issues. Medical and the DSG are evolving towards full electronic delivery. (Note: Participants must still return forms via mail or special delivery due to personal information, but secure web transmittal is a future possibility.)

B. Program Integration

Coordination Between WBS

Accomplishment: We created a central McMurdo Airfield Advisory Web Application for the McMurdo intranet.

Benefit: The website allows immediate updates for changing airfield conditions.

Accomplishment: We developed the MCM eFoot Plan Update page for the McMurdo intranet

Benefit: This interactive website communicates/updates trail conditions and routes, and allows users to file foot plans. This reduces the manual process at the Firehouse and increases user compliance with recreational travel requirements.

Integration of Environment, Health, and Safety Objectives Across Corporate Activities

Accomplishment: We completed an interim Helicopter Safety Training Video that bridges the potential change in helicopter support contractor; we will update when new contract and possible changes in equipment are resolved.

Benefit: The interim video fulfills ongoing safety training requirements.

Accomplishment: Sustained emphasis placed upon the safety, environmental, and conservation goals of the Program.

Benefit: No injuries, recordable or not, in Multimedia since the beginning of the RPSC contract.

C. Innovation/Process Improvement

Innovative, Technological Solutions

Accomplishment: We implemented the Content Management System (CMS).

Benefit: The CMS automates content creation, updates, and management processes, increases conformity, accuracy and timeliness of information and NSF oversight, and greatly reduces staff time as well as response time for posting web content.

Accomplishment: We updated the South Pole Orientation Video.

Benefit: The video reduces management and staff time spent giving mandatory orientation briefings to South Pole arrivals. We will duplicate this effort at McMurdo at the NSF's direction.

Accomplishment: We provided production support to the National Geographic, gathering additional footage for them during their South Pole deployment.

Benefit: Our expertise reduced the on-Ice footprint of an additional outside videographer. This is a model for future media support and additional cost savings for the Program, as well as a way to control population at critical locations, such as South Pole or field camps.

Responsiveness to Challenge and Change

Accomplishment: We could not find a viable commercial alternative to replace the no-cost NMPS movies at McMurdo. Instead, we instituted an aggressive preventative maintenance program and requested an air conditioning/filtering unit.

Benefit: Ongoing maintenance will extend the life of the 8mm delivery decks. The air conditioning/filtering unit will further improve the environment for sensitive AFRTS electronics. This will save $35K to $45K per year.

Accomplishment: We integrated the RPSC Employment website with the Raytheon Corporate employment site. After www.usap.gov went live, we added direct links to www.rpsc.raytheon.com.

Benefit: This reduces duplication of information and processes.

Identified Issues

Issue: We provided financial support for the NMC R-event (R-903-M).

Response: The NMC indicates that federal regulations, as well as the burden of filing expense reports through RPSC, necessitates direct transfer of funds between the NSF and NMC for future deployments. The NSF should expect communication to that effect.

Lessons Learned

Commercial alternatives to NMPS movie service at McMurdo proved possible but clearly too expensive – the return on investment was not justified. At this point, we did further research and took aggressive action to improve preventative maintenance on the 8mm decks. Such efforts should have taken place before or in conjunction with the research on commercial alternatives. This demonstrates bias towards replacement technology, rather than functional solutions, and is a lesson well learned.

Section 3. Plans for KY07

- Increase winter Broadcast Technician Support of the video production library.
- Continue aggressive support of full in-house, broadcast-quality production services; strategic planning for IPY; and cost savings in support of NSF media plans.
- Install and operate new, shared TV feeds with Scott Base and research additional TV feeds, as practical.
- Continue centralizing the USAP web environment and web services; focus on updating the McMurdo intranet and installing remote access to CMS from McMurdo.
- Continue providing flexible and agile customer service along with innovative solutions to customer web requirements.
- Continue to support the NSF in aligning with E-Gov requirements, as well as expanding E-Business solutions.
- Support continued efforts to improve ethical and collaborative environment.
- Continue aggressive compliance with safety, environmental and conservation goals of the Program.

PROCUREMENT SUPPORT

Section 1. Summary

RPSC added support positions to IT in May 2005 as Procurement was reorganized. For IT, this provides internal resources for requisitioning and tracking IT materials.

Section 2. Qualitative Performance

A. Project Management

General Management

Accomplishment: We added a Division Specialist and Material Control Specialist (MCS) to the staff.

Benefit: The Division Specialist and MCS positions provide IT with internal POCs dedicated to tracking division requirements through the supply chain. These positions research and provide procurement status on material requirements to department management. They work closely with internal customers to verify the status/location of requested materials and intercede as necessary to push through items that may have stalled at some point in the process.

B. Program Integration

Coordination Between WBS

Accomplishment: The Division Specialist and MCS assisted RPSC Procurement as members of the Procurement Flex Team. The Division Specialist placed 271 purchase orders and 820 line items worth [redacted] The MCS expedited purchase orders for both Procurement and the Flex Team.

Benefit: Our input ensured timely delivery of items and identified materials that were past due. The Division Specialist contributed 439 hours to the Flex Team effort.

C. Innovation/Process Improvement

Nothing to report.

Section 3. Plans for KY07

The Division Specialist and MCS are developing Procurement-related training modules for IT personnel. These will provide greater understanding of materials requisitioning and simplify the process for requestors.

IT QUALITY ASSURANCE

Section 1. Summary

Configuration management brings order and efficiency to chaos. This discipline manages identification and documentation of system characteristics, and controls and records changes to those characteristics. In KY06, IT Quality Assurance (IT QA) made advances in applying version control to many software applications, documents, and systems characteristics. The use of issue-tracking tools allowed us to communicate and control changes to IT projects and operational systems. In many cases, the application of configuration management tools prompted process improvements and reduced time and effort to accomplish tasks.

We also applied configuration management to other RPSC divisions, providing a means of controlling their documents, drawings, and other information pertinent to the Program.

We managed the Development and Test Lab (DTL) used for configuring and testing systems and services before deployment. The lab has proven a valuable resource for designing quality systems.

Section 2. Qualitative Performance

A. Project Management

Nothing to report.

B. Program Integration

Coordination Between WBS

Accomplishment: IT QA and Technical Operations transferred the Concurrent Versions System (CVS) control tool to a new server in the Denver Data Center. We integrated CVS into system services, such as Active Directory and Lightweight Directory Access Protocol (LDAP), to provide a seamless user interface.

This year, we started using CVS for POLAR ICE and Multimedia software code, IT Black Island and Marine drawings, and IT procedural documents. In less than three years, the CVS repository has grown to 49 distinct modules containing 43,673 directories and files under version control.

At McMurdo, IT is using CVS to store information, such as equipment configurations, pictures of seasonal installations (put-ins and pullouts), and task lists, as a means to provide turnover information for seasonal employees. For example, when a technician removes mountaintop equipment at the end of the season, he will store descriptions of the equipment in the repository so the next technician will know what is required for re-installation.

Benefit: Version control ensures that changes to software and documentation are organized and controlled, and that it is easy to find current, relevant information. It eliminates confusion and prevents inadvertently using or improperly modifying old files. Version control streamlines our processes for document, software, and drawing revisions because the current information is easily located and controlled for updates. The benefits of version control reach past documentation. For seasonal employees, information regarding equipment installations helps eliminate the possibility of wasted helicopter flight time by ensuring delivery of all materials to remote locations in one trip.

C. Innovation/Process Improvement

Innovative, Technological Solutions

Accomplishment: We increased our use of the issue-tracking tool Bugzilla. Not only do developers and testers use Bugzilla to track software defects, but also technical writers use it to track documents, projects to track issues, and the Configuration Control Board (CCB) to track proposed change requests for the Private Network and server systems. Bugzilla documented 1,330 new issues, with 91% already closed (Table 14-2, Table 14-3), between January 2005 and January 2006. Bugzilla opened 4,470 tickets against 22 products and projects in less than three years.

Table 14-2 Software Issue Tracking, Jan 2005-Jan 2006

Tested Software Product	Defects Found	Defects Resolved
Annual Planning Conference	8	4
AREV Products	120	114
AREV Release Management Environment Products CTS Change Flow MAPCON Change Flow Power 1000 Change Flow PTS Change Flow	170	165
McMurdo Applications Airfield Advisory eFoot Plan eFoot Manager Intranet	42	39
Mini Business Applications SHIELD	90	86
ORT ORT Cargo Waiver ORT General ORT Import ORT OSCR Reports	124	105
POLAR ICE	326	325
USAP CMS	438	371
USAP Feedback Extreme Cold Weather Polar Research Vessel USAP Feedback Management System	10	3
USAP Portal e-Gov Frontend NSF Issues and changes Standards and accessibility	2	2

Table 14-3 Other Organizational Issue Tracking, Jan 2005-Jan 2006

Subject	Issues Documented	Issues Resolved
Budget and Finance Project	1	0
Configuration Management System	8	7
IT Procedural Documents	148	Ongoing
Private Network CCB	324	322

The USAP Private Network CCB assigns a priority and deadline to each change request, with P1 being the most urgent, and P5 being the least urgent. Figure 14-10 shows the trend of these priorities per year, with the desire to assign most requests a P3, P4, or P5, indicating no work stoppage.

Benefit: The software documents problems, issues, and tasks to closure rather than them being lost or forgotten. This develops a higher degree of quality in IT's products and services.

Accomplishment: The DTL provides a means to stage, configure, and test equipment destined for the Ice. It supported more than 14 projects and several long-term general-use investigative activities over the past year. Many software, communications, and networking efforts, such as USAP Web Portal, eFoot Plan, McMurdo Bandwidth Improvement, Iridium for Vessels, and Information Security testing, benefited from staging the equipment in the lab before implementation. This helps determine feasibility and optimal equipment configurations. User satisfaction was 91% despite limited lab resources.

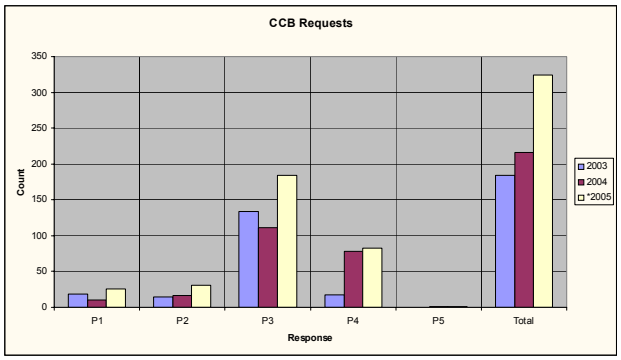


Figure 14-10 Private network CCB Requests by Priority, Jan 2005-Jan 2006

Benefit: Pre-staging, configuring and testing equipment and software in the DTL aids in:

- Capturing design defects before implementing new systems and upgrades.
- Complementing project management requirements for quality assurance and configuration management.
- Ensuring we account for all defined components of a system before implementation at a remote site.

Accomplishment: IT used a R6σ project to simplify the document development and control process by using CVS and Bugzilla. This provides better management of the document development process and provides writers with concise information regarding the status of each document, which number more than 225. This also reduces the time required to complete the document development cycle and improves the communication of responsibilities. (In the November ISO re-registration audit, the auditor favorably commented that this process helps control the document update process and simplifies identifying and tracing document changes, and that it may be beneficial to other divisions where this has been somewhat difficult.)

In addition, this modifies the document approval process, reducing the time for this activity six-fold. This happened by placing this responsibility on the Manager rather than the Director. The use of Bugzilla for recording review comments has helped significantly by centrally locating all related information.

Benefit: Implementing a process that many IT personnel use in the management of documents, and providing status and tasking information to document writers and reviewers, reduced the document development and approval cycle. This provides information that is more current to the writers and reviewers, and eliminates wasted time for document developers. Productivity may increase by 50% based on a few months of data for operating with this new process.

Section 3. Plans for KY07

We plan to expand the use of version control and issue-tracking tools to other RPSC divisions. We are already working with FEMC to version control their drawings. We will work with PA/QA to determine the feasibility of using configuration management tools on their procedural documents.

We will expand the application of quality assurance in the development and maintenance of products and services. With the addition of a QA Engineer this year, we will emphasize:

- Developing a quality assurance program for IT.
- Reviewing engineering project requirements and designs for quality requirements and application of lessons learned.
- Working with project teams to create test plans and to analyze test results to discover defects, configuration issues, and interoperability flaws.
- Conducting internal audits to measure and assure adherence to established standards for systems performance and processes.
- Monitoring corrective action at all project, job, and performance levels.
- Conducting vendor surveillance audits and establishing corrective actions.
- Conducting inspections with particular attention to safety and environmental considerations.
- Establishing a Quality Control Self-Inspection program at work sites.

Members of IT QA and Technical Operations began discussions to expand the capabilities of the Help Desk. Across all stations, standard practices and reports to trend issues will be a focus. This effort will continue in KY06. We will develop a method to track IT-issued hardware, which will help identify problem-prone equipment and can assist Help Desk personnel to spot trouble patterns.

SYSTEMS AND SERVICES (SAS)

Section 1. Summary

System Infrastructure and Services Group

The System Infrastructure and Services group (SIAS) supports, delivers, and maintains USAP databases, file services, data bus issues, authentication, virtual private network, and network access services. Our mission focuses primarily on support and maintenance for existing and delivered applications and services available within the USAP on a regular and ongoing basis. We also are the primary department for developing and delivering solutions to support USAP processes and applications.

The major functional areas within SIAS are:

- Service Definition and Implementation
- Service Maintenance
- Project Support

Our group shares some tasks, though we divide the majority of work between these functional areas.

The Business Process Analysis, Design and Delivery group (BPAD2) maintains, supports, and delivers USAP major business process solutions. BPAD2 participates in USAP-user business process analyses, formulation, discovery, definition, and evolution. Our group continually analyzes and interprets current business processes to determine the detailed information technology required to cost, schedule, and deliver changes to existing (and future) business processes. This includes not only intense and detailed analyses of business processes but also evaluation of existing business functional systems, COTS packages, and GFE for applicability to solutions.

The Functional Engineering group is responsible for evaluating, enhancing, or adding to the physical IT infrastructure. We manage the design, documentation, testing, implementation, and removal of systems, including satellite communications, radio communications, and traditional IT infrastructure, for the USAP stations and other sites.

Section 2. Qualitative Performance

A. Project Management

Customer Satisfaction

Accomplishment: We enhanced POLAR ICE based on grantee feedback. Enhancements include a SIP year-to-year copy feature that saves grantees time in completing their seasonal planning documents, improved validation to ensure document accuracy, and the removal of the problematic itinerary model from the SIP, among others.

Benefit: Grantees responded favorably to the changes.

> "The last time I wrote a proposal to the NSF was in 1978 or 1979. This process is so pleasant compared to then. You have made great use of technology to actually reduce labor!!!"
>
> *Darwin Horn, Artist & Writer*

> "A definite improvement from past years."
>
> *Paul Ponganis, B-197-M*

> "Overall, it worked well and with the online assistance, it's very easy."
>
> *Jennifer Mercer, A-131-M*

> "Thanks for adding the copy facility and for removing the Itinerary model from Palmer and LMF worksheets!"
>
> *Hugh Ducklow, B-045-P/L, B-013-P/L*

> "All the stories I heard about the SIP were scary, so I was really pleasantly surprised at how easily I was able to complete it. You guys must have made mucho improvements over the years. Thanks so much…! Your support was fantastic."
>
> *Holley Zadeh, B-424-M*

> "Overall this season I found filling in the SIP easier, it was less time consuming due to the ability to copy last seasons SIP over."
>
> *David Sullivan, A-145-M*

"Overall good user experience and excellent help staff."

Neil Shubin, OPP Proposal #0538604

"Improved over last year!"

Allan Weatherwax, A-111-M/S, A-112-M/S

"Live help was fantastic!"

Sarah Church, A-366-S

B. Program Integration

Coordination Between WBS

Accomplishment: The UIC codes used in Cargo Tracking System (CTS) conflicted with the Navy's codes, causing billing errors, confusion, and requiring extensive manual work. We wrote a new code to replace the old. IT Technical Operations Client Support will apply the fixes after CTS traffic stops for the season.

Benefit: Improves the CTS and stops billing errors.

Accomplishment: We worked with the DSG to enhance the user interface for their Travel Authorization database.

Benefit: The enhancement will save the DSG approximately 40 hours of data entry time per year.

Accomplishment: The SIAS routinely coordinates activities and interacts with other WBSs across the IT/Comms Division. For example, project scope includes the requisite design, implementation, training, and support resources within the Technical Operations Department, the Quality Assurance Department, and the Chief Technical Architect. Activities are scheduled, coordinated and executed with the full awareness and participation of these organizational elements. Activities are also coordinated across the RPSC Enterprise to support USAP mission goals. Science Support, EHS, PMO, Area Directorates, as well as IT, use our systems and services.

Benefit: This approach to project planning and development allows IT to coordinate resources across departments within our division and others, and eliminates redundant effort and/or rework.

Integration of Environment, Health, and Safety Objectives Across Corporate Activities

Accomplishment: Our department was a key player in the development of the SHIELD program.

Benefit: SHIELD is a key element of the initiative to improve operational safety and situational awareness.

C. Innovation/Process Improvement

Innovative, Technological Solutions

Accomplishment: Online Supply Chain Reporting (OSCR), the existing tracking tool for items in the supply chain, is a cumbersome spreadsheet. We created a browser-based, customizable reporting tool to replace it; coding is complete and testing is well underway.

Benefit: Automation will greatly decrease the time spent collecting data, and increase quality by removing human error. end-users will create concise reports that target their exact needs without a cumbersome Excel file.

Accomplishment: Broadband satellite connectivity for e-mail and other communications from the South Pole Station is available for about only half the day. Communication delays with CONUS can run more than a day because of the time difference. Our team reconfigured the Iridium hardware and firmware so that it operates continuously. We also developed the first-ever mechanism for the detection and auto-recovery of non-responsive Iridium equipment. During the austral summer, the Iridium Multi-Channel System peaked at transporting more that 48% of the daily e-mail into and out of the South Pole Station – carrying more than 2,100 e-mails per day.

Benefit: The Iridium system will carry size-filtered e-mail traffic for the part of each day the main satellites are not visible, allowing 24-hour communication with Pole.

Accomplishment: The National Polar-Orbiting Operational Environmental Satellite System (NPOESS) program wants to install two receptors at McMurdo and send its data to a CONUS collection point. This required an agreement between the Integrated Program Office (NPOESS governing body) and the NSF based on supportability estimates by Raytheon Intelligence and Information Systems (IIS) and RPSC. IT created a schedule and cost estimate for the multi-year effort, and forwarded that to the NSF in preparation for this project. Additionally, RPSC supported deployment of Raytheon IIS personnel to assess the Black Island facilities for strategic planning.

Benefit: Raytheon IIS, as a part of the NPOESS project, will build 15 receptor sites around the world. A receptor site is a ground station where data collected during a NPOESS satellite pass is down linked. Raytheon IIS must assure that data down linked in McMurdo reaches multiple CONUS locations with little latency in order to meet contractual performance requirements. McMurdo is a critical and strategic location where weather data is down linked and retransmitted via commercial satellite to CONUS. NPOESS satellites download huge amounts of weather data during each pass. The current McMurdo satellite communications link, even after the FY05/06 bandwidth upgrade, will not meet the data transmission requirements. Raytheon IIS, in conjunction with RPSC, has developed a solution to move the large amounts of NPOESS data out of McMurdo, and at the same time substantially increase (over three times the current data rate) NSF data out of McMurdo. This increase in bandwidth will allow the NSF greater options in regards to transferring science data in and out of McMurdo.

Accomplishment: We contracted the National Renewable Energy Laboratory (NREL) to assess the power system at the Black Island Telecommunications Facility (BITF) because it will require a lifecycle replacement in a few years. NREL spent one week inspecting the photovoltaic system, the diesel generator system, the wind generation system, the battery system, and the glycol heating system.

Benefit: A formal report is pending. Long-term planning should save money over last-minute procurement orders to save failing equipment.

Accomplishment: We identified the need for Internet2 to provide a path solely for science data traffic as the science demand increases at South Pole and other USAP sites. Additionally, the Internet link for the program required upgrading. The link, which serves the three stations as well as Denver HQ, runs at only 3.088 Mbps.

Benefit: Internet2 offers a number of advantages:

- Internet2 affiliation and any inherent resource leveraging this may provide for end-users accessing Internet2 resources.
- A superior connectivity recovery process, with diverse redundancy and fail-over to NASA Integrated Services Network.
- A forward-looking solution with built-in scalability and flexibility that reduces lead time for other projects, generally providing cost-effective growth.
- Greater control within RPSC to meet, competitively and effectively, science community needs and expectations.

We increased the commodity Internet service to 12 Mbps and the 3.088 Mbps link now serves as a fail-over link. The new Internet2 service, including the necessary new equipment, should be in production by June 2006.

Accomplishment: Vernadsky Station requested a unidirectional wireless link between Vernadsky and Palmer Station for transferring Very Low Frequency (VLF) science data. Our task was to design and procure a wireless test system to provide the link between the two stations and science equipment. Initial work is complete.

Benefit: A test system is ready for implementation.

Accomplishment: The South Pole Station needed a modern VoIP telephone system with analog

backup and a high-speed redundant network backbone. We installed switches inside plant and outside plant per SPSM design and transitioned to operational control.

Benefit: VoIP has been in use for over a year and the analog system is operational. The network backbone system is operational and we will expand it along with the construction of new buildings.

Accomplishment: The South Pole needed a modern network management system with remote management capability, network workstations, peripherals and resources per the SPSM concept. We initiated transition of network servers and management systems to operational control and moved all servers from the Dome to the Elevated Station Data Center.

Benefit: Transition of workstations and peripherals completed.

Accomplishment: The South Pole Station needed a central command and control operations center in the Elevated Station in accordance with the SPSM concept. We installed new furniture and systems and replaced the Communications Center under the South Pole Dome. We installed, tested, and transitioned the systems to operations.

Benefit: The new system monitors HF traffic, air traffic movement, visual Closed Circuit Television (CCTV) monitoring, and communications equipment health.

Accomplishment: IceCube requirements increased for network and telecommunications services to the seasonal drill campsite. We used wireless LAN (WLAN) technology to transport all required communications between the new drill camp structures and the South Pole network. We designed rapidly deployable WLAN facilities to provide network connectivity, telephone service, and public address "All-Call" paging. We deployed pre-assembled and pre-configured WLAN nodes to field structures with minimal site assembly.

Benefit: Personnel with limited technical abilities can deploy and recover these systems. The innovative use of streaming technology to carry the public address system signals across the network provides additional safety communications in a hazardous work environment.

Accomplishment: We designed, built, tested, installed and retested the new Long Duration Balloon Facility communications system according to the NSBF communications requirements defined by the customer.

Benefit: The network systems include high-capacity Cisco layer-3 switches, a complete wireless LAN (WLAN) satellite infrastructure and a WLAN client system for in-building roaming users. We also engineered a building-to-building outdoor cable plant into the system in cases of either interference from the satellite WLAN or other potential RF noise-generating equipment, and as backup in case the WLAN system experiences problems or failures.

Accomplishment: An external contractor executed engineering for renovation and upgrades to the Power and Water plants at McMurdo Station. The design for the Water Plant network and telecom facilities did not reflect current USAP telecom standards, and the design did not define appropriate materials or installation instructions. We coordinated with site construction staff to address these issues.

Benefit: We resolved design shortfalls and standards conflicts.

Accomplishment: We initiated a project to relocate and upgrade fuel dispensing at McMurdo, with requirements for control, alarm, and voice communications. No telecom infrastructure exists near the job site.

Benefit: FEMC will use our preliminary engineering and design for an extension of the McMurdo telecom cable outside plant (OSP) to the MOGAS job site.

Accomplishment: We worked closely with EH&S to define, develop, and refine the

SHIELD program. This web-based application is available from any RPSC operating location and houses information about health, safety, and environmental events including spills, unsafe conditions, near misses, and injuries.

Benefit: Reports go automatically to RPSC Directors and the NSF, and contain root-cause analysis of the reported event. Summary data contain information about events at each operating location, as well as roll-up numbers indicating the overall event record for the year. The system has documented more than 250 events, leading to a safer environment on and off the Ice.

Accomplishment: We successfully rolled out Microsoft SharePoint Services, a collaboration and information management system, at Denver HQ.

Benefit: Multiple divisions within RPSC use SharePoint, and with the addition of Virtual Private Network (VPN) connectivity, the NSF and external agencies also use these tools. Currently, IT uses SharePoint for document sharing with remote locations, including the South Pole. The PMO is using SharePoint to track contractual obligations and Program action items and issues, such as safety incidents to reduce the Total Recordable Injury Rate.

Accomplishment: We implemented a VPN to provide secure access to internal RPSC network assets for appropriate external users, including the NSF, grantees, and external USAP organizations.

Benefit: The VPN provides access to USAP/RPSC assets such as Primavera, SRC budgeting software, and SharePoint. It promotes collaboration on mission-critical items such as schedules and budgets, and provides a yet unknown level of partnership for problem solving and decision support. Furthermore, the VPN provides a tunnel to remote resources for researchers and grantees.

Responsiveness to Challenge and Change

Accomplishment: The Personnel Tracking System (PTS) module of the Advanced Revelations (AREV) Enterprise software was intermittently losing flight and manifest data in Christchurch. We investigated and repaired the problem.

Benefit: PTS now provides accurate flight information for personnel movement. This is critical for manifesting and tracking personnel transfers to and from the Ice.

Identified Issues

Issue: The communications equipment stream carrying the McMurdo WAN needed a lifecycle replacement.

Response: We replaced the equipment with equipment capable of meeting the strategic requirements of increased throughput and manageable data transport. The project included:

- Replacement of modems, Antenna Control System, and Monitor and Control Systems
- Installation of voice gateways
- Modification or upgrade of Programmable Logic Controller, power distribution, microwave radios, and network connectivity
- Removal of General DataComm multiplexers
- Assistance to SPAWAR in implementing new space segment and terrestrial backhaul circuits

The project increased the McMurdo WAN bandwidth from 1.544 Mbps to 3 Mbps, and converted voice traffic from multiplexed analog to IP. Benefits of the project include:

- Replacement of outdated and old equipment
- Full management of WAN traffic, as it is all IP
- Infrastructure to enable IP telephony strategy for McMurdo
- Removal of limiting equipment from the communication stream
- Bandwidth increase up to 10 Mbps with a simple contract modification

Issue: The original Humble Island Remote Data Retrieval System (RDRS) is well beyond its life-

cycle replacement period, and the vendor no longer supports it.

Response: We will design, procure and install a new Humble Island RDRS. The new system will provide the same level of data logging and retrieval capabilities, but will employ newer, more flexible state-of-the-art communications and data logging technology.

Issue: The South Pole MARISAT GOES Terminal (SPMGT) began experiencing anomalously high-reflected power levels that precluded operating GOES at high data rates. Performance continued to degrade until the antenna feed experienced a total failure due to an internal cable failure. This failure resulted in destruction of the GOES diplexor.

Response: We moved GOES service to the GOES Backup Antenna system, and removed the SPMGT antenna feed. We replaced the GOES diplexor and several cables in the GOES transmit string that experience high power. We also replaced the first stage of each Low Noise Amplifier string as a preventive action.

Issue: SPMGT Solid State Power Amplifiers (SSPA) experience wide fluctuations in power output in response to Antenna Shelter ambient temperature changes. This is a result of excessive sensitivity in a temperature compensating/output power regulating circuit.

Response: The winter-over Satellite Communications Technician will make a temporary field modification to smooth output power with direction from the SSPA manufacturer. A permanent fix will use a unit shipped from the manufacturer before station close, assuming the field modification works on the two active units.

Issue: The McMurdo rectifiers exceeded redundancy levels. The failure of one rectifier will cause the entire McMurdo TelCo power system to fail.

Response: We installed four new rectifiers. They reduce the footprint and heat output. The new system is easier to maintain and can be upgraded for remote monitoring.

Issue: The AREV Enterprise application did not support Windows 2003 Server.

Response: We upgraded the system drivers, and will install them as a winter-over task to minimize mission impact. Windows 2003 Server is the Enterprise standard for data systems. Enabling this legacy application to operate on this platform simplifies system maintenance for the Technical Operations group. Upgrading this driver also stabilizes the AREV system, as we will repeat this fix at all seven operating locations using this mission-critical supply chain and personnel system.

Section 3. Plans for KY07

The BPAD2 Group will implement the Budget and Finance Software from Business Objects™ (formerly SRC), continue support of all business applications, and work with Human Resources to replace the paper Employment Requisition Form with a SharePoint solution.

SIAS will continue to maintain Enterprise systems including AREV, POLAR ICE, SHIELD and SharePoint. In addition, a completed Enterprise replication strategy for distributed system in the USAP environment will complete its recommendations for implementation.

SCIENCE SUPPORT, SYSTEMS AND VESSELS (SSSV)

Section 1. Summary

The Science Support, Systems and Vessels team (SSSV) had an excellent season in KY06, supporting 177 events. At the Crary Science and Engineering Center (CSEC), we supported 93 science events, six artist and writer events, and more than 500 participants. We supported ten cruises on the *NBP* and six on the *LMG*. Vessel exit surveys all showed high grantee satisfaction with support and staff.

We continued to improve the computing environment on the vessels. Software updates accommodated new ships' instruments, and simplified and standardized vessel data products.

We contributed to the SIP review this year by participating in all IT SIP reviews, and enhancing POLAR ICE's tracking and reporting capabilities. We produced routine reports for Science Support Planners.

We continued to act as a liaison for the grantee community, publishing notifications and newsletters, sitting on the board of the IT Configuration Control Board (CCB), and submitting and expediting science requests to the CCB for firewall configuration changes.

We continue to perform IT exit surveys, even though they are no longer tied to a formal metric. These surveys showed 100% SIP fulfillment against the Research Support Plans (RSP).

SSSV also supported 125 Geographic Information System (GIS) projects this season. Most projects were relatively straightforward maps of sampling sites or study area locations, overlaid onto topographic data or satellite imagery. The South Pole Traverse Progress map, the Sea Ice Condition map, and the Vessel Location map (Figure 14-11) were all long-duration projects that were high profile, widely distributed, and closely followed by station management and the public.

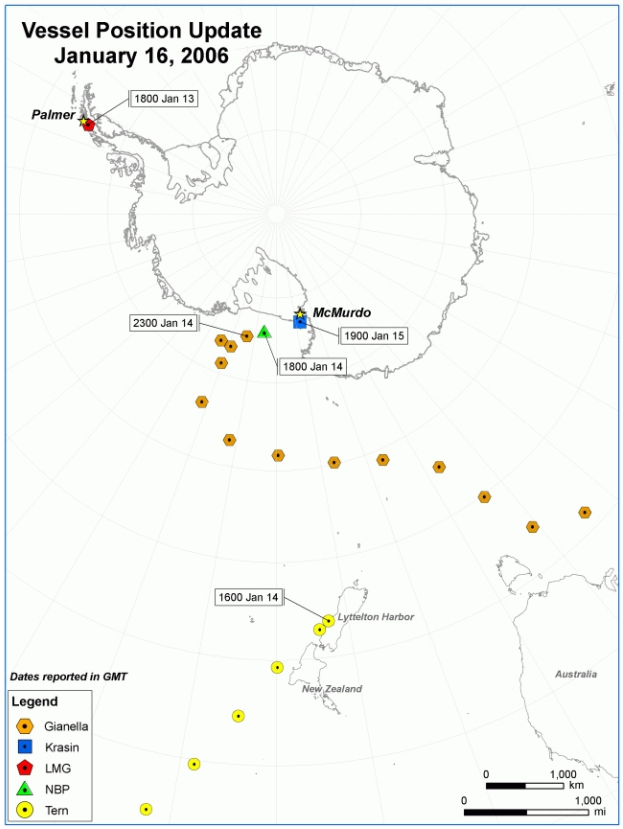


Figure 14-11 GIS Map, USAP Vessel Locations

Terascan Operations acquired more than 1,000 satellite images this year. We met all Service Level Agreement provisions.

The Remote Sensing Analyst presented a "McMurdo X-band Installation" paper at the Ohio Antarctic Meteorological Research Center (AMRC) planning conference on new weather capabilities at McMurdo Station.

Section 2. Qualitative Performance

A. Project Management

General Management

Accomplishment: SSSV produced 12 issues of the *South Pole IT* newsletter.

Benefit: The newsletter provides information about IT activities and plans to the South Pole grantee community.

Accomplishment: We supported and participated in all four user committees: South Pole Users

Committee (SPUC), McMurdo Area Users Committee (MAUC), Palmer Area Users Committee (PAUC) and the Antarctic Research Vessel Oversight Committee (ARVOC).

Benefit: Participating in user committees helps IT better plan for science support.

Accomplishment: We submitted several project proposals, such as the Palmer Station Terascan replacement, vessel Iridium links, and various vessel systems lifecycle replacement and planning projects, as part of the FY05 APP.

Benefit: We are planning for needed lifecycle replacements for science support and looking for opportunities for cost savings in Inmarsat communications bills.

Accomplishment: We produced and supplied Macintosh Operating System (OS) updates and spins across the USAP.

Benefit: Up-to-date, patched Macintosh installations are uniform across the Program, barring minor variations to accommodate differences in local infrastructure.

Accomplishment: We separated all individual science event costs and general science support costs from normal operational costs (in the case of vessels) in the FY06 APP at the NSF's request.

Benefit: The NSF is better able to identify science-related costs.

Accomplishment: We analyzed McMurdo labor data from the previous season and developed inputs for this season's IMS (Figure 14-12).

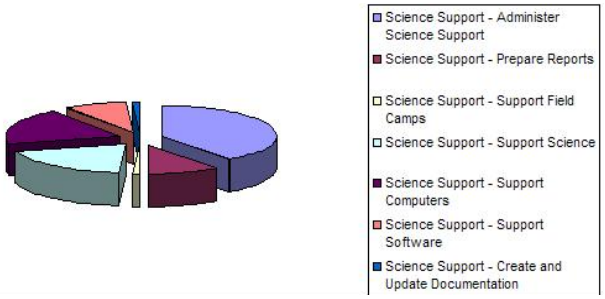


Figure 14-12 Sample CSEC Staff Labor Record from the 2003-2004 Season

Benefit: Such analysis provides a more accurate basis for staff scheduling.

Accomplishment: SSSV supported 125 Geographic Information System (GIS) projects this season (Table 14-4).

Benefit: We met grantee GIS needs, while also serving the public interest in some high-profile projects, like the South Pole Traverse.

Customer Satisfaction

Accomplishment: IT Exit surveys show that IT met 100% of all RPSC requirements for Science Support.

Benefit: Exit surveys demonstrate effective support of all SIP requirements for science.

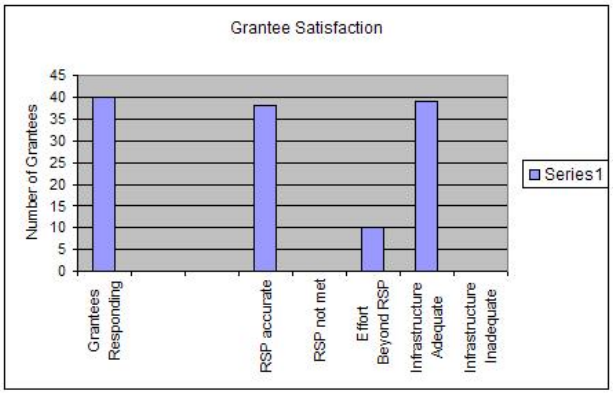


Figure 14-13 IT Exit Survey Grantee Satisfaction

Accomplishment: IT Exit surveys show that IT met 100% of all staff measures, including Expertise, Knowledge, Courtesy, Responsiveness and Attitude. All measures exceed the target metric of "8." (Figure 14-14).

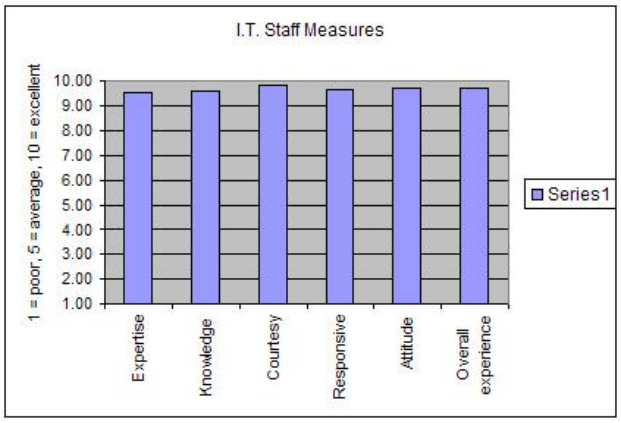


Figure 14-14 IT Exit Survey Staff Measures

Table 14-4 GIS End-of-Season Project List

Event	Project
A-143-M (ATIC LDB Flight)	Map of downed balloon location
A-145-M (LDB Flight)	Map of SW Antarctica and selected sites
	Map showing the Larsen Ice Shelf collapse
B-009-M (Mogensen/ Garrott)	Map of Advanced Space borne Thermal Emission and Reflection Radiometer (ASTER) coverage of Tent and Inaccessible Islands
B-012-M (Petzel)	Various maps of Antarctica for educational purposes
B-018-M (Kanatous)	Set of graphics showing Ross Island and vicinity for website inclusion
	Map of new Ice edge versus old; Tent Island
B-029-M (Marsh)	Maps of diving sites
B-043-M (Bowser)	Map of area between Mt. Brooke and Mt. Newall repeater stations
B-068-M (Hall)	Maps of Depot Island, Cape Ross, and Spike Cape for reconnaissance purposes
B-197-M (Ponganis)	Map of flight plan possibilities to Cape Washington and beyond
B-211-M (Doran)	Map of drilling and campsite locations at Lake Vida
	Map of Lake Vida drill site discrepancy caused by U.S. Geological Survey (USGS) map location error
	Map of Lake Vida drill site/helicopter landing site
B-289-M (Pitman)	Maps of general study area location overlaid with killer whale sightings and tracks
B-300-M (Chin)	Map of GPS'd Pony Lake coastline
	Map of the extent and volume of snow cover on Pony Lake
	Map of Commonwealth Glacier stream outlet to ocean
	Multiple maps of Lake Fryxell bathymetry, analysis of volume of water represented by a particular depth
B-301-M (Manahan)	Map showing relative locations of Manahan Peak, Somero Glacier for presentation
	Multiple maps of study site and feature locations
	Assorted study location maps
	Map of Elephant/Deception/S Georgia Island for Sunday Science lecture
	Maps of surface versus bedrock elevation along two transects
	Printed large-format poster
	Map of Bratina Island location
B-310-M (Ward)	Maps of study area/sample locations
B-420-M (Lyons)	Exported McMurdo aerial photography
	Map of study area locations
G-049-M (ANDRILL)	Multiple maps of study area and drilling sites throughout season
	Map of topography (elevation contours) around Marble Point
G-058-M (Harvey)	Supplied data
G-060-M (Dowling)	Map of Lake Vanda/Don Juan Pond
	Maps of Garwood Valley and vicinity
G-063-M (Marchant)	Maps of Olympus Range/Friis Hills using various datasets (Systeme pour l'Observation de la Terre (SPOT), ASTER)
	Provided GIS data, graphics, and extensive ArcGIS tutoring
G-076-M (Putkonen)	Map of study area and survey locations; burned disk of data and imagery
G-079-M (Wilson)	Map showing most recent Ice conditions around Beaufort Island, distance to sea Ice edge
	Map of sample locations at field site
	Extensive transfer of vector and raster data; tutorial on different ArcGIS techniques
	Modified ArcObjects script for implementation of points-to-polygon generation
	Map of results of different hill shade techniques (azimuths, exaggerations)
G-084-M (Licht)	Maps of Lonewolf and All-Blacks Nunataks for pre-trip reconnaissance
	Map of Brown Peninsula (SPOT imagery)

Table 14-4 GIS End-of-Season Project List

	Map of sample locations in study area (updated several times throughout season)
G-087-M (Dalziel)	Map of established and potential monument sites
G-088-M (Siddoway)	Map of potential landing areas in Fosdick Mountains
G-093-M (Miller)	Maps of study site in Allan Hills
	Map of location of Beardmore Glacier for presentation purposes
	Maps of Mt. Dearborn area for reconnaissance purposes
G-295-M (Johns)	Map of 2005-2006 sites
I-139-M (Pettit)	Map of Larsen Ice Shelf
I-163-M (Raymond)	Map of flagged routes in test area
	Map of surface elevation and Ice thickness around WAIS Divide area
I-190-M (MacAyeal)	Graphic of Marambio Station (Argentina) for presentation purposes
	Maps of seismometer site location near Ice runway and distances to selected sites
I-191-M (Kreutz)	General maps of study area (Clark Glacier, Victoria Upper Glacier)
I-477-M (Taylor)	Maps of the bedrock versus surface elevation along multiple transects
O-176-M (Eisele)	Map of Drygalski area using radar satellite (RADARSAT) mosaic
	Multiple maps of data collection flight routes
	Map of David, Priestley, and Reeves Glacier
O-283-M (Knuth)	Printed out large-format poster
T-913-M (Slattery)	Maps of study area
W-218-M (Andrews)	Map of Olympus Range/Taylor Valley
	Map of visited locations; burned data to disk
W-227-M (Heideman)	Compiled and transferred map data of visited locations ANDRILL, Transantarctic Mountain Deformation Monitoring (TAMDEF)
X-304-M (Boy Scout)	Map of Dry Valleys and McMurdo with selected hut locations
RPSC Department	**Project**
Berg Field Center	Maps of the Lake Bonney/Taylor Glacier area for pre-trip reconnaissance
Carpentry Shop	Map showing distance from Cape Crozier USAP hut to Antarctica Specially Protected Area (ASPA) boundary
	Map showing distances from Penguin Ranch, B-009-M hut to Ice edge
Communications	Updated McMurdo hiking map
	Created various animations and 3D images of McMurdo hiking routes for all-hands meeting
	Multiple maps of proposed new hiking trail (“Back of Ob Hill”)
Crary Lab	Printed out large-format copy of Gantt Chart
	Map of ASPA sites
	Map of New Harbor area
Energy	Map of selected spot locations around McMurdo and Dry Valleys
Engineering	Updated and printed large-format maps for satellite siting project
EH&S	Map of sea Ice camp locations, Penguin Ranch
Firehouse	Printed poster for open house
Fixed Wing	Map of reconnaissance flight lines and waypoints over WAIS Divide drill site
	Multiple maps in support of determination of “safe landing area” around WAIS Divide drill site (survey poles were left by a prior science project)
	Map of Mill/Beardmore Glacier reconnaissance flight overpasses
	Multiple maps in support of planning efforts for I-190-M’s retrieval of seismometer data from iceberg B-15A
	Maps of Fosdick Mountains reconnaissance flight paths and waypoints
Fleet Ops	Map of routes around McMurdo/Scott Base area
FSTP	Periodic updates of the Sea Ice Crack Map
	Map of potential site locations of Penguin Ranch
	Map of downed balloon location near Shear Zone

Table 14-4 GIS End-of-Season Project List

	Map of old versus new Cape Armitage routes
	Map of Fang Camp on Mt. Erebus
	Map of available imagery data in Barwick Valley
	Map of Antarctica (generalized; particular features emphasized) for classroom display
	Map of Wright Valley Traverse for SAR exercise
	Map of Beacon Valley area for SAR exercise
	Map of Mt. Erebus SAR exercise points
	Map of survival cache locations
	Map of routes in G-088-M study area (Fosdick Mountains)
	Maps of Mt. Discovery and Mt. Obelisk with GPS'd tracks
	Map of melt water drain hole location
Fuels	Map of Williams Field fuel line
Helo Ops	Map of *NBP*, South Pole Traverse locations for flight planning purposes
	Map of Hurricane Ridge and Riviera Ridge
	Map of rescue crash and medical kit locations
	Map for name change proposal (from Mt. 1882 to Mt. Spain)
	Map of distance from B-15J iceberg to land
MEC	Map showing snowmobile transit route in relation to other flagged routes
Science Cargo	Printed out cargo form on large-format plotter
	Printed out various spreadsheets, checklists on large-format plotter
Science Support	Printed two poster-sized construction drawings for WAIS Divide
	Maps of science locations and distances from McMurdo for all-hands presentation
South Pole	Map of South Pole High Frequency (HF) radio coverage
South Pole Traverse	Updated map of progress on daily basis; posted to common drive and e-mailed to interested personnel
Survey	Multiple maps of Moderate Resolution Imaging Spectroradiometer (MODIS) imagery overlaid with 2004 Coast Guard reconnaissance points
	Map of *Krasin* position relative to Coast Guard reconnaissance points
Waste	Updated Daisy Picking map
NSF Entity	**Project**
Antarctic Sun	Provided multiple maps, graphics, and distances to specific features throughout the season
NSF Representative	Daily updated maps of cargo, fuel, and Icebreaker vessel locations en route to McMurdo
	Map of bathymetry in Winter Quarters Bay
	Multiple maps of helicopter flight route for congressional distinguished visitors
	Multiple maps for SAR incident (MEDEVAC from Chilean fishing vessel)
	Maps of Antarctic airstrips (skyways and blue Ice)
	Printed out panoramic view of McMurdo Sound
	Map, animation of C16 movement in McMurdo Sound
Agency	**Project**
NYANG	Map of Odell Glacier divert landing site

Table 14-5 Summary of GIS Projects by Type

Type	Number of Projects
Science	67 (37 events)
RPSC	49 (20 divisions)
NSF	8
Other Agencies	1
Total	125

Benefit: Exit surveys demonstrate effective and supportive IT staff.

Accomplishment: SSSV and CSEC staff received many kudos from grantees. Below are just a few examples.

> "It was wonderful to be met so kindly when I had issues with my computer. I truly appreciate both the friendly attitude and expert skills. Thank you, thank you, thank you."
>
> *Sarah Krall, W-224-M*

> "The computer support in Crary is unbelievable. It's the best computer support in the world, helping to get stuff ready and set up and the system knowledge. They don't have that kind of support in a university, not at the magnitude they get in McMurdo."
>
> *Terry Deshler, A-131-M*

> "As in previous years, I-190 has received great support from the IT folks in Crary. The computing environment and network connectivity needed by the I-190 group is in many ways at the state of the art level. The fine support included an excellent technical computing environment (Macintosh, Windows/PC and Unix server) to perform complex data analysis and quality check tasks. We appreciate also the constant small-scale help which was provided on an almost daily basis as minor technical difficulties were addressed."
>
> *Doug MacAyeal, I-190-M*

> " … without exception they have all been stellar, both personally and technically. In fact, they are so useful that I have threatened to kidnap one of them."
>
> *Gabriel Warren, W-217-M*

> "The IT support at the Crary was outstanding yet again. Personnel continuity in the IT Department is necessary because they use their history of our group to customize needs. The current support staff anticipates our needs and quickly solves our problems, year after year. [They] are true professionals that are tops in service and understanding of multiple issues of software, and computers, networks and other aspects of IT. I particularly want to thank them for being cheerful and willing to help us at off hours, such as when my computer hard disc crashed."
>
> *Diana Wall, B-424-M*

Benefit: High grantee satisfaction with support and staff improves the overall mission.

Accomplishment: We worked with the University of Washington to analyze McMurdo's IT infrastructure at the NSF's request.

Benefit: This supported an outside evaluation of the USAP IT infrastructure, specifically focusing on science at McMurdo.

Human Resources

Accomplishment: Two staff members served on the RPSC Diversity Committee.

Benefit: We helped promote diversity, provide insights, and produce posters for display.

Accomplishment: SSSV retained the same great staff in McMurdo for a third year.

Benefit: Experienced, qualified staff provides great service.

Cost Savings

Accomplishment: We produced a consolidated CD of 2004-2005 marine gravity data for the National Geospatial Intelligence Agency (NGA) (formerly the Defense Mapping agency).

Benefit: The NGA gets the data but the *NBP* keeps the marine gravity table at no cost, a savings to the Program of $500K.

B. Program Integration

Coordination Between WBS

Accomplishment: We acted as a broker between Technical Operations and Science Support to manage requests from South Pole grantees for VPN access to the Pole.

Benefit: Science Planners keep up with VPN requests by grantees and assure completion of the requests.

Accomplishment: The GIS Senior Analyst presented an in-house class on GIS and ArcView.

Benefit: RPSC employees received educational opportunities at no additional cost to the Program.

Accomplishment: We published weekly SIP status reports.

Benefit: IT staff, station management and Science Support Planners receive status reports on issues identified for each of their events.

Accomplishment: We drafted and negotiated a memorandum of agreement between the NSF, SPAWAR, and RPSC for emergency support of SPAWAR weather forecasting activities. While the agreement is still in draft at this time, contingency plans are complete.

Benefit: Should a hurricane or other disaster prevent SPAWAR from weather forecasting from Charleston, SC, we can transfer SPAWAR operations to Denver HQ.

Accomplishment: CSEC staff assisted with predeployment laptop screenings in Christchurch, and introduced the new Ultrascan Utility Boot Disk that scans multiple laptops simultaneously.

Benefit: We completed laptop assessments in less time thanks.

Accomplishment: We prepared vessel track plots for the annual *Antarctic Treaty Report*.

Benefit: This helps the NSF meet its Treaty obligations.

Accomplishment: We worked with the RPSC's Terascan Operations in Denver HQ and Christchurch to support SPAWAR's new remote weather forecasting (Figure 14-15).

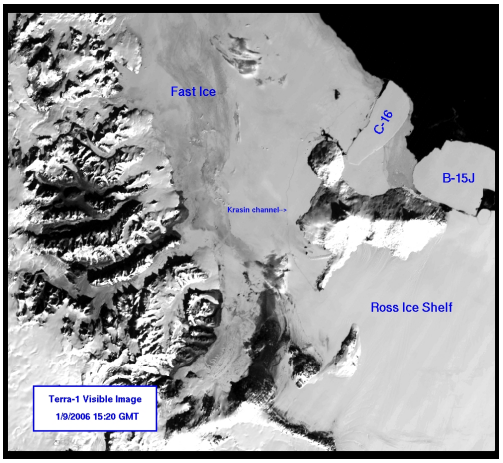


Figure 14-15 Terascan X-Band Terra Image

Benefit: The remote forecasting initiative would fail without support for Terascan data transfers.

Accomplishment: When Finance/APP disconnects resulted in unfunded IT support materials (i.e., lifecycle replacements needed for SIP-related support), we worked with Science Support to roll essential items into the science supplemental funding request to the NSF.

Benefit: Every SIP received essential materials and equipment.

Accomplishment: We tested the GeoMap data application for multibeam sonar data.

Benefit: Our test efforts ensure this NSF-sponsored application works smoothly in a variety of science environments, and facilitates the NSF development program for GeoMap.

C. Innovation/Process Improvement

Innovative, Technological Solutions

Accomplishment: We developed an end-of-cruise report program for the vessels that doubles for permit data when a ship operates in territorial waters.

Benefit: This simplifies end-of-cruise reporting, and saves numerous work hours when pulling permit compliance data.

Accomplishment: We developed a new Thermal Salinograph (TSG) program for data processing and display generation to support the new TSG system on the *LMG* (Figure 14-16).

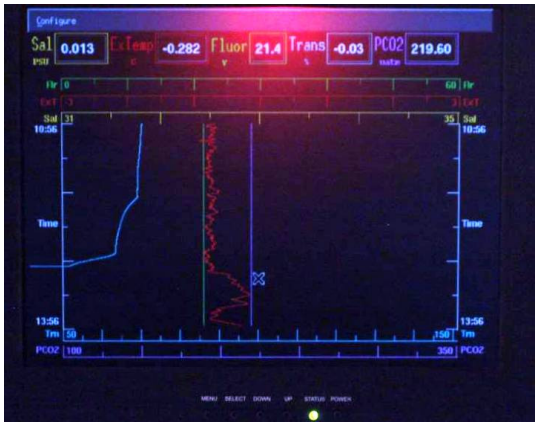


Figure 14-16 Updated Thermal Salinograph Display

Benefit: This provides uniform TSG support to both ships.

Accomplishment: We archived all previous cruise multibeam sonar data.

Benefit: Science can integrate existing survey coverage with newer, current cruise sea floor mapping.

Accomplishment: CSEC provided new functionality in the form of roving webcam sessions (Figure 14-17) for educational outreach. We used an Apple Power book, a digital video camera with FireWire cable attached to a Mac, and an analog phone line with Yahoo Instant Messenger.

Figure 14-17 CSEC Roving Webcam Outreach

- Our first VTC was for B-012-M (Petzel) and their teacher (Teachers Experiencing Antarctica), to her junior high school. It required over a month to work out the kinks. The issues were resolved just in time and the result was flawless. The fish tanks in the Aquarium were a big hit with the school.
- The NSF Representative conducted a VTC with his daughter's school using the same scenario (remote camera, Telesciences phone line). Setup for this session was seamless.
- B-423-M (Doran) did a VTC to a large audience at the University of Chicago's Natural History Museum, with call-ins from multiple parties. We used an AT&T conference call, with one person calling from a traffic jam in Los Angeles and the PI calling from his university. The lesson learned here is that multiple people (schools) can all call in and see the video simultaneously.
- G-076-M (Putkonen) used a 16' FireWire cable and a long phone cord to broadcast from outside the lab. We were inside with the laptop so it would not freeze. This session went flawlessly.
- The NSF Administrative Coordinator did two separate sessions with a remote school and received recognition in the school paper and local newspaper.
- Another teacher, associated with B-300-M, did a VTC to her home school. It went without a hitch because the system was tested ahead of schedule. This VTC was conducted without any involvement from IT staff.

Benefit: VTCs provide a dynamic and involving outreach experience, while conserving McMurdo bandwidth.

Accomplishment: We added an online tool in POLAR ICE to record IT issues, remarks, and resolutions as part of a R6σ project to track SIP issues and review statistics.

Benefit: This tool provides an easy and systematic way of recording SIP review items from POLAR ICE. In KY06, we identified and recorded solutions to 480 separate issues.

Accomplishment: SSSV developed the Ultrascan Utility Boot Disk, an automated, bootable CD that scans laptops for security compliance.

Benefit: The boot disk was used in Christchurch for pre-deployment laptop screening. It reduced the time required and the number of staff needed to perform laptop assessments.

Accomplishment: The CSEC staff worked with B-015-M/B-043-M on automated power-up sequences for the group's underwater cameras and mini-Linux board. They developed file transfer protocol (FTP) scripts for data transfer

to determine the experiment's camera status, and to shut down the Linux board once the camera shuts off.

Benefit: The scripts made it possible for this group to use its equipment in the field. Unfortunately, problems with the group's instrumentation caused the project to be withdrawn before the winter season.

Visionary Management

Accomplishment: We extended participation within IT for SIP reviews. By making use of a new feature developed in POLAR ICE for recording IT issues, SSSV can systematically track SIP issues better than in the past. This season, we identified and recorded solutions to 480 separate issues.

Benefit: Reviews that are more thorough follow up on SIP issues with traceability of comments, remarks, and resolutions.

Responsiveness to Challenge and Change

Accomplishment: SSSV enhanced the new South Pole meteorological data display system (Figure 14-18) for real-time web displays and historic data logging. We integrated with the new system through SQL queries and developed a modest Java application.

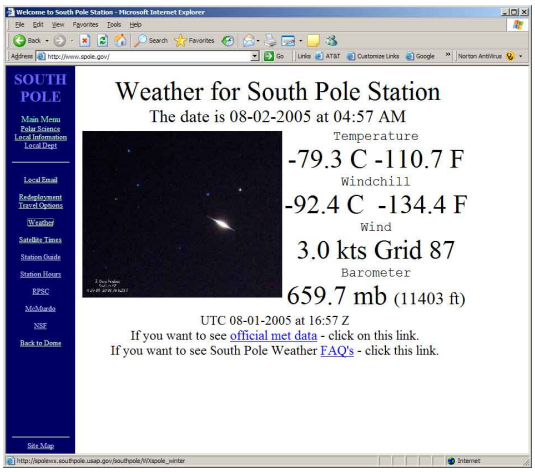


Figure 14-18 Weather Data Display, South Pole

Benefit: Functionality now replicates the capabilities of the old meteorological data display system.

Identified Issues

Issue: A Microsoft Windows update caused systems at CSEC to reboot. This forced us to rebuild the aquarium Data Acquisition System (DAS).

Response: We found an omission of the "do not reboot" list at McMurdo. We added this group back in, and verified the content against current science systems.

Issue: The new SeaSpace X-band Terascan system had excessive data dropouts on X-band data.

Response: SeaSpace identified a problem in the receiver. SeaSpace provided a new receiver but it did not have a necessary Defense Meteorological Satellite Program component. On-Ice staff transferred the modified component from the old receiver to the new receiver, and the system is now functioning correctly.

Issue: Funding is not available for many planned lifecycle replacements.

Response: We rolled unfunded items to FY06, and identified, prioritized and funded all mission critical science items for next fiscal year.

Lessons Learned

From webcam-based outreach efforts from McMurdo, we learned:

- Better bandwidth does not make the frame rate any faster: the frame rate was approximately one frame per second regardless of bandwidth. Using an analog phone is more reliable and allows us to synchronize the audio.
- We need to research the feasibility of remote control PowerPoint presentations.
- It helps to test VTC setups one to two weeks before the session.

There were some notable differences in GIS projects from last season. The most apparent distinction was the increase in science events that asked for GIS services, from 23 in KY05 to 37 in KY06. Approximately 50% of the 75 McMurdo-based science groups received some type of GIS

support during the season. Two programs represent the bulk of those requests: 13 of the 26 Biology and Medicine programs and 11 of the 14 Geology and Geophysics programs. Less quantifiable, more grantees requested raw data, needed assistance with GIS software, or required more sophisticated GIS analysis or extraction techniques. This particular shift in GIS services could indicate a higher level of GIS knowledge in the science community, as more grantees acquire their own GIS software or become familiar enough with GIS capabilities to request services that stretch beyond simple plotting. It if unclear is this is a new trend or merely the aberration of one season. If it is a trend, a shift in the level of services offered by the GIS support office might be necessary.

Section 3. Plans for KY07

SSSV will conduct lifecycle replacement of the *NBP*'s Terascan, the Terascan at Palmer Station, and lifecycle updates to vessel DAS systems, pending funding.

We will submit a lifecycle replacement request for the *NBP*'s Inmarsat system in conjunction with Science Support/Marine.

TECHNICAL OPERATIONS

Section 1. Summary

In KY06, Technical Operations introduced several new capabilities to the Program while continuing to focus on an Enterprise-centric view. We improved infrastructure service delivery in several areas while maintaining costs and reducing expenses.

Technical Operations absorbed several unanticipated requests for resources during the season – such as laptop screening and the McMurdo Bandwidth Upgrade – but still posted excellent metrics for network and system availability, customer satisfaction and overall performance

Section 2. Qualitative Performance

A. Project Management

General Management

Accomplishment: We completed more than 24 projects and managed tasks during the season.

Benefit: We managed this workload while keeping purchasing and hiring on target.

Customer Satisfaction

Accomplishment: Metrics data recorded over 99% customer satisfaction for all work orders performed by our group.

Benefit: Network and system resources reached new levels of availability.

Accomplishment: A science group arrived in McMurdo without a suitable printer to complete its fieldwork. We procured the item and shipped it to McMurdo to meet deadline.

Benefit: The group completed its meteorite survey and print results in the field.

B. Program Integration

Coordination Between WBS

Accomplishment: The Systems group worked with Waste Management to configure an application to travel with its primary user, setting up endpoints in Denver and McMurdo.

Benefit: The Waste Management Specialist has portable access to the application critical to his job function, and it saves network bandwidth.

C. Innovation/Process Improvement

Innovative, Technological Solutions

Accomplishment: We continued to implement the Enterprise Network Operations Center (NOC) in conjunction with the Raytheon Systems Management Center (SMC). The NOC uses automated processes and enhanced tools to provide continuous network and system monitoring. It immediately identifies events that may affect the Enterprise. The NOC also acts as the point of contact for outside agencies that provide services to the USAP. It responds to all alerts and notifies on-call personnel immediately for prompt corrective action. In KY06, the NOC responded to more than 25,000 alerts from Enterprise equipment.

Benefit: We resolved all alerts before any impact to users.

Accomplishment: We enhanced after-hours support to supplement the Denver Help Desk operation. Users calling the Help Desk after hours with an urgent or emergency situation route to the SMC, which directs the call to the appropriate on-call support group.

Benefit: Users can obtain urgent and emergency assistance after Help Desk hours via a single phone number.

Accomplishment: We played a significant role in the McMurdo Bandwidth expansion and telephone upgrade. The Network Operations Group designed a new VoIP Quality of Service approach to improve call quality. In addition, we reduced the bandwidth requirement for VoIP calls, which permits 32 simultaneous calls from McMurdo, up from 24 (33% increase).

Benefit: Calls from McMurdo are better quality, more efficient, and use less bandwidth.

Accomplishment: We continued the lifecycle equipment replacement program by focusing on network, server, and PC equipment.

Benefit: Updated equipment is more supportable and provides new features and functionality.

Accomplishment: We enhanced network and system availability by focusing on redundancy with no single point of failure. Upgrades to all stations have been very successful in improving stability.

Benefit: Users see enhanced network and server availability with a more robust environment.

Accomplishment: We continued to improve Enterprise bandwidth management procedures. The Network Group enhanced McMurdo traffic through packet monitoring and shaping techniques.

Benefit: Enhancements improved bandwidth management and WAN data access.

Accomplishment: We initiated several security enhancements to protect against various Internet attacks. We enhanced desktop and server antivirus protection with McAfee® ePolicy Orchestrator®. We installed Microsoft SMS for patch management, and introduced increased spam protection and firewall improvements.

Benefit: Increased protection eliminated many problems from viruses and other malicious attacks from the Internet and e-mail. This also significantly reduced spam e-mails.

Accomplishment: We continue expanding the wireless network operation at McMurdo. Science groups expect enhanced coverage for 802.11 and phone support at remote locations. We implemented 22 wireless clouds using 900MHz backbone links to enhance network support.

Benefit: The science community is able to use the wireless network for data transfer and e-mail support in several new locations.

Accomplishment: The Communications, Telecommunications and Antenna Rigging Group (the Riggers) brought the Porta-Comm communications shelter on Hjorth Hill further online by moving equipment to indoor racks from transportable carrying cases at the base of the site tower. Hjorth's shelter provides wireless and telephone repeater service to science camps in the lower end of the Taylor Valley, Marble Point, and ships in McMurdo Sound. The shelter also provides a protected workspace for technicians and will accommodate the projected needs of the area for several seasons into the future. Currently, the site is running solely on solar power, but we are studying integrating a wind turbine into the power system.

Benefit: Relocating communications repeater systems for F6 and Lake Fryxell from Mt. Voslips to the shelter reduced the number of flights and amount of equipment at Mt. Voslips. Hjorth Hill is lower in elevation and lies on the main flight path to Marble Point, which makes it a much more convenient relay point.

Accomplishment: Both Lake Hoare and Cape Royds switched from 900 MHz spread spectrum to 802.11 services to accommodate the increasing need for more bandwidth at remote locations as grantees bring increasingly sophisticated data devices and request radio carrier support back to McMurdo.

Benefit: By increasing antenna gain and adding amplifiers, we can increase bandwidth at more locations.

Accomplishment: The Riggers are nearly finished phasing out the venerable Optaphone UHF radiotelephone system, used locally since 1994/1995, in favor of UHF sets from Telepoint. The addition of transmit combiners and multi-couplers at Hjorth Hill and Bldg. 65 in McMurdo better use Telepoint's capabilities.

Benefit: The equipment will free up valuable tower space at both locations.

Accomplishment: The Zetron dispatch terminal located in Mac Ops had a trouble-free season;

however, proper maintenance of the system must continue.

Benefit: The terminal has ceased to be an area of major concern.

Accomplishment: Installing the new digital page bridge in the Joint Space Operations Center (JSOC) freed rack space in Bldg. 182. The Riggers also installed a new digital paging transmitter in Bldg. 221.

Benefit: Modernization of the paging system is complete.

Accomplishment: The new Orthogon digital microwave radio system for the LDBF has proven itself reliable. The Riggers moved the McMurdo end of the link from Bldg. 221 to Bldg. 69.

Benefit: This eliminates RF interference caused by the Mobile Runway Support Facility (MRSF) radio link.

Accomplishment: Technicians assigned to Black Island played a major role in upgrading station bandwidth. Planned training will familiarize technicians with new equipment configurations.

Benefit: Station bandwidth capacity increased from 1.5 to 3.0Mbs.

Accomplishment: The Telecommunications group (TelCo) closed 437 work orders during the 2005-2006 austral summer.

Benefit:

- We set up T-1 support to Bldg. 221 (T-Site) for the LDB group. We ran cables to each building, installed jacks and hooked up phones and network support where needed. We packed, removed, and stored voice, data, and UPS systems at the LDB buildings, and tagged and documented how to reinstall the equipment.
- We installed a new rectifier system in the TelCo battery room, replaced and upgraded wiring to inverters and rectifiers, cut over all equipment to new system with minimal problems, and set up a weekly test schedule for batteries.
- We installed new cable television (CATV) cable runs near Bldg. 175 to improve distribution, and repaired various CATV problems throughout the station. We adjusted Blonder Tongue amps for maximum signal in all buildings.
- We successfully completed seasonal Ice Runway and Williams Field installations, running cables to each building, and installing phones and network connections.
- We ran telephone OSP cable to the Jamesway for repair of icebreaker screws (for the divers' safety).
- We solved the INET crossover problem by adding two extra lines from Bldg. 221 to Bldg. 182 (TelCo) to improve signal distribution, and switched two antenna inputs at Bldg. 221.
- We installed new 200-pair cable from Bldg. 68 to Bldg. 182 to replace the old cable, which had too many bad pairs. We used bucket truck IAW per the new RPSC safety guidelines. This also solved the problem with dropouts on the Comprehensive Test Ban Treaty circuits.
- We wired the new (Smurf hut) building for telephone and data at Pegasus Field.
- We provided troubleshooting for the engineers having difficulties seeing all the Direct Digital Control (DDC) units at the building sites.
- We installed PairGains in two NSF dorms, Hut-10, Bldg. 146 (Gravity Barn), the temporary fish hut at Ballpark next to Bldg. 161, and the Science Cargo hut.
- We installed a new fiber optic run from AFRTS to Finance in Bldg. 155 for the new ATMs, and assisted the ATM Technician to install and cut over to LAN-based ATMs.
- We assisted the NOC with all necessary rack, ISP fiber, ISP Cat5-e cable runs, terminations, and patch panel installations for the Black Island 3Mb upgrade.

Table 14-6 Supported Sites, 2005-2006

Site Type	Site	Notes
Wireless Sites	Twenty separate locations received wireless service. Wireless terminal equipment was reused when camps closed or vessels departed. Five repeater locations serviced ten users.	
Science Camps (Total = 11)	Marble Point	
	New Harbor	
	Lake Fryxell	
	F6	
	Lake Hoare	
	Lake Bonney	
	Cape Royds	
	Cape Crozier	
	Lower Erebus Hut	
	AFTAC - Mt. Newall	(new 05/06 wireless installation)
	Blood Falls	(not funded for next season)
Sea Ice Camps (Total = 6)	Penguin Ranch (B-197-M)	
	Big Razorback Island (B-009-M)	
	CTBT	
	MRSF Tower	
	Pegasus Airfield	
	ANDRILL	(new 05/06 wireless installation)
Repeaters (Total = 6)	Mt. Voslips (Hill 1353) - Lake Hoare, Blood Falls	
	Mt. 1882 - Lake Bonney	
	Mt. Terror - Cape Crozier	
	Mt. Erebus Cones - Lower Erebus Hut	
	Hjorth Hill - Marble Point, F6, New Harbor, Lake Fryxell, Cape Royds	
Vessels (Total=3)	*American Tern*	
	Gianella	
	NBP	
Telepoint Sites	Twenty-six separate locations received telephone service; telephone terminal sets were reused when camps closed or vessels departed. Three repeater locations serviced six camps. Mt. Erebus repeater was relocated to Hjorth Hill.	
Science Camps (Total = 9)	Marble Point	
	New Harbor	
	Lake Fryxell	
	F6	
	Lake Hoare	
	Lake Bonney	
	AFTAC - Mt. Newall	
	AFTAC - Lake Vanda (Bore Hole)	
	Lower Erebus Hut	
Sea Ice Camps (Total = 9)	Penguin Ranch (B-197-M)	
	Big Razorback Island (B-009-M)	
	LDB (2)	
	CTBT	
	MRSF Tower	
	Pegasus Airfield	
	MLS Shelter	
	ANDRILL	(new 05/06 Telepoint installation)

Table 14-6 Supported Sites, 2005-2006

Repeaters (Total = 6)	Mt. Voslips - (Hill 1353)	
	Mt. 1882 - (Lake Bonney)	
	Mt. Newall - Lake Vanda (Bore Hole)	
	Hjorth Hill - F6, Lake Fryxell, Lower Erebus Hut	
Vessels (Total = 7)	*American Tern* (2)	
	Krasin	
	Gianella	
	NBP	
	Polar Star (2)	
VHF Repeater Sites	No special repeater placements were made during the season. The marine-band repeater normally used to support USCG icebreaking operations was not deployed.	
Flight Following (Total = 5)	Mt. Brooke	
	Mt. Newall	
	Mt. Coates	
	Minna Bluff	
	Mt. Erebus (Truncated Cones)	
Field Party (Total = 6)	Mt. Brooke	
	Mt. Newall (Wright Valley)	
	Mt. Coates (Taylor Valley)	
	Mt. Aurora	
	Mt. Bird	(cross-banded thru Mt. Terror)
	Mt. Terror (Cape Crozier)	
Antenna Rigger Installations	The list is just for new installations and removals at field locations and does not chronicle standard, maintenance, repairs and replacements undertaken as regular tasking.	
South Pole	TCI-550-4 conical monopole, one tower and curtain	
	TCI-548-1 horizontal log-periodic, four towers, two curtains	
	20M HF antenna and tower	
	40M HF antenna and tower	
	Triband HF antenna and tower	
	Backup triband HF antenna and tower	
	Near Vertical Incidence HF antenna, tow towers, one curtain	
	Coaxial transmission lines for all antennas	
	Ground screens for conical monopole and horizontal log-periodic antennas	
McMurdo	Instrument support platform for G-295-M, Mt. Erebus	
	Instrument support platform for I-190-M, Ice bergs	
	Instrument support platform for G-078-M, Mt. Fleming	
	Instrument support tower for B-015-M, New Harbor	
	Automatic Weather Station platform for ATS, Black Island	
	Instrument platform removal G-079-M, Lone Wolf Peak	
Deep Field	HF antenna support tower, WAIS Divide deep field camp	
	Two-meter GOES-3 antenna dish and support king post, WAIS Divide deep field camp	

- We repaired approximately 15 TV sets for the community and the Housing Department and eliminated irreparable units. We repaired several electronic items for the community after hours on the Technician's personal time.
- We reprogrammed the PBX T-1 cards and installed new cables at the NOC and Bldg. 182 for the VoIP system upgrade.
- We solved several unexpected Williams Field phone outages when TelCo technicians discovered a C-130's tail can block signal from Williams Field to Bldg. 221 if parked in the line of sight.

Accomplishment: The Network Engineering Group (NEG), which closed 371 network change requests during the season, led the engineering efforts for the McMurdo WAN bandwidth project.

Benefit:

- Increased IP bandwidth from 921 Kbps to 3 Mbps.
- Converted Air Force Technical Application Center (AFTAC) and Wells Fargo to VPN connection.
- Found an alternative layer 2 VPN solution for NASA, with savings of $40K.
- Converted PBX voice traffic to VoIP solution, saving long-distance costs.
- Optimized voice packet payload size, reducing per call bandwidth requirement from 24K per call to 16K per call, and increasing total call capacity from 24 calls to 32 (33%).

Accomplishment: The NEG upgraded the VoIP voice gateway system in preparation for a software upgrade to the Call Manager.

Benefit: The upgrade allows redundant gateway network connectivity and increases total call capacity for all stations. It replaced end-of-life equipment no longer supported by the vendor.

Accomplishment: The NEG replaced the aging 4003/4006 switch platforms at Denver HQ that were experiencing increasing hardware failures due to the age of the equipment.

Benefit:

- Increased port capacity throughout the building.
- Reduced the complexity of engineering and maintenance by upgrading to standard native Cisco operating platform, providing more flexibility to support future designs.
- Reduced the number of network devices from 13 to six, through Voice and Data network consolidation, saving Cisco maintenances costs.
- Added redundant power and network connections, decreasing potential user down time.

Accomplishment: The NEG upgraded the server farm switch on the USAP Private Network, eliminating redundant paths from the server farm to the Denver HQ core network and increasing port density for greater capacity. We replaced end-of-life equipment no longer supported by the vendor.

Benefit: This increases the level of services available from the server farm switch. We tripled port capacity from 80 to 240 ports. Bonded Gigabit connections reduce daily backup time by 50%.

Accomplishment: The NEG installed an Enterprise-class VPN solution.

Benefit: The VPN 3030 architecture is scalable, redundant, secure, and adaptable for all USAP client-to-site VPN requirements. An additional benefit is the security it provides Denver HQ wireless users because of the encrypted radio signal.

Accomplishment: The NEG installed a redundant-pair Cisco Access Control Server (ACS) to provide LDAP Authentication, and Authorization and Accounting (AAA) against the USAP domain.

Benefit: This technology allows the USAP Private Network to leverage the 802.1X network support.

Accomplishment: The NEG upgraded Packeteer software. The existing Packeteers had reached end-of-life and were no longer eligible for maintenance contracts.

Benefit:

- Newer technology supports higher throughput rates, higher performance platform and compression support.
- Other benefits are due to the acquisition of Mentat by Packeteer. The current two-device configuration does not allow for maximum efficiency of the SkyX compression because the Packeteer is unaware of the increased bandwidth.
- Packeteer is working on a single-device solution that integrates both packet shaping, TCP proxy, and data compression.

Accomplishment: The NEG developed a firewall installation guide to ensure consistency, and established defined procedures for implementing Checkpoint Firewalls.

Benefit: A consistent process is essential due to the critical security nature and wide-ranging impacts of a firewall problem to science and station operations. This document will become part of a larger USAP firewall manual for reference by future employees/contractors.

Accomplishment: The NEG successfully moved active computer servers from the South Pole Dome to the Elevated Station as part of the SPSM project. We got them up and running at the new location with only minor impact to the South Pole community.

Benefit: This transition completes the move of all action servers to the new station before demolition of the Dome begins. This also saves on the fuel used to run the servers and heat the building.

Accomplishment: The NEG staff worked around the clock during the entire South Pole summer to transition many of the old server systems to new equipment and new operating systems.

Benefit: These new systems will greatly enhance the IT capability of the new station to store, move, and transfer data.

Accomplishment: The Systems Group (SG) installed anti-spam greylisting rules at the edge of the USAP e-mail system. Greylisting introduces a slight delay to incoming e-mails in order to thwart unsolicited commercial e-mail (spam or junk mail); it is one of the most effective tools in the anti-spam arsenal.

Benefit: Spam e-mail decreased from 12.5% of USAP e-mail to 3%.

Accomplishment: The SG installed internal, unsolicited commercial e-mail filters that integrate with Microsoft Exchange server's junk e-mail rules.

Benefit: Spam filtering (tagging and sorting) virtually eliminated user complaints of spam. This centralizes automated junk e-mail filtering by integrating with existing e-mail systems, saving end-users large amount of time.

Accomplishment: The SG consolidated and moved multiple file server systems at Denver HQ to a high-availability file server cluster and high-capacity direct attached storage. We implemented quotas on all root directories and migrated applications to a higher-performance application server.

Benefit: This eases administration of multiple systems, allows for future growth and increases uptime. Quotas will allow us to manage future growth. Moving and consolidating applications to an application server increases performance; separating it from file system operations increases performance and uptime even further.

Accomplishment: The SG moved user accounts, groups, computers and server accounts from Active Directory sub-domains to the root Active Directory Domain USAP and created a single "account database." The initial Active Directory design was cumbersome to administrators and

users due to the transient nature of the USAP user population. This resulted in increased workload for administrators and lost productivity for users.

Benefit: Extending the USAP Active Directory root domain into USAP stations and consolidating accounts into the USAP Active Directory domain has several distinct benefits:

- It creates a single accounts domain that can be leveraged by other authentication technologies.
- Users will no longer need to know the location of their user account as they deploy/redeploy.
- The administrative burden of tracking and manually moving user accounts is no longer necessary.
- Centralized account management becomes possible.
- Reducing administrative overhead saves money.
- This centralizes Enterprise-wide policies while allowing local administrative control.

Accomplishment: The SG collaborated on an Active Directory Standards Guide, and implemented a set of configuration and administration standards for Active Directory and systems throughout the USAP.

Benefit: Established standards maintain consistency at each site. This reference guide allows administrators to focus more on administration and less on localized configurations, and it increases efficiency of IT staff as they change job locations between stations. In addition, it increases the efficiency of Enterprise administrators assisting local administrators.

Accomplishment: The SG added simple mail transfer protocol (SMTP) connectors and changed Routing Group Connectors to pure SMTP Technology to the Christchurch e-mail system.

Benefit: The existing connectors in Christchurch did not allow e-mail to continue flowing in the event of lost VPN connectivity between Denver HQ and Christchurch. Changing the existing Christchurch-Denver connectors to SMTP, and adding an additional outgoing SMTP connector, effectively creates redundant outgoing e-mail routes for Christchurch.

Accomplishment: The SG installed Integrated Lights Out (ILO) management to critical server systems.

Benefit: ILO enables systems administrators to remotely power off/on systems, increasing our ability to administer, respond, troubleshoot, and resolve remote server systems.

Accomplishment: The SG helped Client Services test and install Windows XP Service Pack2, the largest Service pack with the greatest number of changes to an operating system Microsoft has released to date.

Benefit: Service Pack2 provides a dramatic increase to the XP Client OS security, including a host-based firewall configured as “enabled” while computers are not attached to the USAP network.

Accomplishment: The SG helped Client Services test and implement Timberline, a project-estimating tool.

Benefit: Timberline saves time and labor for FEMC personnel, and increases accuracy of construction estimates.

Accomplishment: The SG enabled Live Communications Server capability to built-in Windows Messenger and Active Directory by installing Microsoft’s Collaboration Server and Live Communications Server (LCS).

Benefit: LCS, in concert with Windows Messenger and Active Directory, provides secure Instant Messaging (IM) and collaboration between USAP domain Users. IM provides the capability of real-time communications when normal communications channels degrade, without relying on external and potentially unsecured third-party IM solutions. LCS enables inter- and intra-site collaboration with whiteboard sharing, applica-

tion sharing and Remote Help Desk Assistance and Support. LCS provides the capability of integrating with third-party IM solutions at a future date.

Accomplishment: The SG researched, selected and installed Microsoft SMS at Denver HQ.

Benefit: SMS gives stakeholders the ability to run numerous reports on hardware and software inventory, current patch levels and system components. It introduces labor cost savings and increased security by enabling systems operations the ability to push critical updates and upgrades.

Accomplishment: The SG implemented secure password authentication from Unix Solaris to Microsoft Active Directory Services.

Benefit: Kerberos and LDAP authentication simplifies user account management by merging user accounts into a central location. This reduces the amount of administrative overhead and lessens the number of username/password combinations users must remember, thereby increasing productivity and security for both users and administrators.

Accomplishment: The SG installed centralized antivirus management tools.

Benefit: This increases security and efficiency by giving systems administrators the ability to:

- "Push" antivirus updates to clients whenever necessary.
- Detect computers on the network that do not meet USAP antivirus standards.
- Centralize reporting for scanning, alerting and inventory management.
- Reduce network traffic on satellite and WAN links to Internet by creating central internal points for client antivirus updates.

Accomplishment: The SG implemented a new mail list server (listserv) that provides the USAP community with subscriber-based notification capabilities. Four lists encompass Enterprise, McMurdo, Pole, and Palmer programs. Subscribers receive items of interest, such as notifications of planned (and unplanned) outages.

Benefit: The self-subscription capability of listserv reduces administrative overhead (users can subscribe/unsubscribe to the lists as desired without manual intervention), as well as decreases the possibility of missed notifications to concerned parties.

Accomplishment: The SG installed new Blackberry server hardware and upgraded the Blackberry application.

Benefit: The upgrades provide added capability for Blackberry users.

Accomplishment: The SG expanded the existing Help Desk work order system at Denver HQ to include remote sites such as Christchurch. This was accomplished by implementing a web-based front-end to the existing system.

Benefit: Remote sites are now capable of generating, tracking, and closing work orders. Help Desk management has better reporting options.

Accomplishment: The SG installed Microsoft Terminal Services to replace unsecured legacy Citrix remote access systems because Microsoft no long supported this system with security updates.

Benefit: RPSC maintained the original licenses used by Citrix via software assurance. We extended remote access to critical systems for key users with a minor end-user license upgrade. These include Database Management Specialists who administer AREV servers remotely and remote third-party clients such as the NYANG and SPAWAR.

Accomplishment: The SG implemented automated run book logging on all USAP Server Systems.

Benefit: Whenever a change occurs to a system, there exists the possibility of adversely affecting other systems. Systems Administrators are now required to record the purpose and details of their session, thereby creating a historical

record. This is extremely helpful when troubleshooting a system.

Accomplishment: The SG implemented a universal logon script with security banner, user and site intelligence. Previously, each USAP site scripted and maintained its own logon script and security banner that varied from one site to another, based on that site's requirements.

Benefit: The new Enterprise-wide logon script standardizes the text in the security banner, recognizes each site's unique requirements, and enforces strict compliance with the security banner by forcing logoff if the user does not agree with NSF security policies required for system access.

Accomplishment: The SG implemented "Least Privilege Use" for systems administrators.

Benefit: Least Privilege Use allows systems administrators and network engineers to perform everyday tasks as non-privileged users, while elevating their privileges for specific, more secure applications and tasks within the same logon session as needed. This not only increases security, but also saves the user from logging off/on repeatedly.

Accomplishment: The SG implemented Windows Software Update Services (WSUS) at Denver HQ.

Benefit: WSUS acts as the single external connection to the Internet for downloading patches and security updates, making them available to down-level clients. This saves bandwidth on satellite and Internet WAN links, and provides centralized reporting capabilities on the status of installed updates.

Accomplishment: The SG helped SAS implement Microsoft SharePoint Services.

Benefit: SharePoint is a collaborative Internet tool that will be used for online project collaboration.

Accomplishment: Information Security, Network Operations and Systems Operations collaborated on the InfoSec Incident Response Matrix.

Benefit: Lessons learned from testing the InfoSec Incident Response Matrix via simulation lead to vast improvements in detection and response capabilities, thereby greater IT security. It also identified future needs for security and incident response.

Accomplishment: The SG implemented procedures and capabilities for monitoring server, network, and environmental systems, and responding to the alerts generated from those systems.

Benefit: Increased efficiencies for reporting and mitigating outages, and greatly decreased response times to alerts.

Accomplishment: The SG provided technical support for the SPSM systems during installation and transition.

Benefit: Our technical expertise, labor, technical writing and review contributed to the smooth transition of critical SPSM systems into production. This resulted in reduced outages, downtime, and integration with existing systems.

Accomplishment: The SG provided technical support for the implementation of Remote access solutions currently used by RPSC, the NSF and third-party organizations.

Benefit: This support smoothed the implementation of a VPN solution.

Accomplishment: The SG assisted Network Operations to test and implement site-to-site VPN between Denver HQ and Christchurch.

Benefit: VPN between Denver and Christchurch vastly increases security of critical business traffic. It also complies with certain government regulations regarding the security of personal information.

Accomplishment: The SG assisted the SAS group with testing, installing and ongoing sup-

port of an integrated Iridium/Microsoft Exchange e-mail solution for the South Pole. Iridium multi-channel is a low-bandwidth application that operates during the 12 hours a day when the main satellites are not available.

Benefit: This is the first reliable and continuous connection to the South Pole for limited e-mail capabilities, emergency voice access and Instant Messaging. It dramatically increased the efficiency of business processes as well as science.

> "You were after a word on how the Iridium e-mail link is going. It's working very well. Too well - I don't get a break from e-mail."
>
> "I'm very happy with it. We are going through a schedule change due to the small flight delay early in the week, and the quick turn around in e-mails 24/7 resulted in a noticeable improvement in productivity compared to previous seasons for similar activities."
>
> "I'm trying to have all IceCube people use the RPSC e-mail system for e-mail, and use our e-mail system for experiment control related activities only. The 24/7 e-mail has been a big selling point for this."
>
> *Darreyn Schneider, Ice Cube Project Manager*

Accomplishment: The SG implemented scripts to manage incoming/outgoing user accounts at remote sites.

Benefit: Automating this process greatly reduces the potential for human error, and increases corresponding user and administrator productivity.

Accomplishment: We provided critical support to the voice/telephony portion of the McMurdo Bandwidth Upgrade Project.

Benefit: By transitioning voice circuits to VoIP, the number of simultaneous calls to/from McMurdo increased from 24 to 32 (33%).

Accomplishment: Client Services taught 312 different group courses and 177 individual courses to 968 students at Denver HQ, McMurdo and the South Pole (Table 14-7 thru Table 14-10).

Benefit: Internal training increases employee value and leads to employee retention.

Table 14-7 Total Number of IT Student Events, KY06

Location	# of Student Events*
Denver HQ	415
McMurdo Station	412
South Pole	141
Total	968
*One student event is equivalent to one student attending one class.	

Table 14-8 IT Training Courses Taught at Denver HQ

Course Type/Name	# of Group Classes	# of Individual Classes
USAP Business Applications		
MAPCON	32	10
Cargo Tracking System (CTS)	20	8
Power 1000 (Purchasing)	15	1
Personnel Tracking System (PTS)	0	7
Online Requisition Tracking (ORT)	28	5
POLAR ICE Navigation	12	5
Content Management System (CMS)	22	2
OSCR (MSR replacement)	12	0
Total	141	38
Business Productivity		
MS Excel 2003	10	25
MS Outlook 2003	12	20
MS PowerPoint 2003	4	2
MS Word 2003	4	12
MS Office 2003	5	4
MS SharePoint 2003	28	0
Total	63	63
User Support Services		
CD Burns	0	8
Digital Cameras	0	0
General User Questions & Answers	0	48
Total	0	56
Grand Total	361	

Accomplishment: Denver HQ PC Technicians (PC Techs) implemented anti-virus management console support at Denver HQ, McMurdo, Palmer and the South Pole.

Benefit: Centralizes management of all USAP workstations and allows us to better react to and remediate viral threats.

Table 14-9 IT Training Courses Taught at McMurdo Station, WINFLY thru Mainbody, 2005-2006

Course Type/Name	# of Group Classes	# of Individual Classes
USAP Business Applications		
MAPCON	30	3
Cargo Tracking System (CTS)	10	2
Power 1000 (Purchasing)	0	0
Personnel Tracking System (PTS)	2	0
Online Requisition Tracking (ORT)	3	1
POLAR ICE Navigation	2	3
Content Management System (CMS)	0	0
OSCR (MSR replacement)	0	0
Total	47	9
Business Productivity		
MS Excel 2003	20	1
MS Outlook 2003	12	2
MS PowerPoint 2003	7	2
MS Word 2003	2	1
MS Office 2003	0	0
MS SharePoint 2003	0	0
Total	41	6
User Support Services		
CD Burns	0	5
Digital Cameras: Tech Tips	1	0
Laptop Configuration (Mac & PC)	5	0
Total	6	5
Grand Total	114	

Table 14-10 IT Training Courses Taught at South Pole, Mainbody, 2005-2006

Course Type/Name	# of Group Classes	# of Individual Classes
USAP Business Applications		
MAPCON browse	5	0
Total	5	0
Business Productivity		
Computer Basics	6	0
Total	6	0
User Support Services		
CD Burns	0	0
Digital Cameras	0	0
Video Editing	3	0
Total	3	0
Grand Total	14	

Accomplishment: PC Techs upgraded all USAP workstations to Windows XP Service Pack2.

Benefit: Service Pack2 provides upgraded protection for all PCs.

Accomplishment: PC Techs implemented the laptop-screening project, screening 1,079 PCs for anti-virus definitions and Windows updates (Table 14-11).

Table 14-11 Number of Laptops Screened

Agency	Number of Laptops
ATS	11
Grantee	337
NSF Staff	14
RPSC	301
SFA	36
Personal	380
Total	1079

Benefit: Laptop screening provides the USAP significant protection against computer viruses and other threats.

Accomplishment: PC Techs assisted with the implementation of the SharePoint software at both Denver HQ and McMurdo.

Benefit: SharePoint is a collaborative Internet tool used for online project collaboration.

Accomplishment: The Denver HQ Help Desk opened 9,692 work orders in 2005 (Figure 14-19).

Benefit: We responded quickly to help requests to minimize end-user down time.

Responsiveness to Challenge and Change

Accomplishment: We sent a technician to Christchurch to perform pre-deployment laptop screening. Of the more than 1,000 laptops screened in KY06, we screened 80% in Christchurch. Only 85 laptops received red tags for further remediation.

Benefit: Testing as many laptops as possible, in conjunction with distributing the InfoSec Aware-

ness User Information Booklet to all participants prior to deployment, significantly reduced the workload for PC Technicians at McMurdo and the South Pole.

Section 3. Plans for KY07

Nothing to report.

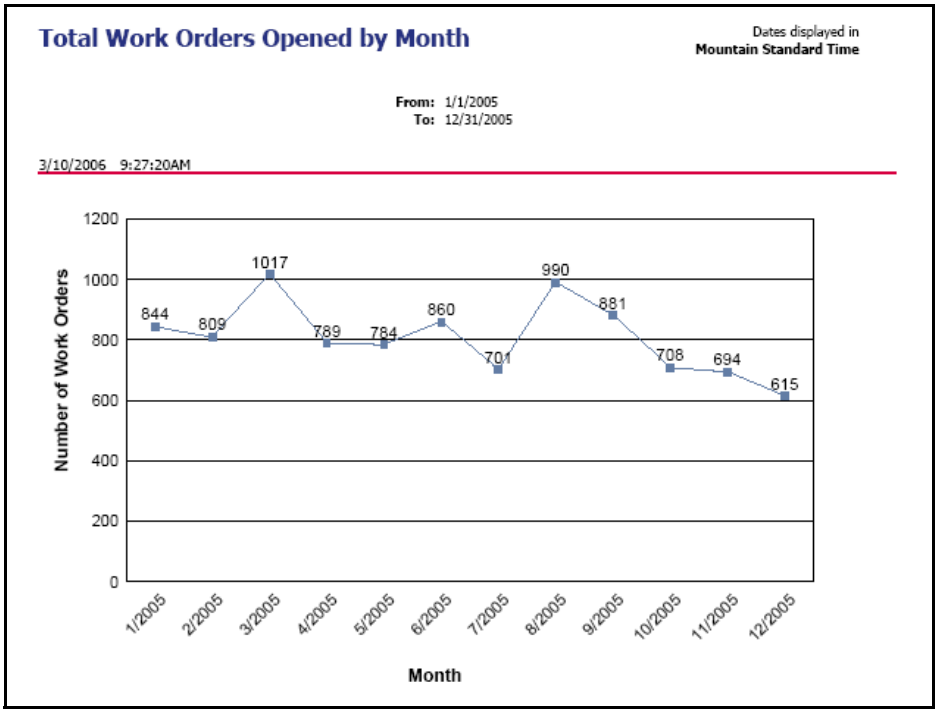


Figure 14-19 Total Help Desk Work Orders Opened by Month, Jan-Dec 2005

LOGISTICS

Logistics' performance in KY06 can be characterized by the following:

- Responsive problem solving that eliminates or mitigates Program impacts
- Timely accomplishment of scheduled and emerging requirements
- Cost-effective performance through innovative solutions and astute decision-making
- Process improvements that increase efficiency and effectiveness
- Dedicated employees focused on USAP objectives (such as reducing airlift and eliminating excess and obsolete materials)
- Competent employees (HR recognized Logistics for consistently hiring good employees)
- Safety-Conscious employees who get the job done with fewer injuries

In KY06, Logistics produced cost benefits of more than $862K, eliminated obsolete materials from all three stations, and continued to make safety our number one priority.

A comparison of the total recordable injury rate (TRIR) with Alaska and national averages revealed that the Logistics rate was well below these two averages (Figure 15-1). Reduced injury rates have a positive effect on productivity, new employee hiring, and retention of trained and experienced employees.

We delivered 41 million pounds of cargo this season. A number of changes and improvements accounted for this massive movement of material, including:

- The airlift metric changed from mission accomplishment to volume of cargo delivered. Consequently, aircrews began to load aircraft closer to the aircraft cabin load (ACL), resulting in an additional 192,000 pounds of cargo delivered to South Pole.
- An Airlift Review Board (ARB) oversaw both commercial air and military (Christchurch to McMurdo) air movement. The ARB determined when we would use these more expensive methods to move cargo, based on benefit to the Program. Under the ARB, we stuck close to the planned airlift estimate. Last year, we exceeded the planned estimate by 227%; this year we exceeded it by only 125% – a 55% improvement.

Section 1. Summary

Antarctic Terminal Operations (ATO). ATO supported 592 flights, moving 8,110 passengers and 19.1 million pounds of cargo. Reduced airlift capacity during parts of November and December when the New Zealand C-130s flew caused some cargo delays. We quickly cleared the backlog when C-17s returned to the air on December 21.

We saved nearly $100K this season by redeploying all four USAP helicopters on a single C-17 flight. The original plan called for moving the helicopters in two flights, but we worked with PHI to dismantle the helicopters into more manageable proportions.

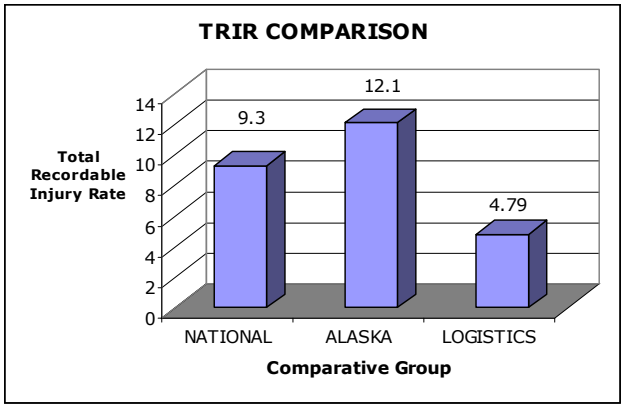


Figure 15-1 TRIR Comparison

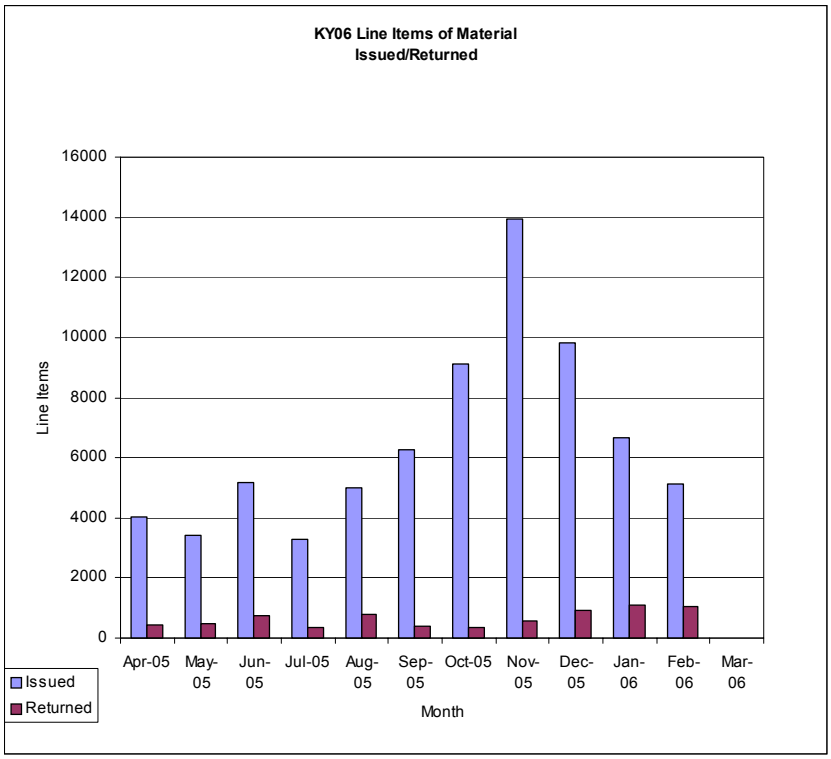


Figure 15-2 McMurdo Supply Issue and Return Volume

Supply Operations. Internal customer satisfaction remained our top priority. We processed 71,921 line item requests to support operations at McMurdo Station. We returned 6,755 line items to inventory (Figure 15-2).

Port Hueneme Terminal Operations. We managed the movement of more than 25 million pounds of cargo – 22 million on the resupply vessel, three million via commercial surface, and half a million by other means.

Besides normal operations, we expedited movement of critical materials in support of various operations. For example, we moved 8,000 pounds of diving gear on a direct flight to Christchurch on a Sunday to expedite repairs to the damaged icebreaker *Krasin*.

Peninsula Logistics. We delivered and tracked materials for the major IMS winter construction project. We responded to numerous changes in transport schedules caused by vessel mechanical problems and sea ice conditions. We supported the biennial hazardous waste transfer from the Peninsula to CONUS.

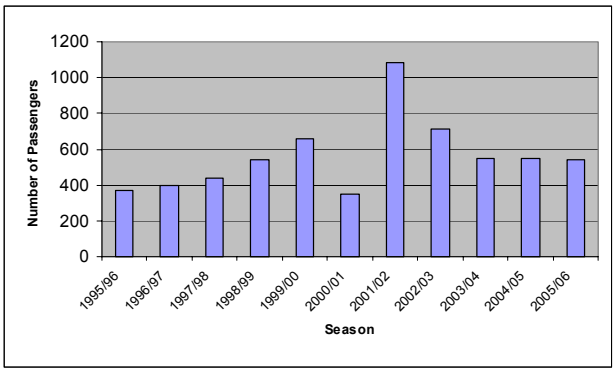


Figure 15-3 Seasonal Peninsula Passenger Assistance

The Palmer Station retrograde effort removed 9,913 pounds of material from the station. The elimination of excess or obsolete materials reduces the station's footprint and improves aesthetics.

Figure 15-3 and Figure 15-4 show the volume of Peninsula passengers moved this contract year. Passenger volume has been flat for the past three years, ranging between 544 and 549.

South Pole Logistics. This season was a record-breaker for both inbound and retrograde cargo. We delivered approximately 10 million

pounds of cargo and fuel in a record 377 flights, and retrograded approximately two million pounds of cargo to McMurdo.

Our pallet drift plan took advantage of 52 early season flights, delivering 260 pallets of cargo by identifying appropriate materials to discharge while the plane taxies on the flight apron. Without this plan, we would not have been able to deliver any pallets on these flights. (Poor visibility created by contrails in extreme cold temperatures early in the season prevents heavy machinery from approaching the rear of the aircraft.)

We processed vessel cargo quickly and efficiently, thanks to the addition of a Caterpillar 277. We partially reorganized some of the cargo berms and put a series of new procedures into place to continue this process.

Section 2. Qualitative Performance

A. Project Management

General Management

Accomplishment: Early in KY06, Supply Operations placed general consumables under central inventory management control, transferring $198K in stock from other divisions.

Benefit: Centralized inventory control will ease the workload for other operations, such as Procurement and Port Hueneme, by identifying needs before they become critical. It also assures that we do not develop excess inventory beyond our annual needs and budget.

Accomplishment: Supply effectively managed the 69 employees assigned to vessel off-load, allowing them to redeploy after three days.

Benefit: This eased redeployment flight demands later in the season. In addition, the early release of these employees reduced the overall labor costs for the season.

Accomplishment: In this fourth year of the McMurdo Retrograde Project (designed to reduce excess and obsolete inventories at McMurdo), Supply's Retro Team processed 751,000 pounds of material. This brought the running total for the project to 4.2 million pounds, more than half a million pounds ahead of schedule. Most of our efforts were focused on inside storage areas, but we also cleared approximately 75,000 outside-area square feet of excess and/or obsolete items.

Benefit: We can use recaptured warehouse space to more efficiently store and protect required materials. One possible use of the regained space

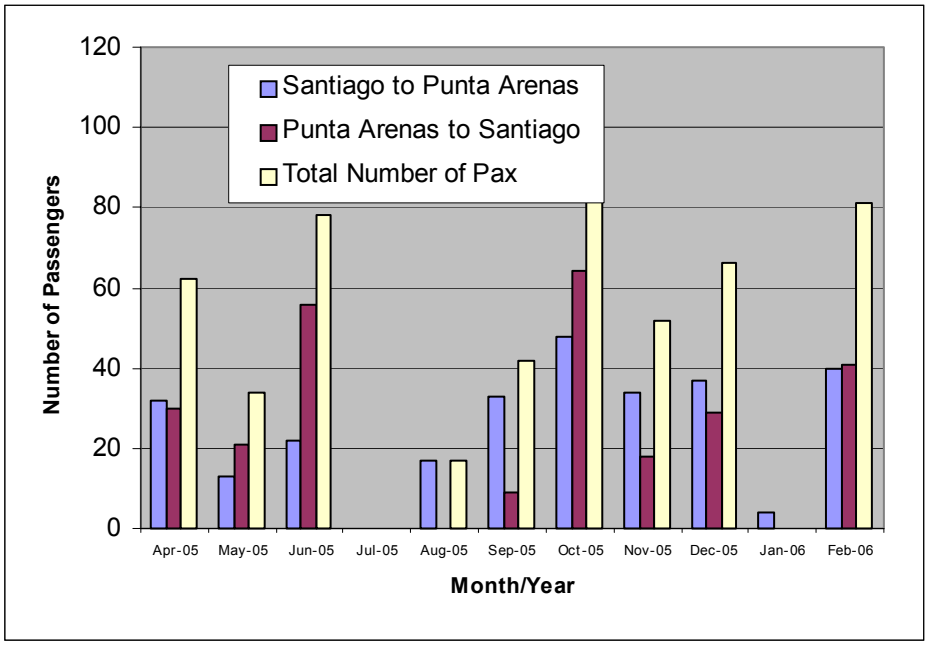


Figure 15-4 Total South American Passenger Assistance by Month, 2005-2006

is to store South Pole materials, reducing their dependence on resupply vessel deliveries.

Accomplishment: Port Hueneme Terminal Operations (PHTO), in coordination with McMurdo Station, loaded the McMurdo cargo into sea containers by project and work center.

Benefit: This refinement allowed McMurdo employees to schedule unloading the containers when it was most advantageous, eliminated multiple handling of the cargo, minimized the cargo's exposure to the elements, and allowed the station to receive containers faster during vessel resupply operations.

Customer Satisfaction

Accomplishment: ATO worked closely with the military airlift command to increase average aircraft lift by about 2%, from 26,000 pounds to 26,511 pounds. That amounted to 192,000 pounds of additional payload.

Benefit: The Commander, JTF Support Forces Antarctica, commended us for our "expert" management of cargo this year:

> "There was a unified effort and spirit of cooperative problem solving with the 500 Air Expeditionary Group (AEG), 139th Expeditional Air Squadron (EAS), and 304 EAS Commanders to make this an exceptional year from Week 1 forward."

Accomplishment: ATO adapted quickly to a change in metrics, shifting our focus from completed flights to cargo moved.

Benefit: The NSF Systems Manager for Operations and Logistics offered his congratulations:

> "…. Manager, ATO, and his entire team got on board with the goal of tracking cargo delivered and not flights from the beginning of the season. This was a big change in metrics for many folks and ATO contributed greatly to the overall success of this change by keeping the focus on airlift performance."

Accomplishment: IceCube grantees requested a report to track cargo movement from their universities to the South Pole. ATO created an IceCube Shipping Cadence Report that tracked "ship" and "receive" dates and the transportation modes used throughout all transit points.

Benefit: The customer expressed great satisfaction. Grantees knew when to expect the cargo at the South Pole. This system tracked 595 cargo items weighing 739,658 pounds.

Accomplishment: Supply Operations remained highly-focused on customer service and satisfaction throughout year.

Benefit: The Supply Supervisor received 88 letters of praise and appreciation during KY06. These letters, mainly from supervisors and managers of other divisions, praised our 72 contract workers for going above and beyond in a variety of capacities.

Accomplishment: The MAPCON Edit Team in Supply Operations and Logistics' Material Control Specialist functioned as a "flex-team" that coordinated procurements and assisted with backlogs across different divisions in the 3rd Quarter.

Benefit: The flex-team expedited orders, resolved blocked invoices, received SAP goods, and distributed reports. This support contributed to the timely delivery of material.

Accomplishment: The U.S. Air Force required a part to fix the C-17 that flies the Christchurch to McMurdo Station missions. PHTO coordinated the pickup and shipment of the part to Christchurch within 24 hours of the request.

Benefit: Our rapid response minimized repair down time and only one C-17 flight day was lost.

Accomplishment: Under tight constraints, PHTO moved 8,000 pounds of diving gear on a direct flight to Christchurch on a Sunday, all within 24 hours of notification.

Benefit: Contract divers were able to make expedited repairs to the damaged icebreaker *Krasin*, allowing it to continue supporting vessel operations.

Accomplishment: Grantees from the University of Mississippi and Woods Hole Oceanographic Institution requested their cargo be sent from the

east coast direct to Punta Arenas. PHTO coordinated the pickup and movement with the steamship lines.

Benefit: Grantees received their equipment in time to complete last-minute testing and adjustment.

Accomplishment: PHTO coordinated the movement of seven Microwave Landing System (MLS) units from seven different locations, including Alaska, to Port Hueneme to the Ice (Figure 15-5).

Benefit: The USAP now has the pieces from ten units to provide spare parts for the on-Ice system.

Accomplishment: PHTO accommodated a grantee request to move a large cargo item from Wallops Island to New Zealand by having it picked up and delivered directly to Chicago for onward movement.

Benefit: This reduced the transportation time and provided the grantee with additional preparation time, for which he expressed appreciation.

Accomplishment: South Pole Logistics provided excellent support to grantees.

Benefit: Grantees referred to the excellence of our support in science out-briefs. Grantee satisfaction is a key indicator of the level and quality of support we provided to the NSF.

Human Resources

Accomplishment: ATO had a high manager retention rate, maintaining experience and Program knowledge. We attracted and hired a number of enthusiastic contract personnel to staff other positions.

Benefit: Our managers had the experience and knowledge needed to train the new contract employees, whose enthusiasm was critical to our ability to maintain a high level of customer support.

Accomplishment: Supply's fulltime management team offers a consistent, structured, and career-friendly environment to the 72 people who fill the contract slots at McMurdo throughout a calendar year.

Benefit: Our retention rate this past contract year was 82%, and it has been consistently high for the past several years. This high retention rate means far less time required for training and transition activities at the beginning of each season and higher productivity.

Accomplishment: South Pole Logistics cargo coordinators and load planners received training in Christchurch. In addition, our staff received training while in McMurdo awaiting the opening of South Pole.

Benefit: Training in Christchurch saves time on station, i.e., when the cargo crews arrive at South Pole they are able to receive flights immediately.

Figure 15-5 MLS Units Loaded for Shipment to Port Hueneme

Training in McMurdo also allows cargo coordinators the opportunity to practice their skills and build a good working rapport with station points-of-contact. It allows cargo crew members to hone their equipment skills so they can better contribute to opening South Pole.

Cost Savings

Accomplishment: ATO reduced material needs by 9.5%.

Benefit: This saved the Program $8K.

Accomplishment: ATO shipped four USAP helicopters in one flight instead of two.

Benefit: This saved almost $100K.

Accomplishment: ATO submitted all Special Assigned Airlift Mission (SAAM) Requests to the U.S. Transportation Command at Scott Air Force Base on time.

Benefit: The timely submission of SAAM requests gave the NSF a 10% discount, a cost savings of approximately $467K.

Accomplishment: Supply took "ownership" of two large and unused propane dewars on station. Our staff completed certified propane handling training before deployment, allowing them to fill propane bottles on station during the austral summer. Additionally, we built a loading platform out of discarded materials that allows staff to handle propane bottles safely.

Benefit: RPSC will now buy and ship propane in bulk to McMurdo, in a single dewar that will act as a filling station for the various sized bottles used by our customers. This will save the USAP $136,672 in direct and indirect costs.

Accomplishment: The 2006 resupply vessel departure moved up seven days. In response to this schedule change, PHTO loaded 98% of the planned break-bulk on platforms or flat racks.

Benefit: This reduced the number of vessel lifts and saved one charter day, delivering a savings of $36K.

Accomplishment: PHTO successfully repaired the refrigerator on the *LMG* and loaded Palmer's frozen food into it in time for the ship's scheduled sailing.

Benefit: We saved $12K, which is what it costs to send a commercial reefer of frozen food.

Accomplishment: PHTO transported hazardous waste and contaminated soil from the Palmer Station dump cleanup and disposed of it in the U.S. In all, the *LMG* carried eight containers of hazardous cargo, one container of retrograde cargo and miscellaneous break-bulk to Port Hueneme. We met all Homeland Security documentation and clearance requirements and discharged the waste without incident. Following the hazardous off-load, the *LMG* returned to Punta Arenas filled to capacity with 110,510 pounds of cargo, including the bathroom retrofitted berthing van, compressed gases, Palmer Station dry and frozen food, the SPG Filtration Van, and two Marine cable spools.

Benefit: By planning four months in advance, Peninsula Logistics, Port Hueneme Logistics and Marine Science were able to utilize the *LMG*'s southbound transit and load the ship to capacity with Peninsula cargo, thereby saving on commercial shipping costs for the Program. At an average cost of $0.92 per pound for commercial surface cargo, this avoided $101,669 in transportation costs.

B. Program Integration

Coordination Between WBS

Accomplishment: ATO held a meeting with all divisions to gather and assess their airlift requirements before the annual meeting of the Air Cargo Priority Board.

Benefit: With this information, we prepared a final airlift plan for requesting USAF C-17 and New Zealand Defense Force C-130 support.

Accomplishment: Supply revamped the food storage process so the winter crew can find materials more quickly and efficiently.

Benefit: Improved access to food stocks reduces the cost of issuing items by making the process more efficient, and it helps support menu changes.

Accomplishment: The VMF requested Supply's assistance in their Rebuild Room clean-up project. We provided labor and forklift support and helped identify components for off-site repair. We also documented and packaged these items.

Benefit: This effort greatly increased Rebuild Room workspace. We sent 159 line items with a core value of $382,782 to CONUS to be rebuilt.

Accomplishment: Supply provided forklift and loader support to the Housing Department to deliver new office furniture and mattresses.

Benefit: Housing was able to install the new furnishings on schedule.

Accomplishment: Supply participated in the "volunteer" Dining Attendant program. We took on the bulk of the Logistics schedule to minimize the impact on ATO and provided 250 labor hours in support of this program.

Benefit: We maintained our operation while helping to improve Dining Facility safety.

Accomplishment: PHTO loaded resupply vessel containers for McMurdo by work center or project, as discussed with various divisional representatives.

Benefit: This change in loading practices allows departments the flexibility to control where, when, and how sea containers are unloaded.

Accomplishment: Peninsula Logistics worked with Palmer FEMC, Operations, Science, and IT to retrograde 1,473 line items totaling 9,913 pounds.

Benefit: This freed up storage space on station, reduced unneeded inventories and costs, and improved the station's appearance.

Accomplishment: Several times each year, Peninsula Logistics publishes the vessel cut-off dates based on schedule change input from Marine Science. The vessel cut-off dates link acquisition activities to transportation schedules, so material can be purchased and shipped to reach the destination when it is needed.

Benefit: Accurate schedules provide the basis for planning grantee shipments and RPSC acquisitions to support research and operational needs.

Accomplishment: South Pole Logistics added two cargo people this season, one to each shift. These people worked with Waste Management personnel to place waste tri-wall boxes on Air Force pallets for retrograde.

Benefit: We would not have been able to retrograde the approximately two million pounds of outbound cargo without these trained employees. Similarly, Waste Management would not have been able to keep up with the demands placed on the department.

Accomplishment: Divisional representatives worked daily with the ARB at Denver HQ to validate the needs and benefits of delivering requested materials by air.

Benefit: We saved money by setting priorities for air cargo. Additionally, divisional representatives got immediate feedback from the ARB so they could plan accordingly.

Integration of Environmental, Health, and Safety Objectives Across Corporate Activities

Accomplishment: Supply's Q/A Trainer conducted exhaustive safety surveys of all McMurdo work centers.

Benefit: We delivered comprehensive reports detailing our recommended safety-enhancing changes to upper management for review and action.

Accomplishment: Supply took the lead in forklift and loader training. We also conducted full and refresher hands-on forklift classes for 239 non-Supply personnel already at McMurdo. Our personnel prepared and presented a PowerPoint pre-

sentation on "How to Adjust M4K Forks" at an All-Hands meeting and produced a short training video on M4K fork adjustment.

Benefit: Proper training on hazardous equipment keeps people safe and helps with equipment longevity.

Accomplishment: Supply created a display of available Personal Protective Equipment (PPE) items on station so customers would know what was available.

Benefit: PPE use increased after the display was set up. It received much attention and praise by the community.

Accomplishment: At South Pole, each pallet of waste wood left over from winter demolition required four hours to prepare, a timely but necessary task. After discussing our options with the NYANG, South Pole Logistics cut the wood to fit within the dimensions of a pallet with wooden sides.

Benefit: We removed the waste wood, part of the two million pounds of retrograde, in keeping with the NSF's object to remove SPSM construction debris in a timely manner.

C. Innovation/Process Improvement

Innovative/Technological Solutions

Accomplishment: ATO created a daily reconciliation report for on-continent missions. This report assured that 139th EAS passenger and cargo numbers matched with Logistics. Science Support also used this report to notify the NSF about planned and actual cargo and passenger activity.

Benefit: The report improved overall communication between our department and the military airlift command. As a result, we moved almost 10 million pounds of cargo, passengers and fuel.

Accomplishment: Supply reorganized the Outside Storage Area (OSA) known as "Larryville," a long-time eyesore.

Benefit: We now separate scrap materials from inventory. All material is now completely accessible, and the inventory list is 100% accurate.

Accomplishment: Supply converted 40-foot platforms no longer suitable for transporting cargo to material storage "berms."

Benefit: These berms keep bulk material off the ground to protect it from the elements. They also reduce the overall footprint of the area and help clean up McMurdo by eliminating old fish huts used for storage.

Accomplishment: Supply is transferring electronic MAPCON receipt activities from McMurdo to Denver HQ.

Benefit: This will increase the number of discrepancies discovered before station delivery and reduce the pressure to receive items on station under a fixed deadline. It will make information immediately available to end-users, thereby allowing for earlier and more accurate resupply ordering.

Accomplishment: Logistics hosted the Air Cargo Priority Board and USAP Airlift Conference by video-teleconference (VTC) this year.

Benefit: This eliminated hotel and per diem expenses. Seven different locations dialed in for the Airlift Conference, and the participation was far better.

Accomplishment: The Peninsula Logistics Supervisor, the Logistics Budget Analyst, and the Subcontracts Administrator met with our South American agent (AGUNSA) to discuss invoicing, competitive bids, and billing procedures. We also conducted spot audits. We agreed upon more efficient invoicing and payment methods.

Benefit: This meeting improved the general management of this subcontract.

Accomplishment: Peninsula Logistics was the first to respond to the requirement for NSF approval of all commercial air cargo shipments. They led the development of the reports and pro-

cedures for presenting COMAIR requests to the NSF.

Benefit: The rapid development of procedures and the timely delivery of a report allowed the NSF to review and authorize critical cargo, resulting in its timely delivery to the station.

Visionary Management

Accomplishment: Instead of depending on vessel resupply for South Pole in the same year the cargo is delivered to McMurdo, Supply launched an initiative to develop and execute a plan to make McMurdo a forward supply depot for South Pole. By forward ordering, we can prevent anxiety about vessel resupply schedules, especially in light of sea ice conditions in recent years.

Benefit: This will significantly decrease Pole's reliance on getting resupply cargo in the same season that it arrives on the continent. It also reduces the need for more expensive contingency actions, such as flying material from Christchurch.

Accomplishment: Denver HQ personnel will electronically receive cargo into MAPCON as it arrives at Port Hueneme.

Benefit: This will reflect real-time availability, confirm unit-of-issue quantity values, and catch discrepancies. This will greatly enhance accuracy and efficiency in the annual ordering process.

Accomplishment: South Pole Logistics staff reorganized the berms, especially the Petroleum, Oil, and Lubricants (POL) Berm. We recovered almost 400 empty gas cylinders, some of which were buried under three feet of snow, and sent them to CONUS for refilling. We wrote a new procedure to control cylinder delivery, storage, and transfers through the Materials Department. The cylinders are now stored together, in an upright position, and full cylinders are kept separate from empty ones.

Benefit: The new procedures eliminated the necessity of undertaking another major cylinder recovery. We have much reduced the time required to search snowdrifts for particular cylinders.

Accomplishment: Operations cleared out a space near the entrance of the New Garage arch at South Pole, dubbed the "Cul-de-Sac," for use as a stock area. We stored a season's worth of high-use items, such as 10W-30 oil, Arctic Gear Lube, and Cat 50/50 Tech Antifreeze in this space as shop stock. At the end of the summer, we moved the residual drums into the New Garage arch to supply the Heavy Shop throughout the winter.

Benefit: This will reduce the amount of material winter-overs need to move from the berms into the archway, reducing the need to use heavy equipment in extreme temperatures.

Responsiveness to Challenge and Change

Accomplishment: A delay in Water Plant upgrade required the removal of the new generators. Supply quickly evaluated what equipment was necessary to accomplish this task, identified and prepared an appropriate storage area, and completed the move.

Benefit: Working quickly, we completed this high-profile task in only 1½ days.

Accomplishment: When two of three members of the MAPCON Edit Team abruptly resigned, our MAPCON Database Specialist maintained workflow with temporary duty help until we filled the vacancies.

Benefit: The MAPCON Edit Team performed its record quality assurance function during the height of the procurement season without delaying procurements.

Accomplishment: RPSC had seven days to move 8,000 pounds of dive equipment from CONUS to New Zealand so divers at McMurdo could inspect and possibly repair the *Krasin's* damaged propeller. PHTO provided critical logistical support over a weekend and coordinated the movement of the material to New Zealand within five days.

Benefit: The NSF was able to evaluate propeller damage as quickly as possible. The assessment was critical for the NSF to make decisions about:

- Deploying a U.S. Coast Guard icebreaker
- Determining a course of action for unloading the cargo and fuel resupply vessels (collectively, ship charter costs were $75K a day)
- Delivering required winter-over supplies to the South Pole

Accomplishment: The Peninsula Logistics Supervisor worked with AGUNSA to coordinate dry dock repairs to the *LMG* in Chile.

Benefit: The *LMG* was repaired in a timely manner with minimal impact to the vessel schedule.

Accomplishment: When cruise LMG05-14 was unable to make it into Palmer Station because of sea ice conditions, RPSC arranged to move passengers on and off station aboard cruise ships. The Peninsula Logistics Supervisor coordinated with the Palmer Station Manager and AGUNSA to provide customs clearance, transport, and accommodation for passengers embarking and disembarking in Ushuaia.

Benefit: Palmer Station scientists and support staff arrived and departed the station with minimal delay, avoiding a negative impact on science, station projects, and support.

Accomplishment: RPSC learned in January 2006 that Chilean Customs would begin enforcing fishery and agriculture regulations. These regulations required additional documentation and prior notification. The Peninsula Logistics Supervisor worked closely with AGUNSA to clear shipments that were already en route and established procedures to satisfy these regulations.

Benefit: The USAP satisfied regulatory requirements for shipping science samples through Chile, enabling their timely delivery.

Accomplishment: South Pole Logistics moved the Cargo and DNF buildings closer to the flight line, which required us to relocate the complete cargo and waste lines. This task, coordinated with Waste Management, took several days to complete. During this time, we temporarily moved the cargo office to the Dome computer lab and DNF to another warm building on station.

Benefit: The new locations will require far less snowdrift maintenance during the course of the year.

Accomplishment: When South Pole Logistics moved the Cargo office, it made janitorial and housing products less accessible for users. To alleviate this problem, we staged them in skid quantities at Summer Camp and the Elevated Station. We restocked the Hypertat buildings by snow sled when necessary.

Benefit: This system was extremely efficient and required only a single issue at the beginning of the season, with end-of-summer residual stock moved into the Dome for the winter season. We issued these items out of MAPCON when they were staged, and whatever went into the Dome we recorded as “returned to inventory.”

Identified Issues

Issue: RPSC’s long-running difficulty obtaining adequate documentation to support payment of Navy invoices culminated in the Navy halting support of Port Hueneme Terminal Operations, ostensibly because of RPSC non-payment on overdue invoices. We set up a plan to resolve these outstanding invoices and were making progress, when the Navy incorrectly concluded there was no progress and denied access to its facilities. This occurred just before the resupply vessel arrived to discharge the McMurdo retrograde.

Response: The NSF arranged for the Navy to repeal the stop-work order in time to allow the vessel discharge. The NSF contracted a retired Navy comptroller to resolve the invoice issue, with the assistance of RPSC. We are working with the contracted employee, who is attempting to develop an adequate basis for invoice certification and payment.

Issue: We were unable to submit cargo-damage reports and other reports to NSF in a timely manner because the Denver HQ staff was overwhelmed with other, emergent work.

Response: We redirected labor dollars from a vacant position to hire additional staff to support the growing demands for administrative support.

Issue: RPSC incurred additional charter vessel costs because of delays involving the *American Tern*'s documentation. An investigation found delays were a result of containers being moved to the wharf without proper documentation and placed on the vessel without a manifest.

Response: ATO reinstated container movement procedures and controls to ensure accurate and timely documentation of container loading. We added a quality check function in place to prevent a recurrence of this problem.

As part of this effort to make vessel loading more efficient, we worked with the ship's crew and presented a stow-plan for hazardous cargo as soon as the vessel arrived in McMurdo. We presented the remainder of the stow-plan shortly after the last container was loaded.

Issue: A reorganization of the Supply Department in May resulted in the dissolution of the Acquisition Specialist Group and the loss of key, experienced personnel during a time of high-volume requisitioning.

Response: The MAPCON Edit Team stepped in to help create requisitions and run reports for other divisions until we were able to fill key positions with trained personnel. This newly-organized procurement group hit the ground running and adapted procedures for the new organizational structure with minimal disruption to workflow.

Issue: South Pole Logistics experienced problems tracking and expediting cargo this season. We need a better tool to see where requested materials are in the supply chain.

Response: We coordinated with IT to distribute the Material Status Report weekly to all stations. This report provides the status of buys from initiation of a request through Procurement's award of the purchase order, through Port Hueneme's receipt of the material, to delivery at the final destination. In addition, we distributed the ARB report two to three times a week to keep the stations appraised of which items ARB had approved for commercial air movement.

Lessons Learned

Freezing temperatures damaged a number of "keep chilled" samples. This forced an investigation and a review of packaging and shipping procedures. The problem is not widespread, but we want to reduce the chance of it happening again. ATO has put together a working group to identify the root causes of the problem and offer solutions.

American Tern personnel informed us there may be some risk to vessel science samples. ATO is working to identify and mitigate those risks.

Supply needs three dedicated pickup trucks during the entire summer to avoid affecting customer service or monopolizing the shuttles.

A firm cut off-date for resupply vessel material is vital. PHTO incurred a lot of overtime, compared to previous seasons, and more mistakes caused by last-minute loading. Cargo accountability was almost impossible because of the large amount of material received in early December. The late delivery of material prevented development of an accurate load plan before operations began. We also must enforce a cut-off date so we can provide an accurate forecast to the Master of the resupply vessel.

South Pole Logistics needs to retain the two people who assisted with waste collection and removal, as we anticipate another high-volume season of construction waste related to the SPSM project.

Additional MAPCON training at Denver HQ or in McMurdo with the MAPCON Edit Team would be beneficial for South Pole Logistics

staff. The materials persons are the MAPCON experts on the station and training adds depth to their knowledge. In addition, an investment in people helps to retain them, which is extremely important to continuity and productivity.

The South Pole vessel resupply operation was particularly difficult this season. The way vendors packaged DNF pallets cost us many labor hours of re-packaging to ensure we used our limited storage space efficiently. For example, many of the pallets had only one or two pieces of DNF cargo on them, which meant we had to break the pallets apart and pull the DNF materials. We need to work with food vendors to let them know which food items are kept frozen at South Pole and which are not, so they can package skids accordingly.

In addition, the way foods are packaged for South Pole causes collapsed skids and spilled product. It would be helpful to place easily damaged goods, such as flour, rice, sugar and oats, into tri-wall boxes instead of simply shrink wrapping or banding the material to a wooden skid. We need to provide feedback to the vendors about their performance in this area.

South Pole Logistics also suggests using an additional heated Jamesway next year to better accommodate DNF materials. We reorganized the DNF areas in the new station to better accommodate materials from the vessel. For now, we are using the A4 berthing wing to house alcohol and fresh food such as potatoes and onions.

We need to change the way we issue and deliver the South Pole winter-over emergency clothing cache. Currently, this clothing is issued at the Clothing Distribution Center (CDC) in Christchurch to each winter-over. In the future, we suggest shipping this clothing to the station in tri-wall boxes rather than as accompanied baggage. This would improve inventory and ensure items are returned to the CDC. This change will also reduce on-station labor and allow the additional baggage to flow to the station at a more opportune time.

Section 3. Plans for KY07

ATO will revise sample-handling procedures to eliminate the risk of losing science samples. We will implement the Cargo Sled Project, if funded.

One goal for Supply is to centralize all inventoried empty drums and drummed material at McMurdo at one location. We will sort materials by type rather than project code or WBS. This should reduce the material footprint, minimize the potential spill area, and lead to more efficient materials management.

Supply would like to use Bldgs. 344, 345 and 347 more efficiently. We use these converted fuel tanks as warehouses for large items that require forklifts to move or access. We plan to research and identify what will be required to relocate these items to the outside storage areas and put shelving inside these buildings. The goal is to use these areas for dry, frozen storage items, freeing up valuable DNF space in other buildings.

Another Supply project involves separating FEMC-inventoried materials from non-operable and scrap materials. This project mostly involves milvans located behind Bldg. 136 and in Milvan Alley. The will lead to more efficient and accurate materials management.

Supply will also continue using 40-foot platforms as material storage “berms.” This project gets materials off the ground so they will not be iced-in during the annual melt. It will reduce material damage and repetitive motion injuries caused by chipping ice.

The Fuels Department requested that Supply re-integrate their materiel into the MAPCON Inventory Module and subject it to normal receiving, warehousing, and distribution practices. We plan to complete this project at the end of winter 2006.

PHTO is working with the IT to train our staff to use barcode trackers to manage cargo movement at Port Hueneme. Using barcode trackers

will reduce errors when building pallets and loading containers and it will provide an efficient means of tracking cargo between the Navy's Packing and Crating Operation and the RPSC receiving floor.

Peninsula Logistics looks to accomplish the following:

- Continue identifying materials at Palmer Station for retrograde.
- Complete a thorough inventory of GWR this winter.
- Complete the retrograde of materials left over from IMS.
- Coordinate with McMurdo Logistics to standardize procedures for shipping science samples.
- Provide solid logistical support for SHALDRIL and PRIMO projects. Although PRIMO was subsequently delayed until next year, the material was shipped to Punta Arenas as planned.
- Participate in the development and maintenance of the Palmer Station Master Schedule.

At the South Pole, a wall-to-wall inventory of all Heavy Shop parts is the number one priority for the winter. With the help of winter-over Heavy Shop mechanics, we will compile a list of parts needed for next summer, based on required preventive maintenance work orders. We will compare this list to the updated inventory and create a summer resupply list before the summer begins. The intent is to bring the vehicle maintenance parts inventory up to optimum levels and reduce the need to create numerous resupply requests during the season.

In keeping with our goal of centralizing stock management, inventory control will grow from 500 to 5,700 items. The stock value will grow to $1.4 million with the transfer of $900K to fund the additional items. Centralizing control will result in more timely requisitions and reduce the overall carrying cost of inventory.

PROJECT MANAGEMENT OFFICE

Section 1. Summary

In May of KY06, and with the approval of the NSF, RPSC created the Project Management Office (PMO) and hired a manager. However, supervision of the PMO is a part-time task, with the same Manager acting as the fulltime SPSM Project Manager.

The PMO manager set up a PMO Implementation Team to establish and integrate enterprise-wide project management procedures and standards through all RPSC divisions. The team is comprised of matrixed planning and control managers from each of the primary operations divisions (Science Support, IT, FEMC and Station Operations) and a fulltime Project Controls Manager who is responsible for coordinating IMS activities and estimating costs.

During KY06, the PMO established oversight procedures for 30 projects and an estimating process for all proposed future projects. We began to standardize Project Management processes and procedures (an ongoing endeavor), standardize planning and cost estimating, institute scheduled project reviews and standard reporting requirements, and train current and future project managers. Meeting procedures and formats for agendas, attendance rosters, and meeting minutes, including action assignments, are now standardized. Templates for standard project planning worksheets have also been introduced.

The PMO met or exceeded all performance measures assigned for KY06, even though this was a part time effort.

Section 2. Qualitative Performance

A. Project Management

General Management

Accomplishment: We implemented a standardized cost estimating system for projects.

Benefit: This system produces more accurate and timely cost estimates.

Accomplishment: We implemented a standardized reoccurring Project Performance review process.

Benefit: This process improves project organization and control.

Accomplishment: We developed and implemented a small projects management process for Facilities Projects.

Benefit: This process improves efficiency and ultimately results in cost savings by using a graded approach that avoids forcing small projects to adhere to the same guidelines and follow the same procedures as a major project.

Accomplishment: We developed and implemented a standardized Project Status Report (PSR).

Benefit: This reporting process improves project organization, communication and control.

Accomplishment: We developed a standardized protocol for project team meetings, including minutes, action description and tracking, and attendance rosters.

Benefit: This required protocol improves project organization, communication, and control.

Customer Satisfaction

Accomplishment: We standardized the new project proposal review process between the NSF and RPSC.

Benefit: Standardization improves project definitions and the planning and selection of new projects.

Accomplishment: We led the effort to develop and implement the Area Directorate Action Tracking system in Microsoft SharePoint.

Benefit: This system improves communication between NSF Area Directorate ABMs and RPSC, increases the effectiveness of our responses to the NSF, and improves accountability between the NSF and RPSC.

B. Program Integration

Coordination Between WBS

Accomplishment: We coordinated the development and implementation of an integrated master schedule for all Palmer Station and McMurdo Station projects.

Benefit: This integrated schedule results in better planning, forecasting, and allocation of resources.

Accomplishment: We implemented a standardized project WBS structure.

Benefit: This structure establishes a one-to-one relationship between the cost estimating tool, Timberline, and the scheduling tool, Primavera, facilitating communication between the two tools and establishing an enterprise-wide project portfolio.

Accomplishment: We developed and implemented a standard internal Client Communication Protocol.

Benefit: This protocol produces more thorough, coordinated, and timely responses to NSF requests.

Integration of Environment, Health, and Safety Objectives Across Corporate Activities

Accomplishment: We established a requirement to have EH&S represented at monthly project reviews.

Benefit: This requirement results in better planning and integration of EH&S objectives for all projects, both planned and in process.

C. Innovation/Process Improvement

Innovative, Technological Solutions

Accomplishment: We played a key role in the R6σ project that led to the development and implementation of the NSF/RPSC Action Tracking system in Microsoft SharePoint.

Benefit: This system increases the effectiveness of our responses to the NSF and improves communication and accountability between the NSF and RPSC.

Visionary Management

Accomplishment: We established an overarching concept for project management services provided by RPSC, and we started training personnel toward meeting that concept.

Benefit: Employees improve skills and marketability while RPSC improves the product delivered to the client.

Responsiveness to Challenge and Change

Accomplishment: We took initial steps toward integrating the Science Planning group into the integrated master schedule planning program, and we are developing a long term planning capability for them. Also, we developed standardized estimating formats for the Science Planning group.

Benefit: All estimates will have a standard look and feel.

Lessons Learned

Accomplishment: We developed a formal Lessons Learned program.

Benefit: This program allows interdepartmental information sharing, thereby improving communication and reducing errors.

Section 3. Plans for KY07

During KY07, we plan to continue implementing standard project management procedures throughout the enterprise. We will continue mentoring and training project managers – specifically, there is a Project Management Profes-

sional (PMP) certification workshop tentatively scheduled for the end of April 2006. We will consolidate all planning, controls, and scheduling under our purview, and we will oversee the implementation of a more rigorous quality control and quality assurance program for all projects. The cost estimating function will move from FEMC to the PMO, and we will expand it across the Program.

SCIENCE SUPPORT

Science Support supported 172 science events, eight artist and writer (W-events), and numerous technical (T-events), Raytheon (R-events), and visitor events (V-events). The three stations (McMurdo, Pole, Palmer) supported 125 station-based science events, nine T-events that required heavy science support, and the artists and writers. The Marine Science Department supported 43 vessel-based science events and four Peninsula field camps.

The Science Planning Group continued to improve its methods, work products, project management skills, and the frequency and nature of its interactions with the NSF and grantees. This closer integration and communication with stakeholders was a catalyst that drove better definitions of project scope, cost, and execution and led to more efficient allocation and utilization of resources. Meetings between the NSF and the Planning Group at NSF headquarters provided an important venue to discuss the level, cost, and quality of resource allocations and drive change in NSF and RPSC processes.

Significant weather delays severely impacted the start of McMurdo's field season. The Field Support Services team overcame this hurdle by modifying plans and executing a strong logistics push to recover the schedule. Subsequent ideal weather conditions and a strong coordinated effort by all stakeholders allowed us to complete planned tasking. This successful effort required frequent and effective communications between Field Support, grantees, NYANG, and NSF Representatives. Other key support activities included a successful VORCORE camp during WINFLY, conditional occupancy and successful launches from the new LDB facility, and a very successful camp/construction project and science support at WAIS Divide, to name a few. Field Support work centers continued to deploy alternative energy systems to the field. Field Safety trained 1,632 students in six different courses and 131 classes, a 9% increase in enrollment over the previous year.

The Crary Science and Engineering Center (CSEC) had a successful season, in part because of a well-organized summer planning process that developed season plans and laid the groundwork for their efficient execution. Interim and Acting Lab Supervisors and other CSEC staff efficiently directed and executed lab support, in spite of personnel changes and some procurement issues. Dr. Manahan's Biology class (B-301-M) was a high-impact event that received near flawless support from the CSEC staff. McMurdo Cryogenics Support deployed redesigned liquid helium transfer lines and modified its transfer method, increasing safety and efficiency.

The initial schedule for WAIS Divide was severely impacted by weather delays early in the season. This created backlogs in the cargo plan, impacted residency in McMurdo, and had other Program-wide impacts. The Field Support Manager of Field Support and the Project Manager for WAIS Divide worked with the NSF Representative, NYANG, and affected grantees to recover the schedule, culminating in the completion of all milestones and objectives without a recordable injury. Positive interactions and coordinated planning among science construction, camp support staff, FEMC, and the project construction crew were key elements of the many noteworthy successes at WAIS Divide.

Key Science Support activities at South Pole included close cooperation with FEMC and Operations within the context of the Integrated Master Schedule (IMS). As a result of this cooperation, the remaining two of three cryogenics refrigeration units (pulse tubes) were installed, the new Cryogenics Facility was partially occupied, self-sufficient generation of liquid nitrogen was demonstrated, and a number of science projects were efficiently moved from SkyLab to the new station.

After a decade of challenges in supplying and storing liquid helium (LHe) under difficult conditions, the South Pole science team worked with FEMC, grantees, and the NSF to build a new storage facility, apply new technologies, and develop creative solutions. The result of this tremendous effort is a stable and optimal supply of LHe at South Pole. Our success is widely recognized and appreciated, as captured in the following quote:

> "Congratulations on pulling off a successful winter resupply on a very tight schedule. Uninterrupted supply deliveries to QuAD and BICEP have been heroic. They are greatly appreciated by the science community. A leading physicist and competitor at a major cosmology conference remarked that the three strongest experiments we have heard about are all from the Pole.
>
> Helium = data, thanks for keeping it flowing."
>
> *John Kovak*

We supported the IceCube project, which completed, equipped, and connected eight boreholes and 24 IceTop tanks. South Pole Meteorology moved to the new station and was fully functional in two days. Throughout the move, it continued to provide critical weather data to SPAWARS. These data were instrumental in this year's record-breaking 377 LC-130 flights to South Pole. On the planning and environmental front, South Pole Science worked with the Area Directorate and the Antarctic Treaty Secretariat to designate the first Antarctic Specially Managed Areas (ASMA) at South Pole.

Palmer Station received conditional occupancy and began a successful move into its new T-5, or TerraLab, facility. In addition to supporting a normal complement of science events, Palmer Science upgraded its boating program with new 4-stroke motors, improved the safety awareness in its laboratories, developed a new chemical hygiene plan, and installed a webcam to remotely monitor local sea ice conditions.

Marine Science began KY06 with pre-season planning activities and meetings with the stakeholders of complex events. Marine worked closely with the Planning Group to integrate its planning process into the group's products, and they worked with the Project Management Office (PMO) to apply project management techniques to larger, more complex projects. Marine also worked closely with EH&S and Human Resources to develop a thorough and concise marine safety orientation for deploying employees. Marine maintained effective relationships with its subcontractors, Edison Chouest Offshore (ECO) and AGUNSA, its Chilean Port agent. Marine personnel wrote a new procedure for managing ECO, initiated a multi-year process to re-compete the contract for the *LMG*, coordinated a site visit for the challenging Autosub project, and acquired a used multi-channel streamer and other equipment via a government property exchange with the United States Geologic Survey.

Marine Science continues to provide world class research platforms and support.

> "…the atmosphere on the ship is always positive and a true sense of teamwork is omnipresent. This kind of science support at sea is found nowhere else in the world. We are confident that we have made some significant scientific findings on the cruise and look forward to our November 2006 [cruise]."
>
> *Dr. Giacomo DiTullio, Chief Scientist, NBP06-01 (CORSACS)*

Despite its challenges, KY06 was tremendously successful for Science Support, as evidenced by the overwhelmingly positive feedback we have received from supported grantees.

PLANNING GROUP

Section 1. Summary

Planning Support Managers (PSMs) served as points of contact (POCs) for approximately 125 station-based science events, out of a total of 179 events supported by the Program. We also supported eight artists and writer events, as well as nine technical events that required heavy science support. We assisted Marine Science Support in adapting their data collection and reporting to our standard formats and templates, and we provided planning support for various RPSC operational activities.

Table 17-1 and Figure 17-1 present the number and discipline of events supported for the past seven years. The number of events was relatively flat for the first four years of the contract (1999-2003). Since 2003, however, the number of events (driven mainly by Biology and Medicine) has risen by 42%. This is an average of 14% per year – well in excess of budget increases. RPSC has successfully responded to this growth by increasing the carrying capacity of our support functions and platforms.

Table 17-1 Supported Events by Discipline

Discipline	99-00	00-01	01-02	02-03	03-04	04-05	05-06
Aeronomy & Astrophysics	30	30	27	30	32	33	35
Biology & Medicine	33	33	39	41	56	60	70
Geology & Geophysics	26	26	24	23	28	19	23
Glaciology	20	20	18	16	14	10	13
Ocean & Climate Systems	17	17	17	15	17	17	18
Technical Events with Heavy Science Support	5	5	6	6	12	12	12
Artists And Writers	4	4	4	6	6	6	8
Total	135	135	135	137	165	157	179

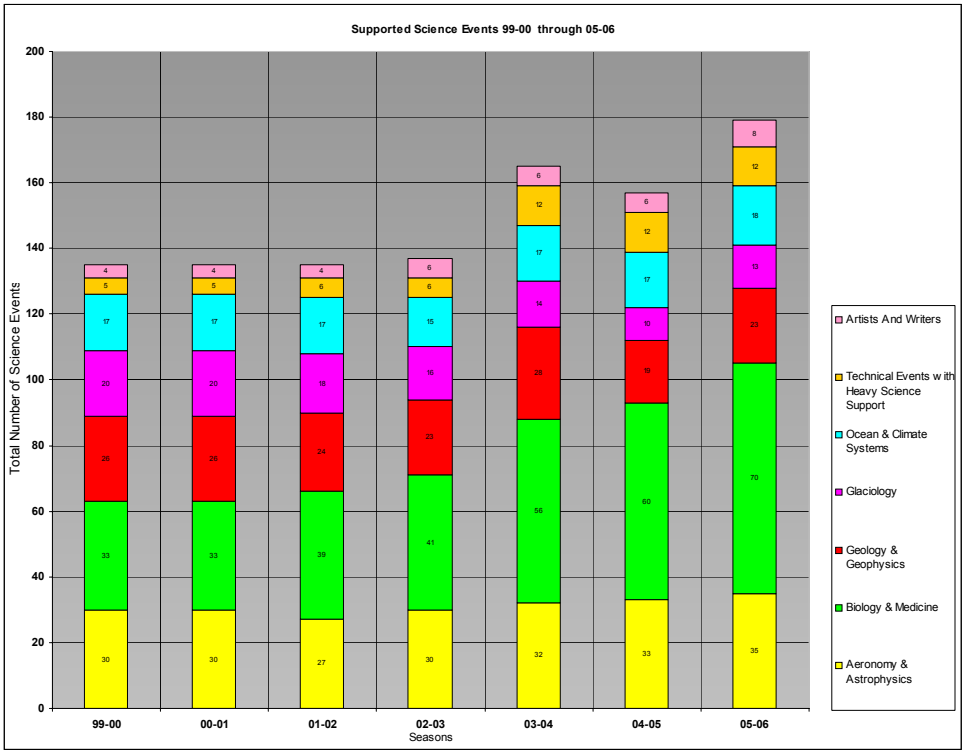


Figure 17-1 Supported Science Events 99-00 thru 05-06

During KY06, we processed SIPs, wrote and distributed Research Support Plans (RSPs), and conducted outbriefs for the 125 station-based events. We also provided Service Level Agreements to Raytheon events that required science support. For the larger and more complex projects, we held or participated in meetings with stakeholders to plan project support and gain consensus. We also participated in large-scale planning meetings, including the ANDRILL AOMG, the Ice Core Working Group, and the ITASE science meeting.

In addition, we generated and delivered to the NSF two documents that describe in detail the resources committed to funded projects: an Allocated Resource Summary for the 2006-2007 field season, and a "Resource Buckets" spreadsheet that provides high-level overviews of critical resources through FY09. Separately, we captured detailed resource allocations for all events funded through the 2010-2011 season.

One of the largest deliverables in the planning cycle is the annual proposal review. Again this year, we visited the NSF in Arlington for a very successful partnering session. Before the meeting, we completed bucket-level reviews of all highly-ranked proposals to determine the impact on key categories of support resources, or "resource buckets." The Program Managers used these buckets to eliminate projects and bring projected allocations to within resource limits. In mid-January, we provided a detailed review of the remaining proposals to the NSF. Through constant refinement, this process becomes easier every year and allows us to deliver a higher-quality product.

We worked on several other projects during KY06. We organized and facilitated user committee meetings for each of the stations – the MAUC, PAUC, and SPUC. We produced a more compact print version of the Science Planning Summary and redesigned the web version. Finally, we supported (and continue to support) other Science Support work centers by providing resources for special projects.

In the broader planning process, we continue to work with the POLAR ICE team to develop a planning database that consolidates many disparate databases and spreadsheets. We are focusing on applying project management techniques to our portfolio of science events. We have already incorporated larger events (ANDRILL and PRIMO, for example) into the new Project Management Office (PMO) framework.

Section 2. Qualitative Performance

A. Project Management

General Management

Accomplishment: During the KY06 proposal review, we developed and implemented a process for estimating the costs required to support each proposed science event.

Benefit: The NSF and funded grantees had a clear understanding of the support that would be provided to each event as the PIs prepared to fill out their 2006 SIPs.

Accomplishment: We folded the separate station user committee charters into a single charter that clearly defines all stakeholders' roles and responsibilities. The new charter also describes how to make and respond to recommendations.

Benefit: We have needed a new user committee charter for several years. One of the PSMs undertook the reorganization as a Raytheon Six Sigma (R6σ) project, gaining acceptance from RPSC, the NSF, and the grantee community. The result is a single charter that governs the entire user committee process.

Accomplishment: In 2005, we coordinated ICDS support for each event by asking the PIs to include all ICDS deployments, cargo, and other requirements in their SIPs.

Benefit: Including ICDS information in the SIP establishes an early communication channel between the PIs and ICDS and reduced confusion about deployments and cargo, allowing RPSC to develop solid field plans.

Customer Satisfaction

Accomplishment: We organized the station user committees and the all-PI meeting for the South Pole. We published meeting minutes and recommendations within one month of each meeting.

Benefit: The user committees continue to be important tools for RPSC to gather feedback from grantees. By providing the NSF with committee actions promptly, we have created a more consistent product, one which allows the NSF to respond to the committee's recommendations and direct Raytheon to act in a timely manner. The South Pole all-PI meeting was an effective way to distribute information about the "new" South Pole Station and the overall plan for KY06. All attending PIs were appreciative.

Accomplishment: We provided the NSF with a schedule of ICDS driller deployments and the events they would support.

Benefit: The schedule gave the NSF an early look at ICDS tasking, which helped them identify capacity within the schedule and make the most efficient use of drillers' time. The NSF informed us that this is exactly the type of leading information they need.

Accomplishment: We guided project support for ANDRILL, gradually incorporating management methods used in the PMO.

Benefit: Formal project management helped to ensure that all divisions within RPSC knew their responsibilities for project support. The NSF sent feedback indicating that the Project Manager was doing a great job.

Cost Savings

Accomplishment: Working closely with the ANDRILL Science Management Office, we came up with facilities for splitting and scanning rock core that did not require major construction.

Benefit: The estimated cost of purchasing two lab vans and constructing a semi-permanent foundation was approximately $115K. Instead, we borrowed one van from Florida State University and arranged to purchase a RacTent, saving the Program $65K.

Accomplishment: We reduced the number of pages in the *Science Planning Summary* and sent copies only to the PIs who requested one.

Benefit: The estimated cost savings is $8500.

B. Program Integration

Coordination Between WBS

Accomplishment: At the South Pole, we helped plan and implement the transition of science events to the new facility and the retrograde of several experiments (including AST/RO, which was itself a very complex undertaking).

Benefit: Our participation helped ensure that important deadlines were met. As resources and population at South Pole continue to be pushed to or beyond their limits, the timely completion of projects becomes increasingly important within the context of the South Pole IMS.

Accomplishment: We continue to make progress integrating South Pole schedules and operational information with our projections.

Benefit: Schedule integration provides a single source of resource information, ensuring that the NSF and RPSC have access to the same data.

Accomplishment: We worked with Marine Science Support to plan the *NBP*'s January port calls to McMurdo.

Benefit: Advanced planning set expectations for both vessel and McMurdo personnel. Even with delays caused by weather and ice conditions, the port calls still went smoothly, and the *NBP* left McMurdo on schedule.

Accomplishment: We collaborated with the PMO to incorporate their procedures into Planning and Science Support.

Benefit: Having a set of consistent PMO practices ensures that the larger science events get appropriate support from all divisions and from

upper management. This framework minimizes surprises in the planning process.

Accomplishment: We have continued to work closely with the POLAR ICE team to streamline the planning process with technical solutions. In the past year, we have incorporated the grantee outbrief and SIP review databases into POLAR ICE and added new functionality to track other action items, including recommendations from user committees and actions from planning meetings. Other enhancements include a capacity for database entry and the ability for users to view resource buckets.

Benefit: Tracking all the planning data in a single tool eliminates redundant data entry, reduces the time spent formatting final products and deliverables, and makes it easier for us to follow through on action items. Our close working relationship with the POLAR ICE team has helped them understand the planning process and has led to the development of these improved planning tools.

Accomplishment: We assisted IT in analyzing program-wide Iridium usage and its corresponding costs.

Benefit: This analysis yielded multiple, immediate cost saving opportunities and provided a framework for a more effective management of Iridium allocation.

Integration of Environmental, Health, and Safety Objectives Across Corporate Activities

Accomplishment: During the proposal review, we collaborated closely with EH&S personnel to identify science events that would require more detailed environmental assessments.

Benefit: By identifying these events earlier in the planning process, RPSC had more time to address complex issues and develop assessments before the events deployed.

C. Innovation/Process Improvement

Innovative/Technological Solutions

Accomplishment: We integrated the grantee outbrief database into POLAR ICE.

Benefit: We can now access the outbrief database from anywhere in the world, eliminating the need to integrate different versions at the end of each season. POLAR ICE automatically generates PDF reports, which reduces the number of steps, amount of labor, and software required to create a report for publication.

Accomplishment: We expanded the Planning Tools application in POLAR ICE to include interactive charts for resource buckets and other resource data.

Benefit: The new format pulls data directly from the primary planning database, eliminating multiple data repositories. The on-screen graphical display reduces reliance on Excel as a presentation tool.

Accomplishment: Enhancements to POLAR ICE allow us to track action items from all planning sources (including outbriefs, SIP reviews, user committees, and planning meetings), highlight issues that affect multiple groups or stations, and flag certain outbrief issues for discussion with the station user committees.

Benefit: These new tools help us track actions more consistently from one planning stage to the next and more effectively highlight larger scale issues, as well as those that need input from the grantee community.

Responsiveness to Challenge and Change

Accomplishment: We worked with the NSF to change how science events are reviewed and funded. We now interact much more closely with the NSF during the review process, and we talk with PIs in order to tighten resource allocations before the NSF writes operations review memos.

Benefit: This interactive approach to proposal reviews results in more accurate and detailed

operational assessments that better guide the scope of each event throughout its funding. The NSF continues to gain confidence and trust in our support recommendations.

Accomplishment: RPSC and the NSF created a Project Management Office to oversee planning for all large science events. Over the past year, we have worked with the PMO to bring the largest science events into this framework.

Benefit: Using this more formal approach to project management has been a challenge. However, working within the PMO framework ensures that all divisions providing direct or indirect support to science events are aware of support requirements. This structured and inclusive approach results in fewer surprises because it allows all stakeholders to assess the resources required to support the event.

Accomplishment: When Brian Stone took on the role of Acting Deputy Director of the Polar Research Support Section, we sent a team member to NSF headquarters to help organize and document all proposals submitted to Antarctic Sciences for the KY06 review.

Benefit: We are flexible enough to assist the NSF with last-minute tasks and provide strong support for core functions, such as the proposal review.

Accomplishment: Because an icebreaker was not available, the NSF directed RPSC to arrange with [redacted] a private tour operator, to retrieve fuel drums and scientific instruments from Franklin Island. The items had been left by a science group that was in the last year of its funding. We worked closely with [redacted] to make the necessary arrangements; RPSC Finance and Procurement completed the fiscal details of the agreement. As a result, two grantees were able to sail aboard the vessel [redacted]

Benefit: Although weather and sea ice conditions prevented completion of the mission, the arrangement demonstrated our ability to implement creative, cost-effective alternatives in remote areas not easily supported by USAP resources. Depending on the direction of scientific research, our ability to procure such third-party support could become increasingly important.

Identified Issues

Issue: During the KY06 SIP review, grantee support costs exceeded the budget by approximately $750K.

Response: After much discussion with the NSF, we implemented a cost estimating process that includes discussing project support with PIs. We tested this process during the 2005 proposal review. Generating a cost estimate at the proposal stage, and giving the PIs clear guidelines to follow while completing the SIP, provides the NSF with a predictable and achievable target for grantee support costs.

Issue: The procurement report attached to the RSPs is MAPCON data that can be cryptic and difficult for grantees to decipher.

Response: Working with Supply personnel, we developed a way to present more complete descriptions in the RSP procurement report, making it possible for grantees to match the purchased items to SIP requests.

Lessons Learned

During KY06, we discovered a B-212 helicopter can only carry seven ice core boxes, which fill the aircraft long before it reaches maximum cargo load. Henceforth, when we support drilling groups in the Dry Valleys, we will account for volume as well as weight in the initial helicopter hour estimates.

The Biology class (B-301-M) ordered an E. coli cloning kit for use in McMurdo. Although the group had not applied for an ACA permit, RPSC purchased the kit and shipped it to Antarctica. A detailed review of the process by a PSM highlighted the steps involved in the procurement and shipment of the kit, allowing us to pinpoint ways in which RPSC can implement administrative controls to prevent the importa-

tion of foreign organisms to the continent without a permit.

Some seal researchers use veterinary drugs as part of their work. These substances do not fall under the usual permitting guidelines for hand-carrying controlled items into New Zealand. We worked with Christchurch Operations to find the appropriate New Zealand permits for these substances.

Section 3. Plans for KY07

In KY07, we will work with the NSF to shift the science proposal review process forward in the schedule so that we can provide better turnaround to potential grantees.

After carefully analyzing the effort and cost associated with producing a paper version of the *Science Planning Summary*, compared with the value of having a book, we may eliminate the paper version of the publication.

We will continue to integrate PMO tools into the science planning process.

We will continue to work with EH&S on an R6σ project, the purpose of which is to 1) recommend a fuel containment policy for science field parties, and 2) define the roles and responsibilities associated with identifying grantee requirements, procuring and shipping materials, and managing materials on station.

Now that all planning databases are incorporated into POLAR ICE, we will use it to track all outbrief, SIP review, and planning meeting action items, as well as user committee recommendations. We will take ownership of POLAR ICE in KY07, refining the SIP as necessary, based on discussions with the NSF about overall science planning strategy.

LABORATORY OPERATIONS – MCMURDO STATION

Section 1. Summary

Crary Science and Engineering Center (CSEC)

Pre-season planning dominated the first half of KY06. Using the Support Information Packages (SIP) in POLAR ICE, we developed detailed allocation plans for laboratory space, equipment, and instruments. The plans, as spreadsheets, accurately scheduled these limited resources, allowing us to fully utilize the laboratory for most of the austral summer.

To avoid sample loss, such as occurred in a previous season, CSEC and Science Cargo personnel worked together to establish a new check-in procedure for samples being shipped off-continent. Grantees can now give their samples a TCN when they hand in the paperwork for shipping, which will allow better tracking.

During the field season, the CSEC supported 93 Science and artist and writer events from a wide range of disciplines. We also provided support to transiting South Pole and *NBP* scientists. Notably, the Biology class (B-301-M), with approximately 40 participants, drew heavily upon lab equipment, staff, and space to complete their mission. Overall, the season was successful, with many events exceeding their research expectations.

In November 2005, the interim Lab Supervisor conducted safety audits of the Dry Valley Camps, accompanied by an LTER grantee and one of the Assistant Camp Managers. They worked on ways to improve safety in the field labs, including the addition of cabinets for safely storing flammable chemicals.

The CSEC hosted an exceptional number of high-profile DVs this season, including the National Science Board, the Congressional Delegation, staff from the U.S. Embassy in Wellington, and military leadership personnel. We gave each event a custom tour, with personalized talks from scientists and the Research Associate.

Analytical Services

Analytical Services (AS) had a difficult season, primarily because there was no clear understanding between CSEC, Montana State University (MSU), and non-LTER grantees regarding who was responsible for providing services and maintaining analytical equipment. This misunderstanding is the result of transferring analytical operations and analysis to MSU staff while the instruments themselves remain in CSEC inventory. Many grantees complained that they could not have their samples analyzed as they had in the past, and they expressed concern that their expectations and priorities have not been met. In addition, there was no clear definition as to who was responsible for calibrating, maintaining, and operating some of the analytical equipment. The definition and assignments of roles and responsibilities between MSU, CSEC, and non-LTER science events needs to be reviewed and clarified during the summer planning cycle so these problems do not recur in KY07.

Research Associate

Early in the season, the Research Associate worked closely with CSEC, EH&S, and FEMC personnel to integrate new safety protocols. She identified issues and helped define the policy variances necessary to allow continued data collection while permanent solutions were developed. She has also been coordinating with Antarctica New Zealand on the construction of a new Kiwi research station at Arrival Heights. She serves as the liaison between the Kiwi construction crews and the American and Kiwi grantees affected by the construction.

Section 2. Qualitative Performance

A. Project Management

General Management

Accomplishment: In the absence of a permanent Lab Supervisor, two succeeding interim Supervisors guided the CSEC staff and managed Lab

Science Support through the season. The transition between interim Supervisors was largely transparent.

Benefit: Grantees continued to receive the high level of support they've come to expect from CSEC management and staff. There was no negative impact on research.

Customer Satisfaction

Accomplishment: We improved our support for the Biology class (B-301-M). The course consists of almost 40 students, teachers, and teaching assistants who require large amounts of space. We configured a study space in the upstairs telesciences alcove and allocated the library lecture area for their use.

Benefit: The study space provided a quiet area, separate from the labs, for students to do work. The lecture space was an improvement from past years when lectures were held in the Phase II open work area. The PI commented that the upstairs lecture space was better suited for keeping students focused.

Human Resources

Accomplishment: When the Laboratory Supervisor moved to the Planning Group, we were able to call upon lab expertise, both past and present, to shepherd the CSEC through what might have been a difficult season. We selected the first interim Supervisor based on his extensive knowledge of science support at McMurdo and his previous contributions to the USAP in lab supervision and dive program management. He deployed from mid-October to mid-November 2005 and brought the CSEC staff together as a professional team committed to safety and customer service.

For the rest of the season, we elevated the Senior Assistant Supervisor to the interim Supervisor position. She brought with her a high level of familiarity with lab staff and grantee requirements. She proved to be an effective leader, maintaining the CSEC team through the end of the season.

To complete the change, we hired a Marine Science Technician as an Assistant Lab Supervisor. He was able to deploy at short notice and brought to the position a wealth of USAP knowledge and expertise.

Benefit: The interim Supervisors and additional Assistant Supervisor guided the laboratory through a difficult transition and provided high-quality support to grantees. Science events completed their research goals for the season.

Accomplishment: The CSEC continues to enjoy a high retention rate, and it continues to attract high-quality personnel to staff vacant positions.

Benefit: Returning personnel bring with them a wealth of experience and knowledge, and they provide a continuity of support to grantees, some of whom themselves return season after season. Quality, new personnel bring fresh skills and insights and an eagerness to join the cohesive and committed CSEC team. The new Electronics Technician, for example, brought enthusiasm and skill to the position and proved to be tremendously helpful in solving instrument problems for several science events.

B. Program Integration

Coordination Between WBS

Accomplishment: We collaborated with the *NBP* Marine Science Technicians to transfer sea ice channel GPS data to grantees (B-289-M) and CSEC staff.

Benefit: This data allowed the science event to better track the movement of the killer whales they were studying. The GIS Specialist incorporated the GPS data into maps of ship movements in the channel.

Integration of Environment, Health, and Safety Objectives Across Corporate Activities

Accomplishment: The CSEC Supervisors wrote ruling requests and obtained temporary waivers to the new safety policies to allow certain critical tasks to continue while permanent solutions were developed.

Benefit: We were able to continue science support activities without compromising safety and without impact to science. Tasks included transporting ice cores from the Helo Pad to the ice core storage facility and cleaning and calibrating instruments on the Arrival Heights Lab roof.

Accomplishment: Several members of the CSEC staff attended pre-season laboratory safety and radiation safety courses at Denver HQ. In the CSEC, we emphasized safety, administered the Chemical Hygiene Plan, and maintained a safe workplace.

Benefit: Continued safety training increases the skill level and safety awareness of CSEC staff members, which contributes to increased safety in the lab. The CSEC had a zero TRIR this season.

C. Innovation/Process Improvement

Innovative, Technological Solutions

Accomplishment: CSEC and Science Cargo personnel worked to establish a new check-in procedure for samples scheduled for off-continent shipment. Grantees can now give their samples a TCN in the lab when they submit their paperwork.

Benefit: A point-of-origin TCN allows instant sample tracking by grantees, significantly reducing the risk of sample loss in shipment.

Accomplishment: CSEC staff developed an integrated resource allocation spreadsheet.

Benefit: The spreadsheet tracks resource allocations and provides dynamic links to outbriefs, science event summaries, and event websites. In addition, the spreadsheet is linked to active documents used to record support issues throughout the planning and field seasons. CSEC staff can access a wide range of current and historical information for each event to help them understand and address on-Ice allocation requests. The spreadsheet also provides continuity in lab support by archiving information and minimizing the knowledge loss that occurs with staff turnover.

Accomplishment: CSEC staff completed the first phase of a project to integrate visual images of all stockroom equipment into POLAR ICE. The staff photographed over 3,000 equipment items and manually indexed them to MAPCON and NSF equipment ID numbers.

Benefit: Grantees and RPSC employees can now click on a link next to a piece of lab equipment and view an image. This will facilitate SIP preparation for grantees and improve stockroom efficiency. The system is configured for continuous update by CSEC staff without programmer assistance. During phase II of this project, we will expand the links to include all installed equipment, and we will incorporate data sheets for heavily-requested items.

Responsiveness to Challenge and Change

Accomplishment: Facing the loss of the Lab Supervisor just before the field season, and without any viable candidates for a permanent replacement, we notified the NSF of our intention to staff the position with interim personnel. We quickly hired a highly qualified interim Supervisor and deployed him in mid-October 2005.

Benefit: Our rapid response and solution to the problem made for a smooth transition with no lapse in quality science support.

Identified Issues

Issue: Confusion over the allocation of responsibilities between CSEC staff and the AS technician strained relations between the two groups and adversely affected grantee support.

Response: We have begun a dialogue with the NSF about this problem and expect to come to a resolution with all stakeholders before the KY07 field season.

Lessons Learned

We found that proven, experienced employees or former employees can serve well as interim Supervisors for one to several months. The integrated resource allocation spreadsheet was instrumental in this success, as was the

existence of an experienced, high-quality staff on-station. While not desirable in the long-term, this short-term approach provides tremendous flexibility for leadership and staff coverage with no noticeable loss in the quality of laboratory support.

We realized that it is important to maintain open lines of communication with EH&S and with first responders, both of whom are stakeholders in lab safety. We found that personnel in these departments were not aware of the CSEC's safety features, nor were they aware of the CSEC staff's high qualifications. For instance, neither EH&S staff nor Fire Department personnel were aware that each separate lab in the CSEC is isolated by the air handling system, such that a spill in one lab does not immediately endanger the entire building. Personnel in these departments were also unaware of the CSEC staff's extensive training and high level of safety and spill-response expertise. Had this knowledge been in place, we might have avoided unnecessary call-outs, with their attendant inconvenience and loss of productivity, especially for grantees. We also might have avoided interdepartmental disagreements. It will be important to reacquaint returning EH&S and Fire Department personnel with this information at the beginning of each season, and especially important to inform new personnel.

Section 3. Plans for KY07

- We will improve upon usable space in the equipment stockroom, and we will research safer and more efficient storage options.
- We plan to make the lab section's equipment list in POLAR ICE more comprehensive and easier to use for grantees.
- We will improve storage security for grantee samples that have been handed over to Science Cargo. We will allocate locked storage areas in the CSEC for temperature-sensitive samples.
- We will resolve the Analytical Services problem with Montana State University and the NSF.

DIVE SERVICES

Section 1. Summary

During KY06, Dive Services supported 17 divers at McMurdo Station (Figure 17-3), three divers at Palmer Station (Figure 17-4), and eight divers aboard the *LMG* (Figure 17-5). In all, we supported 216 grantee dives at McMurdo and 15 dives by the USAP Scientific Diving Control Board (SDCB). RPSC divers made a total of 108 dives. As of this printing, dive totals at Palmer (B-028-P) and aboard the *LMG* (B-307-L) have not been reported.

Our dive support tasks this season were many and varied. We sampled the contaminated water zone and conducted other dives for B-518-M (Figure 17-2), collected fish for B-012-M, installed a current meter at Cape Royds for B-031-M, and recovered a current meter and temperature recorder in deep water near the McMurdo Station intake jetty for B-005-M. We were unable to recover current meters at Cape Armitage (because of heavy brash and anchor ice) or at Cape Bird (because of heavy sea ice conditions). Helicopter support and a hole melter will be required to recover the Cape Bird meter early next season.

Figure 17-2 RPSC Diver Collecting Sediment Core for B-518-M at Cape Armitage

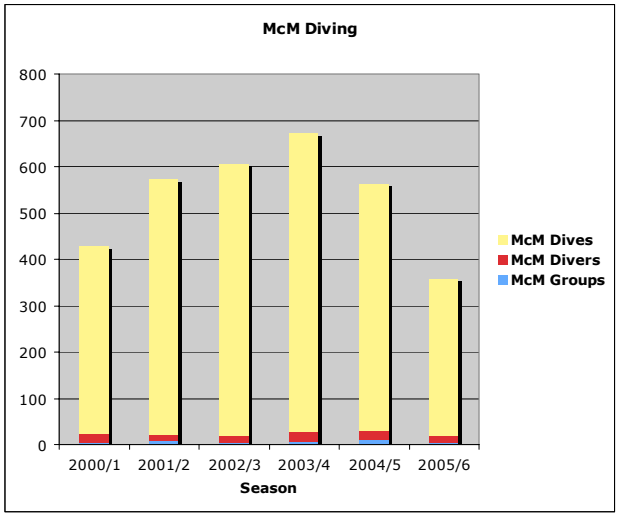


Figure 17-3 Research Diving Supported at McMurdo

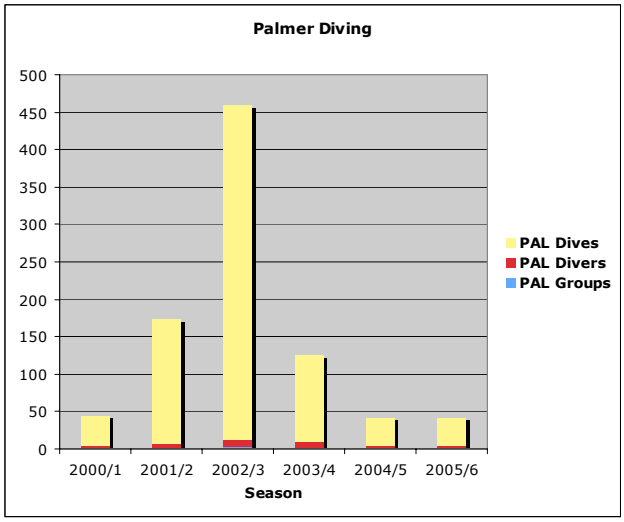


Figure 17-4 Research Diving Supported at Palmer

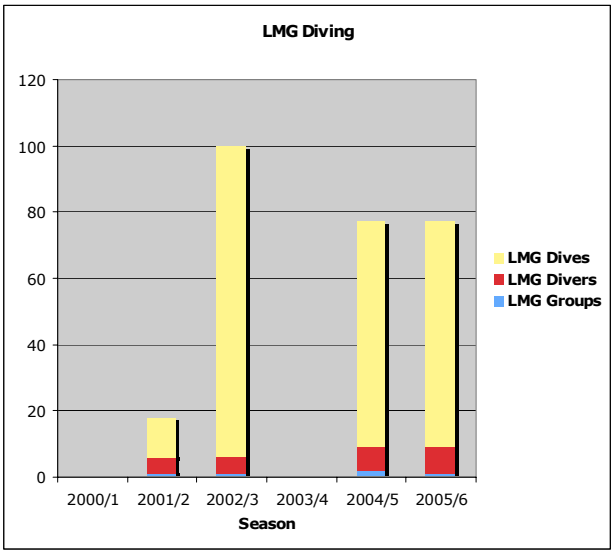


Figure 17-5 Research Diving Supported on the LMG

We inspected the underside of the McMurdo Ice Wharf for RPSC Operations, the seawater intake for RPSC FEMC, and the emergency aquarium pump for Lab Operations, and we assisted in calibrating the Scott Base tide gauge for Antarctica New Zealand (ANZ) and the RPSC surveyors.

We made an emergency underwater inspection of the icebreaker *Krasin* to find that a blade had been lost from the starboard screw (Figure 17-6). We provided logistical and underwater video support to Phoenix Divers when they deployed to repair the vessel. Though RPSC divers have the skill to make repairs of this magnitude, we lack the necessary equipment, such as a hot water system and hydraulic tools. The cost of this equipment is minimal when compared to the cost of deploying Phoenix Divers and the significant cost of delays in icebreaker operations. In addition, a hot water system would be valuable for most RPSC operational diving and some science diving.

We hosted two members of the USAP Scientific Diving Control Board (SDCB), who visited McMurdo Station for ten days each in November/December 2005. The SDCB members, along with the Dive Supervisor, held an informal meeting with all divers on station to discuss diving issues.

The Dive Supervisor attended the LMG06-02 port call in preparation for B-307-L (Madin) dive operations. In addition to providing general dive support, he serviced the scuba air compressor, performed air quality tests, and corrected grantee supplied scuba regulators to make them compatible with USAP scuba tanks.

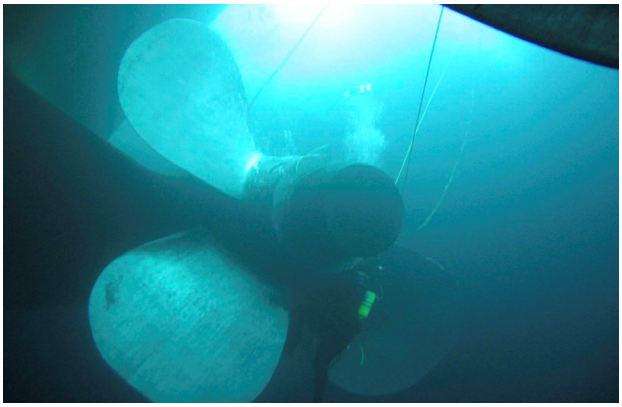


Figure 17-6 RPSC Diver Inspecting Krasin Propeller

We streamlined the air supply plumbing of the McMurdo Recompression Chamber by removing redundant non-return valves, which improved compression times and reduced noise levels. We also conducted weekly training drills for the Chamber Operations crew and McMurdo Medical staff.

Section 2. Qualitative Performance

A. Project Management

General Management

Accomplishment: The Dive Supervisor acted as the RPSC Science Support Lead during WINFLY, when the science population level was exceptionally high. He maintained excellent relationships with the science community, the NSF, and the other RPSC work center supervisors, who appreciated his management style. Challenges, such as storm damage to the VORCORE camp, were handled with minimal disruption to science.

Benefit: WINFLY science was successful. Grantees uniformly praised Science Support's contributions.

Accomplishment: The Dive Supervisor attended, as an invited participant, the Advanced Scientific Diving Workshop at the Smithsonian Institution, where he presented a paper on USAP surface-supplied scientific diving (Figure 17-7).

Benefit: The Dive Supervisor's participation brought international recognition to the USAP dive program and our pioneering efforts in advanced diving techniques.

Accomplishment: The Dive Supervisor continued to work with the head librarian at Scripps Institution of Oceanography to update the *Underwater Field Guide to Ross Island*.

Benefit: Keeping the guide updated enhances its value as a resource to researchers, particularly those working in McMurdo Sound.

Customer Satisfaction

Accomplishment: During outbriefs, McMurdo science events with divers singled out Dive Services for recognition.

Benefit: Positive recognition by science groups during outbriefs represents excellent customer satisfaction.

Accomplishment: In their after-action reports, members of the SDCB praised our operation of the USAP Dive Program:

> "The dive locker is well maintained, and diving activities are safe. [Dive Services is] incredibly qualified to support these activities and both are complete professionals. Raytheon should be congratulated for providing overlap between [divers] so that the replacement can be trained by his predecessor. The diving scientists interviewed were all in agreement that the personnel are top-notch."
>
> *SDCB*

Figure 17-7 Preparing RPSC Diver with Surface-Supplied Air

Benefit: Recognition by the Board represents high-level customer satisfaction with RPSC diving support.

B. Program Integration

Coordination Between WBS

Accomplishment: We inspected the underside of the McMurdo Ice Wharf and the wharf/shore interface before ship operations.

Benefit: Pre-operational inspection ensures wharf integrity so ship off-load can commence safely.

Accomplishment: We performed a calibration survey for the ANZ tide gauge at Scott Base.

Benefit: Annual calibration ensures accurate tide gauge data are available to both ANZ and USAP researchers. Cooperation with ANZ fosters good will between the USAP and ANZ dive programs.

Accomplishment: We continued to improve the POLAR ICE dive authorization section.

Benefit: The enhancements streamline coordination between the USAP diver, the home institution dive safety officer, the RPSC Dive Supervisor, and the USAP Diving Safety Officer (DSO).The DSO requested, and POLAR ICE developers provided, computer source code for implementing a similar system at the Smithsonian Institution.

Integration of Environmental, Health, and Safety Objectives Across Corporate Activities

Accomplishment: We completed all required EH&S training. We submitted a SHIELD report for a small hydraulic leak on the sea ice from the dive locker tracked vehicle. We maintained a zero TRIR in KY06.

Benefit: Maintaining a current training status and reporting all environmental events supports the USAP's environmental goals and treaty obligations. A zero injury rate improves productivity and morale.

C. Innovation/Process Improvement

Innovative/Technological Solutions

Accomplishment: We removed redundant non-return valves in the air supply line of the McMurdo Recompression Chamber.

Benefit: Dangerously high noise levels have been reduced and the rate of compression increased. Both improvements increase the safety and utility of the chamber.

Responsiveness to Challenge and Change

Accomplishment: We worked with ANDRILL personnel to design and plumb a high pressure (HP) air system for their seismic gun.

Benefit: The HP system worked extremely well and contributed to the success of ANDRILL seismic survey operations.

Accomplishment: New health and safety directives placed impossible limitations on diving operations. Diving equipment is heavy by nature. Weight is required to offset buoyancy inherent in dry suit diving. Unable to comply with the new 40 pound weight restrictions, the Dive Supervisor wrote letters of variance to gain exemptions for RPSC divers and tenders.

Benefit: Diving operations proceeded with minimal disruption.

Accomplishment: We conducted emergency inspection dives on the icebreaker *Krasin* and determined that one of the four blades on the starboard screw had broken off.

Benefit: Data from the inspection allowed the NSF and the *Krasin* crew to make informed decisions on how or whether to proceed with repairs, and what contingency plans were required for continued icebreaking and ship escort duties.

Accomplishment: When two science divers arrived on the *LMG* with non-standard dive regulators, the Dive Supervisor scavenged parts from the AGUNSA warehouse to mate the regulators to USAP-provided cylinders.

Benefit: The divers were able to participate in science diving activities and contribute to a successful cruise.

Identified Issues

Issue: Grantees sometimes arrive in Antarctica with inappropriate or non-standard dive equipment.

Response: We coordinated with the POLAR ICE development team to incorporate additional descriptive information about USAP-supplied equipment.

Lessons Learned

To make a dive hole at locations inaccessible to the Reed Drill, we must use a melter (Figure 17-8). However, we found it takes 24 to 48 hours and significant labor to create a hole with this method. In addition, melting a hole raises environmental concerns because it requires a large amount of fuel and entails the constant risk of fuel and glycol spills in the field.

To address these issues, we have begun investigating alternatives to the current method of melting dive holes.

Section 3. Plans for KY07

We plan to develop a redesign of the McMurdo Station Dive Locker that will improve efficiency, functionality, and ultimately, safety.

Figure 17-8 Dive Hole Melting at a Remote Site on McMurdo Sound

CRYOGENICS

Section 1. Summary

The Cryogenics staff at McMurdo Station supported a wide variety of science events and programs in KY06, including A-360-M (VORCORE), NSF-funded researchers in the Crary Lab, Antarctica New Zealand (ANZ) researchers at Scott Base, Italian Antarctic Program (PNRA) researchers at Terra Nova Bay, and RPSC Medical. Long Duration Balloon (LDB) projects did not require cryogenic support. In all, we supplied a total of 4200 liters of liquid nitrogen (LN2), the smallest demand in five years. For the first time, South Pole was self-sufficient in LN2.

We performed periodic maintenance on McMurdo's LN2 plant throughout the austral summer to keep it running smoothly. We inspected all LN2 dewars for integrity and certified them fit for use. To reduce the need for helicopter resupply, we procured two new LN2 refrigerators to support researchers who require small volumes but long storage times in the field. Though ANZ researchers at Scott Base required more LN2 than anticipated (a total of 1,000 liters), the increase was well within our current production capacity.

We filled PNRA dewars with 200 liters of LN2 for researchers at Mario Zucchelli Station. They arranged their own dewar transport to and from McMurdo via PNRA Twin Otter aircraft.

The winter supply of liquid helium (LHe) arrived in McMurdo aboard the *American Tern* in two 11,000 gallon transports. We transferred LHe to three smaller transports and flew them to South Pole. (We considered using the USAP-owned 4,300 gallon transport as a fourth container, but after inspecting it we deemed it unreliable and returned it to CONUS for evaluation.) We used four new specialized LHe transfer lines and found them to be very effective at reducing vaporization and LHe loss. The lines also gave us the flexibility to appropriately place the transports for safe and effective transfers.

We continue to improve the performance and technical capability of Cryogenic Services.

Section 2. Qualitative Performance

A. Project Management

General Management

Accomplishment: We developed a detailed LHe plan during the SIP review that quantified LHe demand for the summer and winter. We provided a copy of the plan to the NSF and all LHe users.

Benefit: The plan allowed us to procure sufficient LHe to meet the needs of all users, even with the unexpected delay of the *Tern*. The plan also met a key documentation requirement of the grantees and the NSF.

Accomplishment: After a researcher at South Pole inadvertently mixed chemicals and created a hazardous compound, the Cryogenic Technician quickly coordinated with the South Pole Waste Operations Manager to identify the proper course of action.

Benefit: We defused a hazardous situation and avoided a costly disposal.

Customer Satisfaction

Accomplishment: We provided timely support to the VORCORE balloon project during WINFLY.

Benefit: The PI informed Science Support that VORCORE was a "HUGE" success, and they were very appreciative of the excellent support (including Cryogenics support) they received.

Accomplishment: The Cryogenics Technician and Crary Lab staff dealt with an event's (G-081-M) unanticipated loss of critical LN2 in the field by replacing it quickly and efficiently.

Benefit: A timely and effective response ensured that research could continue uninterrupted. The PI expressed "many, many thanks indeed to all who helped get this [replacement LN2] here so fast!" He also noted that the entire Crary staff was extremely helpful, and that the Cryogenics Technician jumped at every chance to help out

with issues involving chemicals, LN2, and lab waste.

Cost Savings

Accomplishment: We contributed technical knowledge and assisted with the procurement and installation of two additional cryogenic pulse tubes refrigerators at South Pole.

Benefit: By reducing the LHe loss rate and increasing the supply, we increased our operating flexibility and saved the Program money.

B. Program Integration

Integration of Environment, Health, and Safety Objectives Across Corporate Activities

Accomplishment: We trained Crary Lab staff and other station personnel in cryogenic and compressed gas safety.

Benefit: The training ensured the continued safe handling of cryogenics and compressed gases.

C. Innovation/Process Improvement

Innovative, Technological Solutions

Accomplishment: We researched, procured and deployed new liquid helium transfer lines.

Benefit: The new, longer lines allow us to space LHe transports further apart when we are transferring helium. This reduces heat leak and makes transfers safer, easier, and more efficient.

Accomplishment: We procured two new LN2 refrigerators for field use.

Benefit: The refrigerators reduce the need for helicopter LN2 resupply flights and give researchers greater flexibility.

Accomplishment: We procured new transfer lances for the Cryogenics facility at South Pole.

Benefit: The new lances provide a better interface between bulk storage transports and the Wessington dewars, and they have filling ports for smaller dewars.

Accomplishment: The Cryogenics Technician created and executed a plan for cooling and filling three LHe transports for South Pole.

Benefit: The plan used the cooling power of vapor in the largest container to lower the temperature of the empty containers and save an estimated 4500 liters of LHe.

Visionary Management

Accomplishment: We deployed two more pulse tube refrigerators at South Pole as part of an effort to increase LHe capacity and reduce losses. This was a collaborative effort between McMurdo and South Pole cryogenics staff and grantees.

Benefit: We have a more reliable and cost-effective supply of LHe at South Pole.

Lessons Learned

We learned that the new transfer lines worked better than expected and allowed for more rapid transfers. We also learned how to efficiently cool and fill transports of various sizes and temperatures. Applying these lessons will increase the efficiency and flexibility of the cryogenics operation and reduce Program costs.

Section 3. Plans for KY07

We do not anticipate any significant changes in Cryogenics Services in KY07.

FIELD SCIENCE

Section 1. Summary

During the KY06 austral summer, Field Science Support provided on-Ice services to most of the 179 events supported by the Program and essential primary support to125 station-based science events (see Table 17-1 and Figure 17-1, page 17-3). We staffed deep-field camps at WAIS Divide and Siple Dome, multiple local field camps in the McMurdo Dry Valleys and at Odell Glacier, and the Long Duration Balloon (LDB) operation.

Berg Field Center

The Berg Field Center (BFC) supported 118 groups (68 science events, six T- and R-events, seven field camps, and 37 departments at McMurdo). This is an increase of eight science events and six groups over KY05, but recent equipment inventory upgrades and a staff increase give us the capacity to support more groups. We issued 114,543 items from our inventory, and we continued to provide assistance in the field to science events and field camps, as authorized by the Field Support Manager (FSM). Sending BFC staff into the field serves a dual purpose: it builds BFC staff's practical knowledge concerning how gear is used under various conditions, and it trains staff in field procedures, thus creating a reserve of skilled people capable of temporarily replacing grantees or others sidelined by injury or illness.

Field Safety Training

Field Safety Training (FSTP) offered six different courses and taught 131 classes attended by 1,632 students, a 9% increase in enrollment over the previous year. Increasing enrollment, a static level of staffing, and a continuing lack of working vehicles to efficiently move students to and from field training sites challenged our ability to maintain a high quality of service. We supported 27 science groups, during which our staff of mountaineers logged 168 days in the field. We provided particular support to I-139-M at Blood Falls, A-112-M in East Antarctica, and I-190-M on its iceberg project. Direct field support has increased over the past three years, much of it to address ad hoc needs. This trend demonstrates our continued effort to be responsive by evaluating grantee needs and capabilities and filling gaps as required to ensure safe, efficient field operations. We supported station operations by working effectively with Fleet Ops, Medical, Fuels, and Recreation to ensure safe operations in and around McMurdo.

Fixed Wing Operations

Fixed Wing Operations overcame several major hurdles during the 2005-06 austral summer. Early season weather delays, particularly at WAIS Divide, caused numerous schedule changes and adjustments. We lost our Assistant Supervisor to health problems and cycled several interim people through the position until the BFC Supervisor was reassigned and took it for the second half of the season. In late September, after the Air Operation Planning Summary had already been published using mission count as the performance metric, the Executive Management Board (EMB) changed the metric from "number of missions" to the "weight of cargo, fuel, and passengers moved to South Pole and deep field camps." We quickly worked with Logistics to develop a weekly cargo tracking and variance report that reflected the change and helped us keep track of our progress. Overall, our efforts contributed to an outstanding season and efficient use of LC-130s.

Field Camps

WAIS Divide was the primary main focus of our deep field camp operations, though we also had significant operations at other locations. WAIS cargo movements were the second largest component of on-continent cargo operations, after South Pole. We originally planned on an ACL of 19,900 pounds for WAIS, but reduced that to 18,500 pounds once the NYANG assessed conditions at the camp. Our realized ACL was 18,415 pounds, very close to the operational target. Ultimately, the cargo flown to WAIS was 200,097 pounds more than planned, a 27.8% increase (Table 17-2).

The increase in weight delivered over plan was primarily the result of changing science requirements and unforeseen infrastructure challenges. The most significant component of the total variance was +107,496 pounds of bulk fuel. 82,460 pounds (11,780 gallons) of this fuel remains staged at WAIS and will reduce LC-130 missions in KY07. Two main factors contributed to the excess fuel moved to the site:

1. We made efficient use of ACL by moving fuel to WAIS on pull-out flights.
2. The NYANG carries adequate margins of reserve fuel on all flights in case of poor weather. Some of this reserve fuel can be off-loaded at camp when a good weather forecast makes it unnecessary for the return flight to McMurdo.

Siple Dome saw a final variance between planned and actual cargo weight delivered of +3,174 pounds. Fuel weight moved to Siple Dome exceeded the plan by 70,773 pounds, or 10,110 gallons. This excess fuel resulted from opportune LC-130 missions to stage fuel at Siple Dome when South Pole experienced bad weather. At the end of the season, Siple Dome's fuel inventory was 50,351, pounds or 7,193 gallons. This pre-staged fuel will allow the USAP to jumpstart field camp openings next season and could free up 2.5 LC-130 missions to Siple Dome in KY07.

Table 17-2 Total Cargo Variance

Item	Percent of Variance	Notes
Fuel	54%	Primarily pre-staged for next season
Camp and Construction	33%	Unanticipated or moved ahead of schedule
Science Cargo	12.3%	Primarily unanticipated equipment or replacement for failed equipment
Passengers	0.54%	
Note – We have submitted a detailed variance report to the NSF.		

Helicopter Operations

Despite a significant turn-over of personnel this year, Helicopter Operations completed a very successful season. Total flight hours for the combined PHI and HNZ airframes were 1,656 hours. Total mission hours were 2,710. We transported 6,835 passengers and moved 1,784,311 pounds of cargo.

Mechanical Equipment Center

The MEC Supervisor, Assistant Supervisor, and three mechanics deployed at WINFLY to prepare and issue equipment to WINFLY science events. We also packed support materials and equipment for the traverse to Marble Point.

During the season, we directly supported 78 science or technical events and five artist and writer events. We also supported four Raytheon events, including the South Pole Traverse and two deep field camps. We trained over 1,000 people on various types of equipment, including snowmobiles, vehicles, generators, rock drills, and chainsaws. We provided all equipment requested by grantees (both planned and unplanned). In addition, we maintained the Renewable Energy Program field power systems we deployed in previous seasons, and we provided significant support to other RPSC departments on a continuous basis throughout the season.

Science Construction

Close coordination between Science Construction and FEMC contributed to a very successful season. Science Construction opened, maintained, and closed 13 field camps in four geographic areas. On the sea ice, we built large, fixed camps for three major science events. We also supported four smaller sea ice events, for a combined total of 16 fish huts and several other structures. Our work in the Dry Valleys consisted of routine maintenance, camp upgrades, erecting Polarhavens, and supporting the Lake Vida project. We supported five local and helicopter-serviced camps: the LDB facility, Cape Crozier, Cape Royds, Windless Bight, and the Lower Erebus Hut. With the help of FEMC, we

supported the two deep field camps at WAIS Divide and Siple Dome. We continued our efforts to standardize procedures for field camps, and we fabricated a myriad small items (both planned and unplanned) for the science community.

Section 2. Qualitative Performance

A. Project Management

General Management

Accomplishment: The Field Science Support Manager exhibited extraordinary leadership and remained resourceful and proactive in the face of tremendous challenges, including the new safety initiatives and the early season weather delays for WAIS Divide. He provided constant support and encouragement to supervisors and staff.

Benefit: We were able to maintain our high level of support for science, remain responsive to the needs of grantees, and accomplish all of the season's major goals.

Customer Satisfaction

Accomplishment: Science Construction added solar panels and small solar systems to all sea ice fish huts in a continuing effort to minimize the use of fossil fuels.

Benefit: Grantees can use these renewable energy systems to power fans that blow warm air across diving/fishing holes to keep them free of ice. This reduces the time grantees must spend keeping the holes open.

Accomplishment: The MEC trained mountaineers from selected science events to maintain, troubleshoot, and repair snowmobiles.

Benefit: These events were more self-sufficient in the field and required less frequent equipment replacements. This reduced demand on the MEC equipment inventory, on MEC personnel, and on aircraft operations. The more self-sufficient science events had less down time and higher productivity.

Accomplishment: The MEC reset Skandic WT snowmobile clutch settings for G-081-M (Kyle).

Benefit: Adjusting the clutches for altitude increased their utility and produced better performance.

Accomplishment: Grantees received all requested equipment, both planned and unplanned. Unplanned equipment issues had no impact on other events or on MEC inventory.

Benefit: MEC metrics for the season were 105%, centered within the target range of 100-110% and an indicator of high customer service.

Accomplishment: The MEC provided extensive pre-planning and mechanical upgrades for G-057-M and G-058-M (Harvey) in addition to mechanical training.

Benefit: These two groups operate on rough, blue ice surfaces that are very hard on snowmobiles. The upgrades and improved planning led to a 75% decrease in unplanned maintenance, dramatically increasing the productivity of the science group.

Accomplishment: We retrieved instruments for G-079-M (Wilson), despite weather delays and the loss of scheduled Twin Otter support. Helicopter Operations deployed two helicopters and recovery teams. These teams worked in tandem on night flights and under SAR constraints, to complete a highly-compressed recovery schedule very late in the season.

Benefit: The science group was able to retrieve all of its on-continent data and instruments in its final field season.

Accomplishment: Helicopter Operations provided unscheduled support to B-300-M (Chin) as conditions in the field changed.

Benefit: The altered timing of the Pony Lake-Lake Fryxell-Pony Lake moves did not impact other science groups and the science group had a very successful season.

Accomplishment: We retrieved data recorders from Iceberg B-15 for I-190-M (MacAyeal) within the allocated flight time, despite schedule delays caused by open water conditions.

Benefit: Valuable data and equipment was recovered that might otherwise have been lost when the iceberg broke up.

Human Resources

Accomplishment: Field Science Support has one of the highest retention rates in the Program.

Benefit: High retention translates to experienced employees with extensive Program knowledge. Retaining these individuals means we can provide a quality and continuity of customer service that ensures a high level of customer satisfaction. Our employees anticipate requirements, react to change, identify creative just-in-time solutions, and move easily between positions when necessary.

Accomplishment: Field Science Support maintains a culture that attracts individuals committed to providing grantees with the best support possible.

Benefit: The result is an efficient, effective organization that consistently delivers a high level of service and customer satisfaction.

Cost Savings

B. Program Integration

Coordination Between WBS

Accomplishment: Field Science Support continues to work closely with the Planning Group to determine support requirements. They also work directly with other divisions, grantees, organizations, and subcontractors.

Benefit: Cross-divisional coordination results in high-quality customer service that meets Program requirements and supports the USAP's mission.

Accomplishment: When equipment was delayed in procurement and could not be transported to Black Island via traverse, Helicopter Operations flew the equipment to the site. This included several large, bulky items for which the Helitechs had to design, rig and stabilize non-standard sling loads.

Benefit: The Black Island bandwidth upgrade was completed on schedule.

Accomplishment: Helicopter Operations worked with Stations Operations, the NSF, and vessel personnel to evaluate ice conditions in the channel.

Benefit: NSF and Operations personnel were able to make informed decisions and develop contingency plans for off-loading the vessel and tanker and supporting the *NBP*'s port call.

Accomplishment: When I-163-M (Raymond) experienced poor signal-to-noise performance with its GPR radar at WAIS Divide, the Fixed Wing Coordinator arranged to bring the team and its gear back to McMurdo where the equipment could be repaired. Afterward, the team was redeployed to the field to partially complete its imaging program. We coordinated this effort with the McMurdo Communications shop, which played a key role by trouble-shooting and reconfiguring the equipment.

Benefit: I-163-M was able to salvage part of its field season.

Accomplishment: Field Science Support worked closely with RPSC Subcontracts and third-party provider Antarctic Logistics & Expeditions (ALE) to negotiate and provide field support for G-087-M (Dalziel) through ALE's operation at Patriot Hills.

Benefit: This approach extends the capabilities of the USAP into areas we could not otherwise support in a cost-effective manner.

Integration of Environment, Health, and Safety Objectives Across Corporate Activities

Accomplishment: In prior years, rough ice conditions caused significant access and mobility problems for science groups working at New Harbor and Lake Bonney. The potential for injuries in these conditions is significant. This year,

the BFC researched and supplied a more suitable sled to partially mitigate these problems.

Benefit: The improved mobility and efficiency of these new sleds led to more productive research. B-043-M's PI was thrilled with the performance of the Siglin Toboggan and felt it the perfect solution to their rough ice problems.

C. Innovation/Process Improvement

Innovative, Technological Solutions

Accomplishment: The MEC designed a pictorial snowmobile inspection sheet for three high-use science events.

Benefit: The inspection sheet gave event team members a visual tool for detecting maintenance issues before they became serious.

Accomplishment: The MEC improved procedures for inspecting, modifying, and repairing snowmobiles. Improvements include more frequent inspections, preventative component replacement, equipping all machines with track cleats and crevasse cabling, re-setting carburetor float settings on ANSMET machines, and re-setting clutches to deliver maximum power at altitude.

Benefit: Improved snowmobile performance, reduced maintenance and repair, and greater productivity.

Accomplishment: The MEC researched and purchased a new style of wind generator for G-081-M (Kyle) to test on Mt. Erebus.

Benefit: This effort assisted the PI's search for a wind generator that can withstand the rigors of Mt. Erebus.

Accomplishment: An MEC mechanic designed custom tools and developed procedures to rebuild the prime movers in our Herman Nelson heaters.

Benefit: We no longer have to send these units back to CONUS for custom machining and repair. We will realize a substantial and recurring annual savings in machine shop and transportation expense.

Responsiveness to Challenge and Change

Accomplishment: When the Fixed Wing Assistant Coordinator redeployed for medical reasons, the Supervisor of the Berg Field Center filled the position on an interim basis.

Benefit: The move was transparent. Fixed Wing continued to provide services as scheduled.

Accomplishment: We supported B-211-M (Doran) in spite of a late funding decision.

Benefit: The event started research on schedule.

Accomplishment: When cargo for the *NBP* arrived late in Christchurch, we delivered critical items to the vessel by helicopter.

Benefit: The grantees aboard ship were able to complete their research.

Accomplishment: We collaborated with PHI and I-190-M (MacAyeal) to reconnoiter a safe route to iceberg B-15J. When I-190-M first proposed to go to B-15J, there appeared to be significant open water around the iceberg, making access impossible since helicopters are prohibited from flying over open water. By working together and reviewing satellite imagery, we eventually found that the iceberg had moved into pack ice and was now accessible.

Benefit: I-190-M retrieved instruments and data that otherwise might have been lost.

Accomplishment: In spite of late funding decisions by the NSF, we made adjustments and provided support to late-funded events and/or events whose SIPs lacked adequate detail.

Benefit: Grantees were able to proceed with research.

Accomplishment: Helicopter Operations provided unplanned support to the LDB project to retrieve the ATIC payload.

Benefit: We recovered the payload without having to dismantle it, so it will be easier to prepare for the next flight.

Accomplishment: Because of poor surface conditions at Fosdick, we moved the G-088-M (Siddoway) camp from Fosdick to Siple Dome via Twin Otter rather than LC-130, as originally planned.

Benefit: This adjustment enhanced the safety of the operation and saved time and money, as we did not have to spend excessive time preparing a skiway at Fosdick.

Lessons Learned

It was a challenge for MEC to manage the competing requirements of WINFLY science support, Marble Point Traverse preparation, and equipment preparation for Mainbody. We now conclude that it is imperative to have four mechanics in the shop for WINFLY through at least mid-October.

Traversing to Marble Point may no longer be an option. This season, Helicopter Operations was able to add unplanned flights to move equipment to Marble Point. Until ice conditions improve, we must build more time into the helicopter schedule to transport items that would normally be traversed.

We will have to work more closely with ICDS to define cargo requirements for ice core drilling groups in greater detail and allocate helicopter hours accordingly. We also have to account for the helicopter time required to move ice core boxes based on both weight and size.

We effectively supported the *NBP*'s port call when ice conditions forced us to make unscheduled and unplanned helicopter cargo flights to the vessel. In the future, we will plan for poor ice conditions and explicitly build helicopter support into our plans for *NBP* port calls.

The destruction of a large, soft-shelled Weatherport tent at the VORCORE camp during a WINFLY storm has led us to discourage the use of soft shelters larger than normal Polarhavens, Jamesways or RacTents. Instead, we will suggest alternative storage options, including milvans where appropriate.

Because of significant delays in opening WAIS Divide, we now recognize the need to investigate options other than using standard images to reconnoiter open field landing sights. Specifically, we will investigate the use of air- or ground-based ice-penetrating radar for crevasse detection, potentially using smaller aircraft to deliver ground-based systems or conduct airborne surveys using air-based systems.

Section 3. Plans for KY07

The Field Science Support operation runs smoothly. In the absence of additional funding or resources, we do not anticipate major changes for next year beyond fine-tuning existing methods and maintaining our focus on providing great support. Field Science will continue to work closely with EH&S to adapt new safety guidelines to our activities by employing process change, mechanization, administrative controls, and waivers, as appropriate.

METEOROLOGY

Section 1. Summary

In KY06, the Meteorology Department enhanced operations at both South Pole and Palmer Stations with upgrades and process improvements. As a result, we improved our ability to provide data for operational forecasting and scientific research.

At Palmer Station, we brought in a vendor technician to evaluate the meteorological system. The technician helped us resolve several technical issues, such as optical sensor unreliability, that have plagued us for much of the past three years. We also installed a backup meteorology system composed of wind, pressure and temperature sensors. This system will provide data during primary AWS (PALMOS) outages, as well as provide us with an independent data set to validate PALMOS performance.

The primary task at South Pole was transitioning to new facilities and systems. As soon as we received conditional occupancy for the B2 Science Lab in the Elevated Station, we moved historical documents, computers, spare instruments, servers, supplies, regulatory manuals, and the historical atmospheric library from our old home to the new space (Figure 17-9). Once there, we established and tested instrument and computer connections. Within two days, all systems were up and running. We rewrote procedures to bring them in line with the new location, and we constructed a technological bridge between the previous database and the new system. We can now process and provision data at a higher resolution than before and can provide one-minute resolution surface data for the first time.

As part of the World Meteorological Organization's CLIMAT Message Creation Project, we began re-processing historical data and validating its accuracy. Once this work is complete, our data will have greater value to both domestic and international researchers. Our efforts demonstrate the USAP's desire to meet the needs of the international science community and participate in global climate change research.

Figure 17-9 South Pole Met Offices, Old and New

Overall, both Palmer and South Pole Stations improved their ability to provide meteorological data to researchers and contribute to Southern Hemispheric and Antarctic forecasting models. Our data continue to play a vital role in climate change research while contributing to the accuracy of operational forecasts for the USAP.

Section 2. Qualitative Performance

A. Project Management

General Management

Accomplishment: We provided an extensive historical temperature analysis for the month of February to the McMurdo and South Pole Area Directorates to support the South Pole summer season extension. We made extra hourly observations during the extension. Our South Pole team provided a weather data analysis to Logistics to support planning for winter storage.

Benefit: These analyses contributed to the success of the South Pole extension, which permit-

ted 15 flight missions after the customary station close date of February 15.

Customer Satisfaction

Accomplishment: We began working with the Antarctic Meteorological Research Center (AMRC) at the University of Wisconsin-Madison to supply monthly surface data to the Atmospheric Observation Panel for Climate (AOPC).The AOPC, which reports to the Global Climate Observing System (GCOS) and the World Meteorological Organization, requested that we transmit these data to the Global Telecommunications Network (GTS). AOPC also requested historical data. We have begun validating those data and constructing the software required to deliver them in the form of CLIMAT "messages."

Benefit: The AOPC uses the surface data we provide to monitor global climate conditions. Antarctic meteorological data is critical to understanding worldwide climate interactions and the possible effects of climate change.

Accomplishment: We created an historical metadata timeline and database that stores information on the methods and instruments used by the South Pole Meteorology Office from 1957 to present.

Benefit: For historical research to be accurate and comprehensive, it must take into account the observational practices, instrument use and performance, and operational details of those who originally collected the data. We are now able to provide researchers with that metadata crucial to the well-informed use of our historical data.

Accomplishment: We implemented a weather forecast page for the South Pole intranet and public galley scroll.

Benefit: Community members and researchers now have direct access to forecast information for both South Pole and McMurdo.

Accomplishment: Our South Pole crew provided the SPAWAR Weather Office in McMurdo with surface and upper air observations. The Met Manager for McMurdo Weather commented that "record setting mission accomplishment this season could not have been done without the outstanding job you all did at South Pole MET. We relied on your observations, upper air data and climate summaries for our forecasts throughout the season and I am sure your accurate and timely submissions were instrumental in that success."

Benefit: This close cooperation and collective functioning contributed to a record-breaking flight season for South Pole: 377 missions, and 9,994,807 pounds of cargo, personnel and fuel moved.

B. Program Integration

Coordination Between WBS

Accomplishment: At South Pole, we began automated transmission of all METAR, Synoptic, and upper air weather messages directly into the Global Telecommunication System (GTS) network, bypassing the South Pole communications center and McMurdo Weather. Two significant improvements made this possible: IT reconfigured the multi-channel Iridium connection, and the Meteorology Coordinator upgraded the South Pole Met system software.

Benefit: The success rate for timely receipt of South Pole weather reports into the GTS network has increased from about 80% to an estimated 99%. Consistent inclusion of South Pole observations into the AMPS (Antarctic) and other southern hemispheric weather forecasting models contributes to improved forecasting accuracy. Direct transmission from our system reduces tasking for South Pole Communications and McMurdo Weather.

Accomplishment: At South Pole, we assisted Science Support by entering the department's time card data and developing a new tracking procedure.

Benefit: We were able to take pressure off Science Support when positions were eliminated. Our tracking procedure improved the time card process.

Integration of Environmental, Health, and Safety Objectives Across Corporate Activities

Accomplishment: At South Pole, we implemented new safety procedures. Weather observers must now receive fall protection training before they can climb Met towers. We modified observing practices to limit exposure to extreme conditions and limited work hours to 54 per week. Finally, we documented these new procedures in our task manual.

Benefit: The new procedures reduce the potential for injury, ensure an alert, well-rested Met crew, and bring us into line with RPSC's corporate safety objectives.

Accomplishment: At the South Pole Balloon Inflation Facility (BIF), we installed eyewash stations, helium-flow control valves, and ear protection devices, and we have upgraded the headlamps.

Benefit: The new equipment improves safety for crew members working in the BIF.

C. Innovation/Process Improvement

Innovative/Technological Solutions

Accomplishment: At South Pole, we developed a database to track instrument data, such as manufacturer, specifications, performance, current location, and calibration history.

Benefit: Researchers need this kind of information when they use our data, and we can now provide it easily. We are also better able to ensure that our instrument calibrations are up to date.

Accomplishment: At South Pole, we automated the process of archiving one-minute resolution data in the new SQL database, the METAR and Synoptic observation files, and climatology reports (Figure 17-10).

Benefit: The automatic entry of one-minute resolution data improves accuracy over the manual method, and daily archival guarantees a one-day threshold on data loss in case of system failure, limiting the impact to operations.

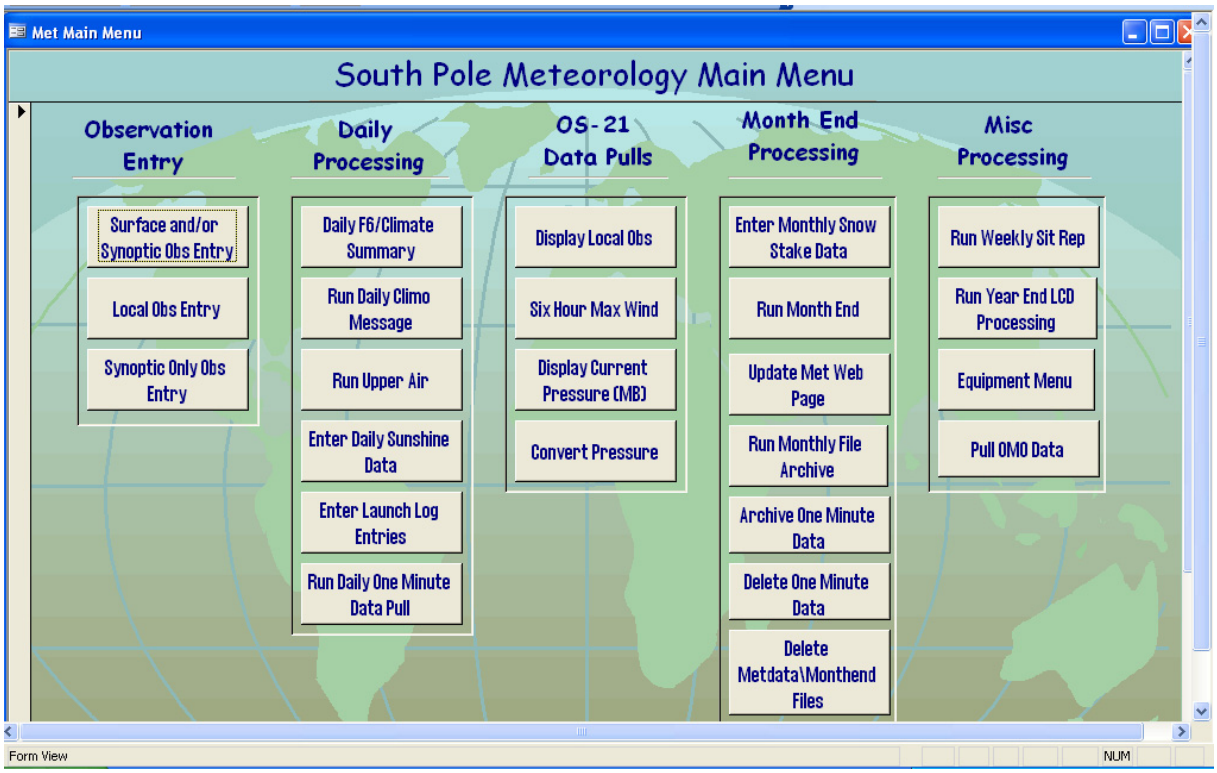


Figure 17-10 Updated Main Menu for the South Pole Meteorology System

Accomplishment: At Palmer, we installed a redundant automatic weather station.

Benefit: The new AWS ensures wind, temperature and pressure data in case of PALMOS outage. It also provides us with an independent data set to validate PALMOS performance.

Identified Issues

Issue: When the new Cryogenics facility was erected, it created a signal hole that prevented balloon radiosondes in the BIF from locking on to satellites before launch.

Response: After consulting with the NSF Representative, we modified balloon launch procedures by taking the radiosonde outside to a downwind location. This allows a pre-launch satellite lock, decreasing the number of failed launches.

Issue: After power outages, the new automated Met system at South Pole did not recover data logging capabilities automatically, requiring instead a full system reboot. When only one observer was on shift, it was difficult to manage system problems and continue flight support observations.

Response: We now schedule two observers for planned power outages, one to provide flight support while the other brings the system back to operational status.

Issue: Our move to the B2 science lab at South Pole resulted in reduced office and storage space, to the extent that we were unable to store existing documents and supplies.

Response: We retrograded all outdated instruments, moved to electronic document storage, and imposed an ordering limit to reduce our spares to a one-year supply.

Lessons Learned

We found that the DigiCORA upper air systems in the BIF require a minimum of 40 minutes to reload satellite coordinates into memory after a power outage. When there has been a power outage, a Met observer goes out to the BIF and restarts the SSP module for the upper air system one hour prior to launch time. We have a standing request with Operations and FEMC to notify us of any power loss to the BIF, planned or unplanned.

Section 3. Plans for KY07

For KY07, we will:

- Continue merging the old and new meteorology systems to produce a streamlined, robust application that retains the full functionality of both systems.
- Continue providing monthly surface CLIMAT messages and creating historical messages for South Pole.
- Complete a feasibility review for providing surface CLIMAT messages from Palmer, and implement it if approved.
- Relocate the PALMOS automated weather station at Palmer, if approved.
- Review current Met applications, support capabilities, and procedures at Palmer.
- Create a weather observer training package for field camp observers.
- Review South Pole and Palmer observation regulations and make modifications where needed.

WAIS DIVIDE

Section 1. Summary

The first field season for WAIS Divide was successful, despite a 20-day delay in put-in caused by bad weather. Nonetheless, we met all field objectives for WAIS and steel arch construction by the close of the season, either on or ahead of schedule. These objectives were:

- Establish a put-in camp at the WAIS site
- Establish a new 10,000 foot skiway
- Deploy and assemble new heavy equipment
- Erect new RacTents and deploy new hard-sided modules
- Deliver camp/construction cargo
- Install camp fuel systems and storage bladders
- Support all science activities and groups
- Prepare arch snow foundation
- Erect steel arches
- Winterize arch facility
- Close camp, winterize and secure equipment

Section 2. Qualitative Performance

A. Project Management

General Management

Accomplishment: The Project Manager (PM) administered all aspects of planning, design, and procurement for the field camp and drilling facility. He coordinated the requirements of all WAIS stakeholders and incorporated them into the overall Science Support annual plan.

Benefit: The PM made certain the needs of the stakeholders were met and ensured the KY06 WAIS plan could be supported by all RPSC work centers.

Accomplishment: The Camp Manager and Construction Coordinator maintained a strict focus on safety during a challenging deep field camp put-in and construction. WAIS had no injuries.

Benefit: A zero injury rate translates to increased productivity and higher morale.

Accomplishment: WAIS camp management remained flexible in the face of shifting priorities and schedules, re-allocating resources as needed to keep the overall project on track. The PM coordinated closely with the Field Support Manager (FSM) in McMurdo to manage arch construction.

Benefit: We completed all planned tasks. Construction of the steel arch facility was completed ahead of schedule and contributed to the successes of WAIS Divide.

Customer Satisfaction

Accomplishment: The PM stayed in regular contact with all WAIS stakeholders throughout the season and updated them with scheduled reports from the field.

Benefit: Consistent reporting and timely communications with stakeholders helped maintain realistic expectations, something particularly important during early-season weather delays.

Accomplishment: We achieved all WAIS project goals despite a 20-day delay in camp put-in. We supported all scheduled WAIS science activities at agreed-upon levels.

Benefit: Researchers were able to proceed with their work on schedule, and all planned science activities were successful.

Accomplishment: The camp staff and supporting McMurdo-based trades, including Science Construction, the Mechanical Equipment Center, and FEMC, successfully installed a large deep field camp and skiway. These facilities, necessary to support several large science groups, were up and running in a timely manner, despite unanticipated delays and despite the inauguration of new equipment and camp structures.

Benefit: Science personnel frequently commented positively on the quality of the WAIS Divide facilities and camp services. The NYANG constantly praised the camp staff for

establishing and maintaining a safe, high quality skiway and providing the Guard with reliable ground services.

Accomplishment: The arch construction crew completed the arch two weeks ahead of schedule, in spite of a late start. The team incurred no injuries – a significant accomplishment given the type of construction and the remote setting.

Benefit: RPSC rewarded the arch construction crew members with Achievement Awards for their tremendous and successful efforts.

Human Resources

Accomplishment: RPSC filled key WAIS positions, such as Construction Coordinator, with quality, field-experienced people and made them stakeholders with early involvement in planning.

Benefit: Having the Construction Coordinator participate in the planning phase added significantly to his sense of ownership, perspective, and satisfaction and contributed to the success of the project.

Accomplishment: The PM continues to develop management skills through continued education and training.

Benefit: Career development and continuing education enhance the PM's ability to manage such a complex and challenging multi-year project.

B. Program Integration

Coordination Between WBS

Accomplishment: The PM and FSM successfully coordinated in establishing the largest deep field camp since Siple Dome.

Benefit: This team approach to managing the camp and supporting the science groups contributed greatly to the project's success.

Accomplishment: We worked closely with all Science Support work centers to meet the specific needs of the ice core community and other science events using WAIS camp facilities.

Benefit: Grantees were able to focus on achieving their scientific goals. Science Support continues to develop and adapt its model for deep field support to meet the changing needs of the science community.

Accomplishment: The PM integrated the support efforts of FEMC, QA/QC, Procurement, and Logistics to meet project delivery dates and milestones.

Benefit: We met delivery dates and milestones, and we developed solid working relationships that will support the continued planning and execution of this project.

Accomplishment: The PM worked closely with RPSNZ to procure several costly specialty items and camp structures.

Benefit: Christchurch vendors provided high quality products and services at lower costs than were available in CONUS. These savings freed up funds for other project costs.

Accomplishment: We have integrated the WAIS Divide project into the broader USAP planning and controls process. The PM worked specifically to dissolve divisional walls.

Benefit: This has allowed the further integration of Science Support into general planning and support and contributes to a more integrated USAP.

Integration of Environment, Health, and Safety Objectives Across Corporate Activities

Accomplishment: We created an Initial Environmental Evaluation (IEE) for the project as required by the NSF. The IEE ensured WAIS adhered to the requirements of the Antarctic Treaty.

Benefit: Environmental stewardship has been integrated into camp operations and future planning. This includes the use of secondary containment for all designated pollutants and the use of upgraded, double-walled fuel tanks.

Accomplishment: We have worked closely with EH&S in all phases of project planning, includ-

ing design reviews. EH&S provides Life Safety Codes and safety planning for construction efforts and camp infrastructure.

Benefit: This collaboration increases safety. In the design and execution of the project, we met all recommended Life Safety Codes and safety standards.

Accomplishment: The arch construction crew experienced no injuries. The Construction Coordinator worked closely with EH&S to develop a construction safety plan. During construction, he conducted daily safety meetings and joint field exercises with the camp Physician's Assistant.

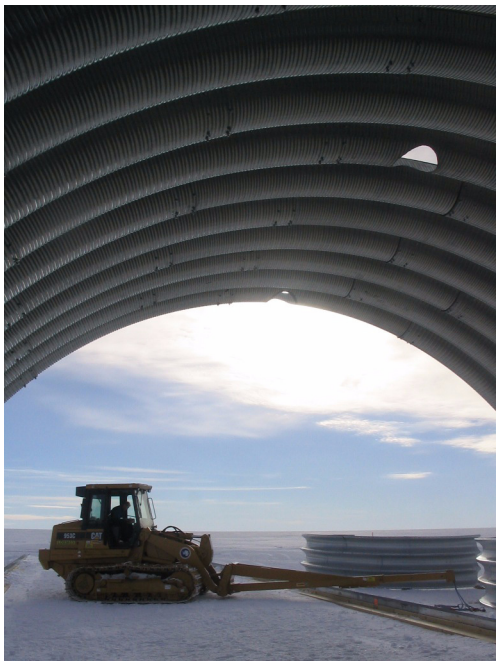


Figure 17-11 Arch Construction

Benefit: We achieved a safe working environment and successfully managed an inherently dangerous work environment to ensure the safety of the entire crew.

C. Innovation/Process Improvement

Innovative, Technological Solutions

Accomplishment: The DISC drill and core processing requires a large structure to handle the projected snow loads of the WAIS Divide area. We selected, and the arch construction crew successfully erected, a 184 foot long x 30 foot wide x 25 foot high steel arch, the first construction of its type in the deep field since the early days of the USAP. They did this with a limited selection of non-optimal equipment and intermittent LC-130 supply flights.

Benefit: This extraordinary accomplishment met a significant project goal (Figures 17-11 thru 17-13).

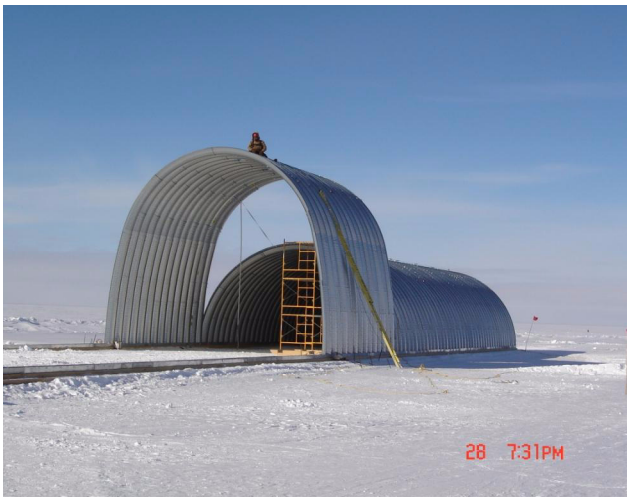


Figure 17-12 Arches

Figure 17-13 Completed Arches

Accomplishment: Improving field camp operations requires a new approach to camp equipment. To meet the heavy lift requirements of the camp, we purchased a Caterpillar 953C Super Low Ground Pressure tracked loader (Figure 17-14). It was disassembled, transported to WAIS Divide via LC-130, and re-assembled in the field. In addition, we designed and purchased a

completely new type of Tucker Sno-cat (Figure 17-15) with a set of light duty forks. This medium duty machine combines lift and grooming capabilities with excellent speed and mobility.

Figure 17-14 Caterpillar 953C

Figure 17-15 Tucker Sno-Cat

Benefit: The Caterpillar and Sno-Cat proved to be major assets to camp operations. By design, they met the limitations of LC-130 transportation, which is often a major constraint for such items.

Accomplishment: We designed and built a new ski-way groomer to replace older, less effective trail groomers (Figure 17-16).

Benefit: The new groomer allowed us to establish a ski-way that could accept high ACLs earlier in the airlift plan. This helped us make up for

Figure 17-16 Skiway Groomer

time lost to weather delays. The groomer surpassed our expectations, greatly reducing the time required to produce a quality ski-way.

Accomplishment: To improve our ability to off-load LC-130 aircraft and minimize damage to sensitive or odd sized cargo, we redesigned an existing cargo sled to meet our unique requirements (Figure 17-17). We now have two cargo sleds that can be operated separately or in tandem to accept T-3 or T-4 pallet off-load configurations.

Figure 17-17 Cargo Sled

Benefit: The sleds were very useful for efficiently and safely off-loading cargo that could not be combat off-loaded.

Accomplishment: One of the main goals in redesigning field camps is to minimize setup and take down effort by replacing older structures

with better designed, more efficient ones that use modern materials and construction methods. We designed and procured new RacTent sections for the main camp structures and incorporated hard panels into modules for the galley, washroom, and mechanics' shop (Figure 17-18).

Figure 17-18 Module with Attached RacTent

Benefit: In the past, these key structures were disassembled and staged for the next season. The new modules remain assembled over the winter, thereby requiring little opening and closing effort each subsequent season. As an added benefit, we now have structures available at the first flight of camp put-in, greatly increasing comfort and safety.

Visionary Management

Accomplishment: One of the great challenges in Science Support is balancing the goals and requirements of the science community with USAP resources. The PM took an integrated and long-range approach to coordinating these goals, requirements, and resources.

Benefit: Integrating the goals and vision of WAIS stakeholders with overall project planning helped us maintain a high level of customer satisfaction while balancing our use of limited resources.

Accomplishment: The PM was involved in WAIS Divide from its inception, actively participating in workshops and interacting with the Ice Core Working Group.

Benefit: The PM was able to anticipate resource and logistics requirements in advance of formal planning and scheduling.

Responsiveness to Challenge and Change

Accomplishment: The PM responded to extensive weather delays early in the season by working closely with the FSM and the Fixed Wing Coordinator to coordinate daily, often hourly, adjustments to the flight and field schedules.

Benefit: We took maximum advantage of weather windows and WAIS ultimately proceeded on schedule. The close, collaborative relationship we developed was instrumental in the success of the project.

Identified Issues

Issue: We discovered several major mechanical problems with new tractors as we were preparing them in McMurdo for transportation to the field camp.

Response: The mechanic immediately contacted the PM at Denver HQ, who initiated warranty claims and parts replacements with the manufacturer. The PM also coordinated communication between the manufacturer and the mechanic to facilitate repairs.

Issue: We experienced serious personnel problems at the WAIS Divide camp.

Response: We took immediate action to quickly remove troublesome employees, restore morale, and keep the project on track.

Lessons Learned

We found that having a dedicated Project Manager is a key factor in successful planning and execution. The PM's role in coordinating and managing the efforts of external stakeholders minimized miscommunications and eliminated unpleasant surprises. We anticipate continued use of PMs for large field camp and construction projects like WAIS Divide.

We discovered it is important to have contingency plans and a backup labor pool in place to

deal with unanticipated personnel problems. That way, problems can be addressed quickly, minimizing morale issues and work delays.

It is important to empower field camp staff and field construction crews to make critical decisions as issues arise. Doing so draws self-sufficient, motivated, quality people and facilitates a rapid response to problems. However, it also requires experienced crews with clearly-defined roles and responsibilities, and it requires a high level of trust and communication between field staff and the PM.

Close integration and communication between the PM and the FSM is critical to the success of a deep field camp with a major construction effort. It is also important to arrange PM/FSM site visits to align with significant project milestones.

The PM must be in a position to provide procurement and logistics support for unforeseen issues and breakdowns. This capability was one of the key contributions to this season's success.

The design, engineering, and procurement of specialized items require close collaboration with suppliers. Design criteria need to be clearly understood and expectations need to be established and managed. It helps to involve PA/QA at the design stage and plan several manufacturer site visits to inspect key equipment.

It is important to involve all stakeholders early to ensure a project is supportable. Early participation minimizes surprises and contributes to a successful project.

Section 3. Plans for KY07

We plan to install floors in the arch interior, excavate space for the core storage basement, drill tower, and winch, and install ventilation and electrical systems for the DISC drill that will deploy in KY08. We will upgrade the camp water and electrical systems and evaluate winter-over drifting and equipment storage procedures.

SOUTH POLE SCIENCE SUPPORT

Section 1. Summary

South Pole Science Support worked with the Science Planning Managers at the beginning of KY06 to review proposed and funded science projects, a process that culminated at the external SIP review in May 2005. Given the tight nature of available resources at South Pole, many science event timelines were adjusted to avoid conflict with planned construction and other operational activities. We had to set priorities regarding the heavy equipment, construction, and logistical requirements for several large events (e.g., BICEP, South Pole Traverse, and IceCube) to ensure schedules could be maintained. Finally, we incorporated all project tasking and resource demands into the South Pole IMS to yield an overall station picture.

In June 2005, we hosted the South Pole Users Committee (Figure 17-19) and All-PI meetings. Our primary purpose was to identify, communicate, and discuss resource demands that exceed current capacity. We identified population, power generation, bandwidth, and electromagnetic interference (EMI) as significant challenges to be addressed. We established working groups to solicit input on these issues from all stakeholders.

Figure 17-19 2005 South Pole Users Committee

When the station opened in October 2005, we held outbriefs with winter-over grantees to gather feedback on the quality of our winter support. We helped the winter-over research associate and grantees turn over tasking to their summer replacements. We also assisted IceCube and RPSC operations personnel as they began the early season drill camp setup.

In early November, we began work on the Science Transition of SPSM. This project, which involved man-hauling all the equipment from SkyLab up to B2 in the Elevated Station, was a joint effort between the Science Coordinator, the Science Construction Coordinator, and several grantees. It was successfully completed in late January 2006.

Throughout the season, we maintained a close working relationship with FEMC and South Pole Operations. The value of this cooperation is evidenced by the successful installation of the BICEP experiment and completion of the new Cryogenic Facility. We were involved in the planning and design of both projects and will be coordinating future support activities for each.

Section 2. Qualitative Performance

A. Project Management

General Management

Accomplishment: We helped coordinate the itineraries of the many DVs that visited South Pole this year, including the congressional delegation (Figure 17-20), and we served as science POC for these events.

Figure 17-20 CODEL at IceCube Drill Camp

Benefit: We provided first-hand science information regarding cosmological and atmospheric research to some of the representatives directly responsible for allocating funds to the USAP.

Customer Satisfaction

Accomplishment: We worked with the grantee community to promote the use of working groups as a method of overcoming challenges in the science planning process. As a result, the South Pole Oversight Committee (SPOC) will convene in 2006 with working groups for EMI, Sector Management, and Cryogenics.

Benefit: Increased stakeholder input helps the NSF manage sometimes competing science and operational requirements. For example, defining sector boundaries, setting scientific goals and collecting information on limitations and controls has produced standard operating procedures for three sectors adjacent to the station.

Accomplishment: We continued the long range planning process we began in prior seasons.

Benefit: Science has benefited from our previous projections of support requirements. Achievements in KY06 (e.g., the 10 Meter Telescope) relied heavily on our ability to schedule available resources and predict conflict.

Human Resources

Accomplishment: To facilitate the SPSM Science Transition, we hired research associates that demonstrated aptitude in moving equipment, setting up lab spaces and integrating science experiments into building infrastructures.

Benefit: This made for a smooth transition and impact to research was minimal.

B. Program Integration

Coordination Between WBS

Accomplishment: We assisted with the installation of the BICEP experiment into the Dark Sector Lab (DSL), the first tenant in the new building. The telescope collected "first light" in late January 2006.

Benefit: This important experiment went on-line as scheduled. If the telescope manages to separate the gravity wave background from the cosmic microwave background, this will be the first experiment to accomplish this scientific goal.

Accomplishment: We coordinated the electrical upgrades needed to maintain current levels of support in the new Cryogenic Facility.

Figure 17-21 New Cryo Facility and Balloon Inflation Facility (BIF)

Benefit: With the increased electrical capacity, we were able to install two additional pulse tube refrigeration systems and decrease the liquid helium boil-off rate.

Integration of Environment, Health, and Safety Objectives Across Corporate Activities

Accomplishment: In combination with South Pole management, we documented the scientific importance of the South Pole Antarctic Specially Managed Area (ASMA) and delivered it to the Antarctic Treaty Secretariat (ATS).

Benefit: The information we provided defines and protects the integrity of the ASMA, educates people associated with non-governmental activities on the scientific importance of the ASMA, and discourages them from engaging in activities that negatively impact science.

Accomplishment: This was our busiest and most challenging season to date, with an aggressive schedule and heavy workload. Yet we maintained a perfect safety record, with no recordable injuries.

Benefit: Maintaining a safe work environment increases productivity and improves morale.

C. Innovation/Process Improvement

Innovative, Technological Solutions

Accomplishment: Spearheaded by our efforts, the Liquid Helium Working Group (LHeWG) procured and installed two additional pulse tube refrigeration systems for the large Wessington LHe dewars at the South Pole. This successful effort is the culmination of three years of research, design, planning, and testing.

Benefit: The pulse tube refrigerator systems are cutting edge technology previously unavailable to the Program. LHe boil-off is reduced, saving money and increasing operational flexibility.

Visionary Management

Accomplishment: We worked with the grantee community to produce guidelines and documentation regarding the state of the station's electromagnetic environment.

Benefit: This emphasizes the need to monitor the EMI environment and preserve the spectral integrity of South Pole's uniquely quiet background. The NSF and grantees will be able to accurately assess the effect of new or proposed experiments.

Figure 17-22 Pulse Tube

Accomplishment: Working with FEMC, we arranged to use thermal waste from the pulse tube refrigerator systems to heat the new Cryogenic Facility.

Benefit: Recycling the thermal waste decreases overall fuel consumption.

Responsiveness to Challenge and Change

Accomplishment: Despite significant challenges, all three South Pole research associates successfully disassembled, moved, and re-assembled their respective lab spaces and instruments, without impact to science.

Benefit: This demonstrated our ability to successfully plan and implement complex and challenging projects.

Identified Issues

Issue: Starting up the liquid nitrogen plant in MAPO caused transient power spikes and disrupted the high-voltage power supplies to AMANDA.

Response: We scheduled a technical visit from the manufacturer to address this problem. At the technical representative's recommendation, we installed a "soft start" power buffer device to mitigate the LN2 plant's large start-up current draw. Both the plant and the experiment can now run in tandem.

Issue: The planning tables used in previous seasons were cumbersome and sometimes produced conflicting information.

Response: We developed new and simpler templates to better align the process with the South Pole IMS and produce more accurate planning data.

Lessons Learned

In order to accommodate grantee numbers that exceed available beds, we have been forced to schedule science events very early and very late in the season. Unfortunately, low tempera-

tures at these times make it difficult to provide adequate operational support, as outside construction and vehicle use is difficult, if not impossible. This is particularly true between station opening and the end of November.

We will better communicate this constraint to grantees and NSF Science Program Managers; they need to understand their expectations might not be fully met if events deploy during these periods.

Section 3. Plans for KY07

We will continue our long range planning efforts and will provide weekly updates to RPSC management on critical issues, such as resource allocation and cargo for large scale science projects (IceCube, South Pole Traverse).

For the KY07 austral summer, we are planning to demolish and retrograde the VIPER and AST/RO telescope infrastructures and complete interior construction in the new Cryogenics Facility.

During the off-Ice planning period, we will work with McMurdo field science personnel to develop strategies for remote experimental support.

We will solicit grantee input on station-wide problems, or “global issues.” These issues, such as electrical power availability, population, and communications bandwidth, present significant challenges for the station, both now and into the foreseeable future. The best way to address them is to bring all stakeholders into the discussion, in the belief that multiple perspectives will lead to solutions.

ICECUBE

Section 1. Summary

During KY06, the RPSC IceCube team at South Pole provided extensive support to the University of Wisconsin team (A-333-S) as they drilled eight holes, deployed a full complement of detectors into each hole, and connected the detector strings to data acquisition equipment in the temporary laboratory. Mitigating factors, such as drill camp setup delays and slower than anticipated drill penetration rates, prevented us from reaching our original goal of twelve holes.

Figure 17-23 IceCube Drill Camp

The drill camp (Figure 17-23) consists of the Enhanced Hot Water Drill (EHWD) and its components (high-pressure pumps, water heaters, and control equipment), which are contained in several modified and outfitted ISO containers. In mid-November, we moved the EHWD to its previous location within the IceCube array in the Dark Sector. We had all roads and KY06 drill sites surveyed and compacted and had the snow compacted at planned KY07 drill sites.

We dug trenches and laid 12 connecting cables in four main trunks (totaling nearly five miles of cable) between completed or planned holes and the temporary laboratory (Figure 17-24). We installed 24 IceTop tanks at 12 stations which required excavating 12 large trenches, setting two 600 gallon tanks in each trench, delivering filtered water to fill the tanks, and closing and backfilling the excavations (Figure 17-25).

Figure 17-24 Trenching for Surface Cables

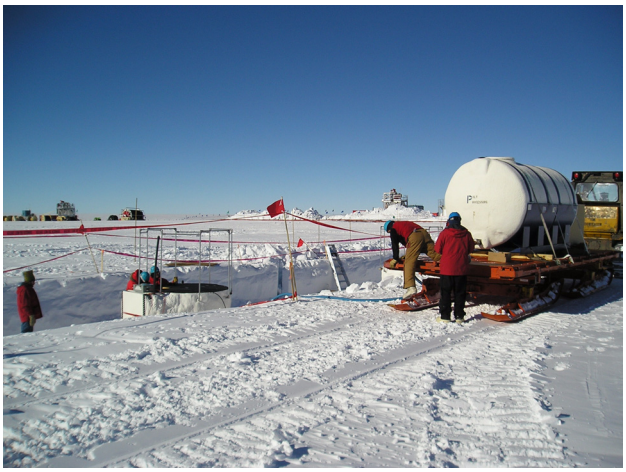


Figure 17-25 IceTop Tank Filling Operation

The IceCube Laboratory (ICL) will be the primary data acquisition center for the detector array. We affixed new siding to the building exterior and installed freezer doors, steel exterior decks, stairs, and landings (Figure 17-26). We erected the east cable tower to secure and guide the main data cables into the building. The tower allows us to raise the ICL as snow accumulates without affecting cable attachments.

Figure 17-26 Stair and Landing Construction

We demobilized the drill camp on schedule, winterized all components, and moved them to winter storage. During KY06, we shipped and received 667,072 pounds of project cargo and received 60,423 gallons of drilling fluid.

Section 2. Qualitative Performance

A. Project Management

General Management

Accomplishment: Our use of proactive management techniques allowed us to support the drilling of eight holes and the deployment of detectors, dig trenches and lay five miles of surface cable, install 12 IceTop stations, and connect in-place arrays and tanks to the temporary laboratory.

Benefit: Despite initial delays and unanticipated problems, IceCube had a very successful season.

B. Program Integration

Coordination Between WBS

Accomplishment: We worked within the constraints of the IMS and the overall South Pole support framework and collaborated effectively with other WBSs.

Benefit: Our presence caused no significant negative impact to station services (FEMC, Operations, Science Support).

Accomplishment: We worked closely with FEMC and South Pole Operations to renovate the ICL exterior, install steel decks and stairs, and erect the east cable tower.

Benefit: The ICL is on track for conditional occupancy in December 2006.

C. Innovation/Process Improvement

Responsiveness to Challenge and Change

Accomplishment: We worked hard to overcome several challenges related to re-establishing the drill camp after the winter, including issues with power (at the winter storage site and at the camp site) and with camp setup and reconfiguration.

Benefit: The process served as a learning experience, allowing us to refine our procedures and become more efficient.

Accomplishment: The large IceCube population and the transition of AMANDA to the B2 science lab presented us with significant challenges regarding lab space. We worked with Science Support to find additional space for IceCube grantees.

Benefit: IceCube grantees were able to continue their work without significant interruption.

Identified Issues

Issue: We received more Digital Optical Modules (DOMs) than we could deploy into the holes. Unless we could find warm storage space on station, the modules would have to be flown back to McMurdo or Christchurch, where ambient temperatures do not drop below the manufacturer's specifications. This was a significant issue, as space in the station is tight and no labor was allocated to this unanticipated and time-consuming task. Altogether, the DOM boxes weighed about 12,600 pounds.

Response: We scheduled training for IceCube personnel in crane platform operation, moved the six strings of DOMs (360 modules) across the station, and stored them in space we identified in the B2 Space Science Laboratory until they can be removed and deployed into holes next season.

Figure 17-27 Relocating the Main Supply Hose Reel

Lessons Learned

We initially thought the process of moving the drill towers and ancillary equipment (Figure 17-27) would require significant effort, but it was much easier than anticipated. We believe this will have a positive impact on future drilling schedules.

Section 3. Plans for KY07

During the austral winter, we will renovate the interior of the ICL. Once summer starts we will re-establish the drill camp and continue drilling holes and deploying detectors. IceCube grantees will take conditional occupancy of the ICL.

LABORATORY OPERATIONS – PALMER STATION

Section 1. Summary

There were many positive changes and improvements in Palmer Station Science Support during KY06, including a new science facility, equipment upgrades in the boating program, improved safety awareness in the laboratories, and installation of a webcam for remote observation of local sea ice conditions.

As soon as we received conditional occupancy for the TerraLab building, we began moving science events from the old T5 and VLF/Clean Air buildings into the new facility. Throughout the summer season, we carefully shut down, moved, and restarted data-collection instruments for each science event. Because we coordinated with other RPSC departments and communicated constantly with PIs, events experienced only minimal data loss. As of this writing, only three projects remain to be moved.

In addition, two Comprehensive Test Ban Treaty (CTBT) personnel came to Palmer for a few weeks to install a radionuclide monitoring station in the TerraLab.

Improving laboratory safety was a high priority this year. We created a safety presentation for all incoming grantees that covered emergency contact information and the location of laboratory safety equipment and spill kits. We put together new spill kits and placed them in highly visible locations throughout the laboratories and chemical storage areas. Shopstock ear protection, eye protection and acid-washing gloves are now readily available. We completed the Palmer Chemical Hygiene Plan and began the weekly, monthly and yearly inspections required by this plan. We evaluated our chemical inventories and eliminated a large quantity of old and expired chemicals. The remaining chemicals are all properly labeled and stored and the Material Safety Data Sheet database is complete.

Figure 17-28 Main Science Room in New TerraLab

Figure 17-29 CTBT Monitoring Room in New TerraLab

Another big improvement for Palmer Science was the change from 2-stroke Johnson-Evinrude outboard motors to 4-stroke Yamaha motors. The new outboards are quieter, more reliable, and more environment-friendly, and the reaction from the scientific community has been only positive. We purchased the motors in a range of horsepower to accommodate varying needs. We use 75hp outboards on the large zodiacs with

Figure 17-30 40hp 4-Stroke Yamaha Outboard and 9hp Kicker on MkV Zodiac

heavy sampling platforms and 40hp outboards on both the lighter large zodiacs and the smaller zodiacs. We use both 9.9hp and 4hp outboards as kickers on all the boats.

Last season, a test webcam was installed as part of the PRIMO research project. We soon recognized it as a valuable tool for remotely monitoring local sea ice conditions. After surveying the Palmer science community for suggestions on where to place the instrument, we chose a spot in the new TerraLab. The instrument's images can be viewed in near-real-time on the WHOI website (http://4dgeo.whoi.edu/tsg), along with data from the thermosalinograph.

Section 2. Qualitative Performance

A. Project Management

General Management

Accomplishment: Detailed planning and coordination, internally at RPSC as well as between RPSC and the NSF, allowed us to successfully integrate and support an ambitious variety of operational objectives and science events.

Benefit: KY06 was the busiest science season at Palmer in many years, with all laboratories, boating facilities, and aquaria used to their fullest capacity.

Customer Satisfaction

Accomplishment: We presented lectures about science objectives and Palmer Station to over 4,500 visitors and conducted station tours for over 1900.

Benefit: Our hospitality educates the public on the importance of scientific research in general and the USAP in particular.

Accomplishment: We moved the VLF antenna tower from its former location halfway up the glacier to an area at the top of the glacier. We removed old posts that were no longer needed.

Benefit: The grantee can now collect cleaner, less "noisy" data. There is a much less chance of seasonal meltout affecting the tower's alignment at the new location, and therefore less maintenance is required. Removing the old posts has reduced trip hazards.

Human Resources

Accomplishment: Science Support at Palmer enjoys high employee retention. Our staff this season consisted of 75% returning USAP employees. 63% were returning Palmer employees.

Benefit: High employee retention is an indication of high morale. Holding on to experienced personnel helps us retain institutional and historical knowledge, and it contributes to higher productivity.

B. Program Integration

Coordination Between WBS

Accomplishment: We coordinated closely with other departments at Palmer Station and in Science Support, such as Special Projects and Marine Science.

Benefit: Interdepartmental cooperation at Palmer smoothed the transition from the old T5 and VLF/Clean Air buildings to the TerraLab, allowing science events to conduct work without interruption. Equipment sharing between Marine Science and Palmer Science Support allows both departments to extend their support capabilities.

Integration of Environment, Health, and Safety Objectives Across Corporate Activities

Accomplishment: We outfitted the laboratory with new safety equipment and increased laboratory safety awareness with new safety presentations.

Benefit: All laboratory users are better educated about hazards and emergency procedures. Our laboratory is safer, and we have moved toward greater compliance with standard laboratory safety procedures.

C. Innovation/Process Improvement

Innovative, Technological Solutions

Accomplishment: We replaced all 2-stroke Johnson-Evinrude outboard motors with new 4-stroke Yamahas.

Benefit: The new motors are quieter, more fuel-efficient, more reliable, and more environment-friendly. Their greater reliability increases safety.

Accomplishment: We retained the PRIMO test webcam and applied it to monitoring sea ice conditions.

Benefit: Scientists and other interested parties can now remotely observe near-real-time weather and sea ice conditions in the Palmer Station area.

Responsiveness to Challenge and Change

Accomplishment: When early season sea ice and high winds prevented grantees from collecting field samples using standard methods, we devised alternative approaches.

Benefit: The grantees were able to collect data under conditions that normally would have prevented it.

Accomplishment: When the *LMG* was unable to deliver science personnel and cargo to Palmer because of heavy sea ice, we assisted short-handed grantees in the field and supplied them with interim materials and equipment from laboratory stock.

Benefit: The grantees were able to continue their research according to plan and without interruption.

Identified Issues

Issue: Delays in procurement and cargo delivery prevented critical scientific equipment from reaching Palmer in a timely manner.

Response: We put rush orders into place immediately and followed up daily. Whenever possible, we provided alternative materials and equipment.

Section 3. Plans for KY07

We are planning for another heavy support year in KY07. The laboratories are currently at near capacity and will stay that way well into June 2006.

MARINE SCIENCE

Section 1. Summary

In KY06, the Marine Science group supported 43 science events, including 15 events on the *LMG* and 22 events on the *NBP.* We collected oceanographic data aboard both vessels for three long-term projects and provided these data to the principal investigators throughout the year. The three remaining projects were Peninsula field camps that received logistical and Marine Science technician support from the *LMG.*

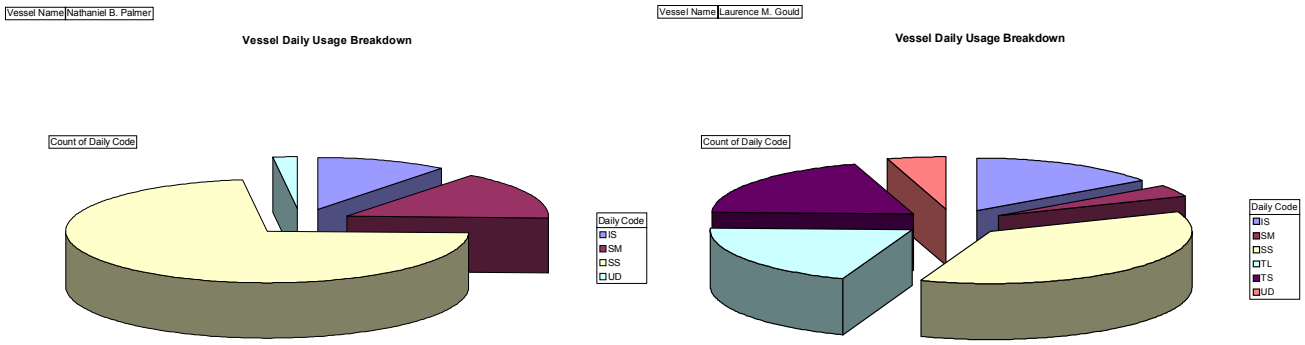


Figure 17-31 Vessel Daily Usage Breakdown - NBP and LMG

Legend

Daily Code	Title	Definition
IS	In-port, Science Support	In port, science cruise support - days spent in port, at Palmer or McMurdo Stations when science is either cleaning up or setting up labs, on loading or off-loading cargo or doing other related activities directly related to ending or starting a science cruise. This would include time spent supporting fishing cruises if the ship is standing by, ready to depart for fishing and awaiting depletion of station research fish stocks. This would also include time while receiving fuel if concurrently loading or setting up for a science cruise.
SM	Scheduled Maintenance	Scheduled Maintenance - days spent in port or at sea when no science cruise work is occurring but other ship-related activities are occurring. This includes time spent in transit in which no science is done, but there was science equipment testing (e.g., multibeam trials or UNOLS Inspections).
SS	Sailing for Science	Sailing for science - days at sea when a funded, scheduled science cruise is on board whether or not the ship is transiting to or from the study site or at a study site. For delays at sea due to weather, see “unscheduled downtime,” below.
TL	Transit-Logistics	Transit/logistics - days spent in transit or on loading and off loading station cargo and passengers. No funded science activities are done or planned for the entire cruise. This includes logistics runs to Palmer Station; the time spent at Punta Arenas, Chile or Palmer Station supporting strictly station logistics (including Palmer Station grantee cargo); transits to shipyards for maintenance; hazardous materials runs (if no "science of opportunity" occurs); days that "science of opportunity" could not be done for weather, but the ship is still in transit to its final location. Fueling of Palmer Station falls within this category unless there was a concurrent science support role.
TS	Transit-Science of Opportunity	Transit/science of opportunity - days spent in transit not in direct support of a scheduled science cruise but where we are accommodating "science of opportunity." For example, the days spent in the Drake doing XBTs for OO-260-O. These should be counted as "science of opportunity" days unless a funded science group is onboard. If XBTs are planned but not carried out because of weather, or for days not spent supporting science on transits, see "transit/logistics."
UD	Unscheduled Downtime	Unscheduled downtime - this is a catchall for time when the ship is delayed in port for emergency repairs, involved in a medical evacuation or other special cases such as humanitarian support to other stations. This also includes days for which no planned science activities could be conducted on scheduled science cruises because of weather or sea ice conditions. A comment regarding the special circumstances must be made when using this code.

Most of the vessel-based science we support is NSF-funded, but the NSF also authorized us to collect science-of-opportunity data for several researchers funded by the National Oceanic and Atmospheric Agency (NOAA). In addition, we supported two science events associated with the Antarctic Marine Living Resources cruise aboard the R/V *Yuzhmorgeologiya*. We provided Mitchell, Measures, and Charrotte with lab supplies, lab instruments, waste disposal and sample shipment, and we supported Detrich at the last-minute by supplying liquid nitrogen (LN2) dewars and significant volumes of LN2, and by shipping samples.

Much of the assistance we provide to non-USAP scientists consists of arranging for our Chilean port agent [redacted]) to handle their travel and cargo transport.

As part of pre-season planning, we met with the stakeholders of complex events and new marine-based events to discuss and plan the support we would provide. In coordination with the RPSC Project Management Office (PMO), we began the multi-year process of re-competing for the *LMG* contract and hired a manager to oversee that effort. Other KY06 projects included:

- Coordinating a site visit for Autosub participants to inaugurate planning for this technically- challenging event.
- Working closely with the Planning Group to ensure that all support requirements for the Polar Remote Interactive Marine Observatory (PRIMO) are in place before this event deploys.
- Acquiring a multi-channel streamer system by means of a government property exchange between the NSF/OPP and the U.S. Geological Survey (USGS).
- Working with the POLAR ICE development team to improve equipment descriptions and other Marine Science-related areas to make the application more functional and user-friendly.

We are also applying project management techniques to many of our larger projects, including the sonar window replacement, dry dock for both vessels in 2007, and the Polar Research Vessel. These are currently awaiting approval by the NSF.

Section 2. Qualitative Performance

A. Project Management

General Management

Accomplishment: We wrote a new procedure for managing the marine science subcontractor, Edison Chouest Offshore (ECO), and mission-critical systems.

Benefit: The procedure improves our ability to track problems with subcontractor-maintained equipment and to hold the subcontractor accountable for repairs.

Customer Satisfaction

Accomplishment: We received many positive comments from grantees aboard the vessels:

> "The employees from RPSC working with us on the ship were very helpful, professional and supportive in all respects. They always radiated a positive constructive and supportive work attitude even in the most adverse conditions. They worked very well together as a group and with us, had a good hand in improvising to try to find whatever solution necessary for emerging problems, necessary changes in schedules on a relative short notice or new science procedures (often invented only few hours before)."

> "Despite the difficult circumstances we had to operate under at times at this time of the year, we could complete all of our science goals. This wouldn't have been possible without the support of Capt. Mike and his crew and all the Raytheon Techs on board who were always accommodating and patient despite the constant demands that we put on them."

> "In conclusion, we thank Captain Mike Watson and the *NBP* crew as well as our MPC ([redacted] and the Raytheon crew for allowing us to get the science done. The atmosphere on the ship is always positive and a true sense of teamwork is omnipresent. This kind of science support at sea is found nowhere else in the world. It is the kind of technical and professional teamwork that all oceanographers dream about. We are confident that we have made some significant scientific findings on this cruise and look forward to our November 2006 expedition."

> "The support received from the RPSC staff was excellent. This cruise supplied many new challenges and they were met with enthusiastic attitudes."

> "MaudNESS required several novel ways of deploying oceanographic equipment from the *NBP*. Both the [redacted] and RPSC parties responded to the challenges in very positive ways — basically with an attitude that we will help you get the job done as best we can. Made for a very positive experience all the way around."

Benefit: The grantees recognize that the support we provide allows them to accomplish their scientific goals.

Human Resources

Accomplishment: We re-structured the position of Marine Science Electronics Technician (ET) Supervisor from a fulltime, permanent position to two annual-contract employees. These employees share duties in a manner that allows us to maintain continuity. While one is deployed, the other remains at Denver HQ, giving us a constant presence in the office. Both employees are provided opportunities to sail on both vessels and thereby stay abreast of operational issues.

Benefit: Increased efficiency, flexibility and better employee satisfaction and retention. Exposure to both vessel systems will give the ET supervisors a better understanding of the technical capabilities of each and better familiarity with onboard science equipment. This arrangement also allows for more vessel time, which increases opportunities for the ET supervisors to mentor new employees and build relationships with contract personnel and ECO crew.

Accomplishment: We proposed to pay annual contract employees for travel days. Multiple deployments are the rule for Marine employees (up to four or five a year) and we felt that paying them for travel days (except for those incurred on the first deployment) is a fair treatment that will lead to higher retention.

Benefit: We anticipate higher retention, which will reduce the cost of hiring and training employees.

Accomplishment: We hired a contract Science Cruise Coordinator to fill in for fulltime coordinators while they deploy.

Benefit: Improved continuity of tasking at Denver HQ.

Cost Savings

Accomplishment: We responded to an unanticipated dry dock repair for the *LMG* by completing our tasking quickly and taking the ship off-hire for five days.

Benefit: RPSC saved the Program about $174K.

Accomplishment: We negotiated with [redacted] recover the cost of the medical evacuation from the *NBP*.

Benefit: We were able to recoup about $93K while still maintaining a good working relationship with [redacted]

Accomplishment: We used the *NBP* to facilitate NOAA's collection of Pacific Ocean XBT data.

Benefit: We received free XBT probes worth over $10K, and NOAA paid for all other costs associated with the data collection.

B. Program Integration

Coordination Between WBS

Accomplishment: We worked with several other RPSC divisions (McMurdo Operations, Logistics, Science Support, and EH&S) to plan and execute the *NBP*'s McMurdo port call. Despite difficult ice conditions and the break-down of the icebreaker *Krasin*, the port call went smoothly.

Benefit: Grantees experiences no problems or delays. We were able to off-load time-critical grantee lab equipment, cruise scientific samples, and 70 drums of hazardous waste. Transiting this waste through McMurdo to the resupply vessel for direct transport to CONUS saved the USAP considerable money and effort.

Accomplishment: We improved vessel equipment descriptions in POLAR ICE.

Benefit: The more user-friendly descriptions made it easier for PIs to complete their SIPs, which reduced the workload of the POLAR ICE team and Marine Science Cruise Coordinators.

Integration of Environmental, Health, and Safety Objectives Across Corporate Activities

Accomplishment: We worked with Safety and Human Resources personnel to develop a thorough and concise safety orientation for Marine Science contract employees.

Benefit: The orientation is now more relevant, as it focuses on safety hazards in a marine environment and avoids issues that do not pertain to vessel operations.

Accomplishment: We transported several tons of hazardous waste from Palmer Station to Punta Arenas aboard the *LMG*, where it was loaded aboard the *NBP* and transported to New Zealand for later transfer to the *American Tern*. This was a large cooperative effort involving Marine Science, Hazardous Waste, Palmer Station management, [redacted] and RPSC Christchurch Operations.

Benefit: The hazardous cargo was carried to New Zealand on a pre-existing transit for loading onto the *American Tern*, eliminating the need for the *LMG* or *NBP* to make a special hazardous waste run to CONUS.

C. Innovation/Process Improvement

Innovative/Technological Solutions

Accomplishment: We developed a novel way to deploy equipment (such as small moorings, seismic boomers, single-channel streamers, and side-scan sonars) from the *Cajun Cruncher* (the *NBP* work boat) and the landing craft.

Benefit: This innovation allowed us to support science during the Anderson/Hallett Chilean Fjord cruise according to grantee requirements.

Accomplishment: We designed an innovative system that permitted us, for the first time, to use the *NBP* moon pool while the vessel was in sea ice. A reducing sleeve and specialized container, equipped with a hoist and plunger, allowed us to clear accumulated ice from the moon pool and perform continuous CTD casts in heavy ice conditions.

Benefit: Even when encroaching ice forced us to recover all other instruments, CTD data collection was unaffected. The *NBP* can now offer uninterrupted access to the water in heavy ice, an invaluable benefit to grantees.

Accomplishment: We upgraded the phone system on the *LMG* to integrate Iridium, Inmarsat, ship's phone system, the wireless connection at Palmer Station, and an answering machine.

Benefit: This dramatic improvement will auto-forward incoming Inmarsat and Iridium calls to the MPC Office, the Electronics Lab, and the answering machine, in that order. Denver HQ can contact the ship via VOIP any time the ship is within three kilometers of Palmer Station, saving Inmarsat/Iridium costs. Calls can also be manually transferred to the ship's phone system, allowing recipients to take them anywhere on board. The answering machine will be a great help to those trying to contact the vessel, particularly during Palmer Station port calls.

Accomplishment: We purchased a Satellite DGPS system to support SHALDRIL.

Benefit: Precise positioning is now available to SHALDRIL, as well as any future events that require it. Because we purchased this system for what it would have cost to rent one, this was a budget neutral acquisition for RPSC and the NSF.

Accomplishment: The superstructure added to the *NBP* to support SHALDRIL made it difficult to enter the helo hangar without opening the large overhead door, which in turn made the helo hangar too cold for the chemicals and science equipment stored and/or used there. To address this problem, we built a man-door into the large door.

Benefit: The door gave grantees easier access to the helo hangar while limiting heat loss to the environment. This solution received positive

comments during the NBP05-08 outbrief. The door was meant to be a one-cruise item but was requested by grantees on all subsequent cruises. It is now considered a semi-permanent addition.

Visionary Management

Accomplishment: We have begun work on renewing the *LMG* contract. We realize we will most likely have the same vessel for a few more years, so we are writing a better and less ambiguous contract**.**

Benefit: More efficient management and control of the vessel charter agreement**.**

Responsiveness to Challenge and Change

Accomplishment: Our EMT-B responded calmly and professionally to a medical emergency aboard the *NBP.* We worked closely with the Captain and with Chilean authorities to arrange evacuation for the patient.

Benefit: The emergency evacuation was successful and the patient is making a full recovery.

Accomplishment: The above evacuation caused a potentially disruptive shift in the schedule. We worked quickly with the NSF and with the affected grantees to develop a feasible solution.

Benefit: The grantees of NBP05-07 and all subsequent cruises were able to accomplish their scientific goals.

Accomplishment: The *LMG* required unexpected dry dock repairs, causing another potentially disruptive change in the cruise schedule. We worked closely with Palmer Station Operations personnel to develop an alternate schedule that minimized the impact on science.

Benefit: Grantees were able to continue their work almost as originally scheduled.

Accomplishment: MaudNESS science objectives required the simultaneous deployment of five instruments in heavy sea ice, without the use of ship power. These “drift stations” often lasted 24 to 48 hours and required our constant attention to prevent instruments from getting entangled, caught on passing ice, or trapped as the sea surface froze.

Benefit: The grantees were able to take several measurements simultaneously from the same column of water, thereby generating more accurate data.

Accomplishment: We researched and procured a new magnetometer system, including a backup sensor.

Benefit: The new system is more robust and easier to support than the previous system, and the backup sensor will prevent data loss in case the sensor is lost.

Identified Issues

Issue: Many pieces of critical cargo were delayed and were expected to miss port call.

Response: We carefully tracked certain items, shepherding them through the system, and we looked for ways to procure other items locally. Our actions were successful and most critical items made their cruises.

Lessons Learned

We found that receiving cargo on a timely basis was a serious problem. We had to track every item and send constant reminders to buyers and Port Hueneme cargo forwarders. We have resolved to continue this process of diligently tracking our cargo to mitigate the risk of mission-critical equipment and supplies missing a port call.

Section 3. Plans for KY07

Not only do two upcoming cruises (NBP07-01 and NBP07-02) offer unique challenges of their own, but there is a port call to McMurdo between them. We will work closely with Christchurch and McMurdo personnel to resolve the critical logistical issues arising from this situation.

One of these cruises, the multi-channel seismic streamer cruise (NBP07-01), requires that we procure a new multi-channel streamer or bor-

row one from another institution (such as the USGS). We are reviewing the latter option for cost feasibility.

We will work closely with the USGS to analyze and repair (when necessary) any equipment we receive from them as a government property transfer. This equipment could significantly add to the current USAP inventory, increasing capabilities at a fraction of the price it would normally cost to purchase this equipment.

Finally, both the *LMG* and the *NBP* will require a U.S. Coast Guard dry dock inspection and maintenance during Contract Year 8. We will begin planning in KY07 for these events. We hope to improve each vessel's scientific capabilities by completing major (sonar window replacements) and minor projects (extending underway seawater service and upgrading deck incubator setups) while they are in dry dock.

SOUTH POLE STATION MODERNIZATION

Section 1. Summary

The South Pole Station Modernization team (SPSM) and South Pole operations are now using the new Elevated Station exclusively. SPSM is nearing completion. Although there is a significant amount of administrative support required to close out already completed construction, procurement is nearly complete, with only resupply, Do Not Freeze, and minor materials orders remaining. We are witnessing a change in the culture and in the ability to support new science. The SPSM team has proven itself under less than ideal conditions to be dependable and ready to meet all expectations and challenges.

The KY06 Winter team completed all identified tasks and, in addition, was able to build out most of the B4 gym pod. Although we did not originally expect to have the B4 section ready for KY06 occupancy, through judicious use of resources and available materials the winter team made it happen. This contributed significantly to the outstanding success of the KY06 summer, with all remaining Elevated Station pods given conditional occupancy. The present KY07 winter will be the first where no one is living under the Dome in over 30 years.

Although the summer team faced challenges – early season flights were constrained because of weather, which forced reconfiguration of the construction schedule because of materials shortages, and the decision to install Tyvek under the exterior siding was an added activity that delayed siding installation – they still completed *all major milestones*. The IMS was again invaluable, since we were able to realign resources to match work priorities.

The continued scheduling of activities and resources using the most optimistic operations scenarios, at NSF insistence, places high expectations on every person working at South Pole and on the planning team throughout the year. Even under these constraints, the RPSC team performed admirably. It is hard to imagine a harsher, more demanding work environment than that found at South Pole, and yet each year the entire South Pole team, including SPSM personnel, rise to the occasion and complete the primary needs of the NSF. It is important to maintain this perspective and recognize the incredible achievements made by this group of people.

The KY07 winter construction team has an aggressive schedule that we will review as part of the KY07 overall review. The team members are experienced and capable, however, and we are confident they will achieve their goals.

Section 2. Qualitative Performance

A. Project Management

General Management

Accomplishment: SPSM personnel completed all KY06 winter tasking, including outstanding punch list items, Elevated Station Wings A4, B3, and B4 interior finishes, and DSL construction. We finished three wings versus the usual two.

Benefit: Completing these tasks paved the way for KY06 summer conditional occupancy.

Accomplishment: We kept two engineers and one designer on-site for winter construction.

Benefit: These personnel provided technical support, utility coordination, and as-built drawing maintenance, resulting in excellent installation quality.

Accomplishment: We further developed and used the P3e/c scheduling tool. We achieved the overall goal of a single planning tool for all South Pole stakeholders.

Benefit: This tool improves project planning. We now use P3e/c throughout the entire South Pole IMS, including resource-loaded tasking for SPSM, South Pole Maintenance, Operations, Science Support, and minor projects. The tool was instrumental in managing limited resources and prioritizing tasking to best meet client objectives.

Accomplishment: We gained conditional occupancy of the DSL.

Benefit: This meets a major goal of both RPSC and the NSF. The BICEP telescope group now occupies the facility and is making scientific observations.

Accomplishment: We gained conditional occupancy of the EFM and the VFM.

Benefit: We now have full use of the new Emergency Power Plant located in the Elevated Station.

Accomplishment: We completely enclosed the Cryogen Facility.

Benefit: Closure of the building meets schedule milestones and allows us to complete interior finishes during the KY07 winter.

Accomplishment: We successfully raised the old Bio-Med arch and constructed new bulkheads on the downwind end of the fuel arch and the upwind end of the old Bio-Med arch.

Benefit: The safety issues associated with the collapse of old arch bulkheads have been corrected.

Customer Satisfaction

Accomplishment: We gained conditional occupancy of Elevated Station Wings A4, B3, and B4, and we completed all priority one punch list items by summer's end.

Benefit: Conditional occupancy meets major goals for both RPSC and the NSF. This is a major milestone. All station operations are now housed in the Elevation Station.

Accomplishment: All science events moved into the Elevated Station during austral summer 2006, and all science operations are now conducted in the new station or outlying science facilities.

Benefit: We can now move forward with demolishing the old station.

Accomplishment: We tuned HVAC controls for Level 2 of the DSL to meet BICEP's specific requirements for optimal experimental operation.

Benefit: BICEP is able to collect the highest quality data.

Human Resources

Accomplishment: SPSM/FEMC filled positions with the most qualified applicants available, which was a challenge because of the very competitive job market for skilled workers. With large reconstruction efforts in the Middle East and in the wake of Hurricane Katrina, the availability of skilled tradesmen has been and will continue to be low. We processed 412 applications and filled 143 summer and winter positions.

Benefit: We met most scheduled tasking and project milestones.

Cost Savings

Accomplishment: We shipped the Snow Haul Trailer from McMurdo to the South Pole via the South Pole Traverse.

Benefit: We saved $156K as a result.

B. Program Integration

Coordination Between WBS

Accomplishment: SPSM/FEMC used the IMS across all divisions and projects to accomplish strategic goals. One notable success was moving several science experiments from older facilities to the Elevated Station and ARO. We used the IMS to coordinate science support, construction, and operations.

Benefit: The transition was successful and all experiments were operational at their new locations by the end of the austral summer.

Accomplishment: We installed the BICEP telescope in a facility still under construction. Detailed planning and open communication with the grantee made this possible.

Benefit: Telescope calibration began on schedule.

Integration of Environment, Health, and Safety Objectives Across Corporate Activities

Accomplishment: We worked diligently with EH&S to modify safety training and information.

Benefit: Together, we made the training more relevant to Antarctic conditions.

Accomplishment: We identified individual training needs and offered follow-up and refresher training throughout the summer.

Benefit: This system ensured workers completed required training before beginning work and maintained skill levels through the construction season.

Accomplishment: We worked closely with EH&S on safety reviews of facilities and job sites.

Benefit: The reviews allowed us to identify and rectify safety issues, creating safer work sites. We also identified long-term issues and scheduled them for resolution in future seasons.

C. Innovation/Process Improvement

Innovative, Technological Solutions

Accomplishment: SPSM engineering worked with CRREL to develop infrared thermal scanning capabilities at South Pole.

Benefit: This tool has been instrumental in identifying areas requiring repair or further investigation, especially regarding the Elevated Station interior vapor barrier.

Accomplishment: The hoist initially supplied for the Elevated Station cargo decks stopped working during the extreme South Pole winter. SPSM engineering extensively researched alternatives and worked closely with one vendor to develop a design that functions under winter conditions.

Benefit: A new hoist has been installed and is working well.

Responsiveness to Challenge and Change

Accomplishment: During the design team inspection of the Elevated Station, we found incorrect electrical connections in the emergency power system. We identified and quickly procured the correct connectors.

Benefit: We were able to replace the incorrect 3-Pole transfer switches with 4-Pole transfer switches during the KY07 winter.

Accomplishment: Problems threatened to delay delivery of a replacement cargo hoist until next summer. When station close was delayed a week, we quickly coordinated efforts with the vendor, Procurement, Logistics, and site personnel to get the hoist delivered.

Benefit: The hoist was delivered before the station closed and has since been installed.

Identified Issues

Issue: A redundant boiler had been removed from the DSL design. The design team, during inspection, determined that the redundant boiler was required.

Response: We reviewed the technical issues and proposed a few minor modifications to the DSL mechanical room. The design team approved the changes. The construction team made them and installed the redundant boiler while the design team was on-site. This action ultimately led to conditional occupancy of the facility.

Issue: The design team inspection of the Elevated Station uncovered a design variance with the leading edge beveled soffit construction. Several modifications to the original design had not been formally documented.

Response: The design team identified and reviewed the modifications and recommended a minor, additional modification. We implemented their recommendation and completed a final bevel installation.

Issue: We had an aggressive siding installation goal for summer KY06, which included completing Wings A2, A3, B2, and B3. Because of a number of unplanned events, we were able to complete only the siding on the windward vertical surface for Wings A2 and A3, with partial completion of the leading edge beveled soffit.

Response: We re-scheduled incomplete tasking for the KY07 summer. We will discuss impact analysis with the NSF during the KY07 austral winter.

Issue: We were unable to complete HVAC controls for the DSL first level because of hardware incompatibilities.

Response: Our engineering team will re-evaluate the design and correct the problem during the KY07 summer.

Issue: Late season dropouts and NPQs reduced the winter population.

Response: This is a problem we face each year. We always secure alternate hires to call when drops occur. This year we used all our alternates and even made some last minute New Zealand hires, but we were still under planned population levels. We will try to identify more alternates, plan according to statistical drop rates, and consider over-hiring for winter. We have used these practices in the past, but usually the economy is the driving force behind high drop rates.

Lessons Learned

Field personnel have requested more rapid responses to engineering questions, RFIs, and CRs. Work at times has to be rescheduled until we receive a response. All construction activities would benefit from 1) designating a single point of contact responsible for timely responses to engineering questions, RFIs, and CRs, and 2) promoting the need for timely responses from all internal and external agencies. The Quarterly Audit and weekly telecons with South Pole and the NSF help with the problem, but it still exists. RPSC and the NSF should take this as an action to be addressed before the next summer construction season begins.

To increase employee safety on the job and conform to OSHA requirements, construction personnel are required to perform Job Hazard Analyses (JHAs). RPSC is reviewing whether most JHAs could be performed at Denver HQ, where more resources are available.

Technical reviews and initial briefings for subcontractors and NSF consultants take significant time and effort when these people arrive on-site. RPSC will consider using Denver HQ to conduct orientations so time on-site is more efficient.

The fulltime MCS/Procurement Coordinator has proven to be invaluable in securing hard to find or late ordered materials. We recommend that this position remain until the Cargo Facility is completed.

Procurement costs did not include vendor shipping charges, which resulted in costs exceeding budget in some areas. Freight charges

are generally incurred 30-60 days after the original purchase order has been paid. Recognizing that freight costs are normally 8% of the material cost, we recommend including this amount in the procurement and not removing it from the ETC until freight costs are incurred. This process will provide a more accurate ETC and more closely represent when costs are actually incurred.

Construction personnel are proceeding with field modifications before the paperwork and issues-to-be-resolved are accepted by the NSF. While this has been minor in most cases, project personnel will be trained to identify changed conditions and then notify proper points of contact so proper documentation can be prepared. When changes are necessary, we will use the RFI/CR process to communicate them and resolve issues.

Section 3. Plans for KY07

- Complete the Cryogen Facility and obtain conditional occupancy.
- Begin construction on the Cargo Facility.
- Construct the Aircraft Fueling Module.
- Continue to install Elevated Station siding.
- Survey and level the Elevated Station, accounting for all differential settlement to date.
- Construct Water Well 3 and begin water circulation.
- Develop and organize all information necessary to perform final testing and achieve occupancy of each system and facility, and for the overall project.
- Continue to address punch list items, with the goal of completing all outstanding items.
- Relocate the Hypertats to summer camp.

PERFORMANCE EVALUATION COMMITTEE KY05

PEC Item 1: Past Due Cost Estimates

Issue: "Updated cost estimates [for the IceCube project] requested by NSF have not yet been received."

Action: [redacted] to submit this estimate.

Assignee [redacted]

Due: 31 Mar 2006

Response: RPSC is reviewing the IceCube estimate internally. It will be published and submitted to the NSF by 28 Apr 2006.

Status: Pending

PEC Item 2: Integrate Planning Season with IMS

Issue: "Science Support should more closely follow approved support plans for SIPs. … There do not appear to be controls in place to limit or eliminate this problem…Including science projects in the Integrated Master Schedule (IMS) would also improve this process."

Action: Science Support Planning Group to integrate the planning season with the IMS for each station. Supervisors for Dry Valley camps, Helicopter Operations, and Fixed Wing Operations will identify PAX/cargo and bed space into their planning effort, then integrate that information with IMS. RPSC will get NSF ABM concurrence with this strategy and include the ABM in planning sessions.

Assignee: [redacted]

Due: 31 Mar 2006

Status: Open

PEC Item 3: McMurdo Vehicle Fleet

Issue: "The McMurdo vehicle fleet suffers from a lack of management ingenuity, analysis and benchmarking of USAP equipment, and of forward-looking recommendations…"

Action: RPSC to implement a comprehensive equipment management plan in FY06 that is in alignment with the NSF ABM. RPSC will provide a benchmark, deliverables, metrics, and progress updates.

Assignee: [redacted]

Due: 31 Mar 2006

Response: RPSC has secured support from RTSC fleet management personnel. Preparation of an overarching plan is in progress; a number of steps required to improve fleet operations and management practices will be implemented in the FY07 summer.

Status: Open

PEC Item 4: SIPs and ORWs

Issue: "SIP and ORW processes require an excessive time commitment and remain the biggest obstacle to effective planning."

Action: RPSC to prepare a POLAR ICE V4 submission to the NSF that addresses any remaining grantee issues; RPSC will review the submission with the NSF ABM.

Assignee: [redacted]

Due: 31 Mar 2006

Response: POLAR ICE V4 will focus on SIP long-term planning, project controls, cost analysis, incremental/scope/change management, multiyear scheduling improvements, and integration with station IMS resource management,

Status: Open

PEC Item 5: Pegasus Facilities

Issue: "Pegasus facilities had no water and clogged toilets, and waiting time was excessive."

Action: RPSC to review plans to resolve this, for FY06 and beyond, with NSF ABMs.

Assignee [redacted]

Due: 31 Mar 2006

Reponse: A Mobile Runway Support Facility funding request was submitted as part of FY06 project submissions. That project has yet to be funded. As an interim solution, RPSC will provide janitorial support through the AGE group. No further action is available until funding is approved. Currently, running water is not available at this airfield.

Status: Closed until funding is made available

PEC Item 6: Benchmark for Project Management Progress

Issue: "…. Facilities Engineering, Maintenance and Construction (FEMC) has failed to significantly or even noticeably improve performance over the term of the contract. For example, performance in the key areas of project management, including planning, estimating and cost control, as well as responsiveness to NSF, is well below what it should be."

Action: RPSC to establish a benchmark for measuring future progress against the following areas:

- Estimating
- Cost Control
- Responsiveness to the NSF
- Project Management Processes
- Planning Processes
- Change Management
- Organizational/Interdepartmental Communications

RPSC will then use these to establish future 90 day expectations and to address missed expectations with NSF ABMs and other RPSC divisions.

Assignee: [redacted]

Due: 31 Mar 2006

Response: An estimating plan has been published. See I:\Collaboration\PMO\PMO Processes and Procedures\Cost Estimating. Closed.

Cost control. Estimating and Cost Control are ongoing processes. Responsibility for both has been transferred to the PMO, which is addressing action items and implementing process improvements. Closed.

Responsiveness to NSF. RPSC has implemented a number of procedures, including the weekly NSF-RPSC telecons intended to improve RPSC response time to NSF requests. This item is considered Closed.

Project Mgmt Processes. RPSC has identified a number of PM process improvements and is implementing them on an ongoing basis. This item is considered Closed.

Planning Processes. These are considered part of Project Management Processes. Closed.

Change Management. A new procedure is in process.

Organizational/Interdepartmental Communications. A communications protocol has been published. Closed.

Status: Closed

Completion Date: 31 March 2006

PEC Item 7: Identification of Specific NSF Issues

Issue: "….. RPSC [Science Support] needs to take a more centralized approach with regard to development and integration of program requirements for POLAR ICE, balancing the needs of RPSC against the time commitments of grantees."

Action: RPSC to identify specific POLAR ICE improvements to discuss with the NSF ABM, agree on steps to take to rectify the issue, and provide a proposal. Include this in the "Next 90 Days" review.

Assignee: [redacted]

Due: 31 March 2006

Response: The noted issues are now addressed in the V3.5 version of POLAR ICE and through the KY quarterly 90 day expectations.

Status: Closed

Completion Date: 11 April 2006

PEC Item 8: Quality Improvement Action Plan

Issue: "Science Support … fails to make value judgments based on data collected and is more

apt to provide NSF with raw data than to synthesize it and make recommendations on how to proceed in response to the data."

Action: RPSC to identify specific issues that the NSF wants rectified. RPSC will establish an action plan with specific Science Support individuals to improve the quality of information, the format used, and the product sent to the NSF. Establish a review process to ensure adequate product quality.

Assignee [redacted]

Due: 31 March 2006

Response: The Science Support Director has held weekly meetings with NSF counterparts to identify and then resolve issues of key concern to NSF and affecting the product delivered to the NSF. In addition, an NSF-RPSC partnering meeting has been scheduled to discuss this specific issue. This item is considered closed.

Status: Closed

Completion Date: 12 April 2006

PEC Item 9: Project and Field Camp Tracking System

Issue: "Science Support should more closely follow approved support plans for projects. There is a tendency to provide more support than was planned/approved, raising budget and work load concerns, and there do not appear to be controls in place to limit or eliminate this problem."

Action: RPSC to establish a project and field camp tracking system, with benchmarks for each project and for overall resources, that allows comparisons between the original plan and actual resource utilization. This reporting capability should provide comparative updates during the season and then an overall summary at the end of the season to show how we did against the original plan.

Assignee [redacted]

Due: 31 March 2006

Response: RPSC developed a science cargo tracking system for all continental airlift that was acceptable to the NSF. This system will be used each season to track all deep field and South Pole science cargo and will be managed by the Science Support Division.

Status: Closed

Completion Date: 11 April 2006

PEC Item 10: Long Term Fix – SHALDRIL

Issue: "Including science projects in the Integrated Master Schedule (IMS) would also improve this process."

Action: Regarding SHALDRIL: RPSC to identify specific concerns of the NSF ABM, identify a long-term fix, and benchmark annual performance comparisons. RPSC will secure the agreement of the NSF on proposed improvements and review progress with the NSF ABM quarterly.

Assignee [redacted]

Due: 31 March 2006

Response: The SHALDRIL project is now reviewed as part of the project review process. The Science Support Director and the Project Manager participate in this meeting. The EVMS and project schedule are reviewed monthly. The NSF and the Science Support Director review progress against actionable tasks. This item is considered closed.

Status: Closed

Completion Date: 11 April 2006

PEC Item 11: Establish Baseline for Tracking Actual Progress

Issue: "… RPSC … underestimated the amount of cargo to be shipped by air from Christchurch to McMurdo … RPSC was 227% above its estimate."

Action: RPSC to establish a quantifiable baseline with specific benchmarks for tracking actual progress against planned COMAIR, USAP airlift, COMSUR, and vessel deliveries. RPSC will secure agreement from the NSF ABM on this procedure and provide regularly agreed updates of delivery status.

Assignee: [redacted]

Due: 31 March 2006

Response: For COMAIR and COMSUR, the annual baseline is the APP estimate.

For USAP Air, the baseline is the material requirement approved at the Air Cargo Priority Board. Progress is tracked continuously and reported to Directors and to the NSF. The ARB reviews additional requests for USAP Air. These are approved by the NSF for movement, but not necessarily for addition to the original estimate.

The ARB made a difference: in KY06, RPSC was only 25% over plan, a 102% reduction. Almost all the amount over plan was due to emergent conditions. There has also been a 46% reduction in COMAIR costs against the planned APP expenditure.

Status: Closed

Completion Date: 6 April 2006

PEC Item 12: Integrate Palmer Procurement Requirements

Issue: "… some science cargo [for Palmer Station] was not delivered [to the LMG] prior to cruises setting sail …."

Action: RPSC to integrate Palmer Station procurement requirements with vessel procurement planning. RPSC will develop a long term Logistics plan for the vessels and for Palmer Station and integrate this with the procurement plan.

Assignee: [redacted]

Due: 31 March 2006

Response: The research vessel cutoff schedules and the Continental Area Acquisition Schedule link procurement activities to transportation. Revised procedures include adding a ship-by date to the material to act as a suspense date and a trigger for shipment. This is part of the daily refrigerated items check and has been incorporated into the revised SOP.

Status: Closed

Completion Date: 28 March 2006

PEC Item 13: Vessel Procurement Plan (complementary action to PEC Item 12)

Issue: "…there have been serious and repeated problems getting equipment/supplies to the ships on time and in good working order."

Action: RPSC to develop a vessel procurement plan. Per meeting with Steve Kottmeier on 16 January 2005, RPSC requested that this metric be deleted from Strategy 4. Steve to present the plan at the Third Quarter VTC. Further action will depend on NSF acceptance.

Assignee: [redacted]

Due: 31 March 2006

Response: RPSC is building an acquisition plan that integrates vessel and Palmer Station support. That plan will address this issue.

Status: Closed

Completion Date: 8 February 2006

PEC Item 14: Central Supply Procurement Plan

Issue: "NSF is concerned that individual work centers are purchasing and stocking common items that should be centrally managed. … NSF notes this concern because it has indicated to RPSC on more than one occasion its approval to proceed with establishing a central supply concept but, for some reason, RPSC has not yet done so."

Action: RPSC to provide a quantifiable, trackable Central Supply procurement plan. RPSC will review the plan with the NSF ABM and measure progress against an established benchmark.

Assignee [redacted]

Due: 31 March 2006

Response: To date, control of an additional 5,700 line items (20% of the active inventory) has been transferred from other work centers to Central Supply control. RPSC will continue to expand Central Supply control until all sustaining materials and supplies are procured through this effort.

Status: Closed

Completion Date: 11 April 2006

PEC Item 15: Airlift Charge Validation

Issue: "… Port Hueneme has failed to validate SAAM airlift charges, resulting in costs not only to charter the aircraft, but also for the cost per pound for all cargo carried on the aircraft."

Action: RPSC to secure an agreed method of validating airlift charges with the NSF COTR. The NSF believes we blindly agree with USAF billing.

Assignee [redacted]

Due: 31 March 2006

Response: Effective March 2006, the Unit Identification Code has been updated (RPSC's 499129, which is an active and valid code). This is expected to improve the accuracy of billings. In addition, RPSC is prepared to assume full responsibility for validating airlift costs, a task currently performed by an NSF contracted consultant. No further action is required at this time.

Status: Closed

Completion Date: 6 April 2006

PEC Item 16: Formal Turnover Process

Issue: "NSF also incurred unnecessary costs of $120,000 when the *American Tern, Krasin* and the *Polar Star* were all held at McMurdo for an extra day because paperwork for the *American Tern*'s backload was incomplete."

Action: RPSC to establish a formal turnover process, with signoff of accepted documentation. This will start with the FY06 vessel offload.

Assignee [redacted]

Due: 31 March 2006

Response: In 2005, there was a loss of control for containers moving to the pier, a result of not following established procedure. Consequently, RPSC required a longer time to reconcile the CTS manifest to the load, and this contributed to the delayed vessel departure. This year RPSC returned to the original procedure and added quality assurance controls, which reduced the time between loading the last item and delivering the manifest from 10 hours to 1.5 hours, an acceptable manifest delivery period. During this much shorter period of manifest preparation no time is lost, because containers are still being lashed down.

Status: Closed

Completion Date: 6 April 2006

PEC Item 17: Security Incident Procedures

Issue: "A thorough examination of … incident activities involving the USAP web site www.polar.org revealed potential errors on the part of the Technical Operations group that may have lead to the destruction or, at a minimum, the alteration of potential forensic evidence."

Action: RPSC to secure a specific formal agreement with the NSF on how to proceed during security incidents. This agreement should identify a specific notification process, documentation, management practices, information security activities, personnel support, and infrastructure protection requirements.

Assignee [redacted]

Due: 31 March 2006

Response: RPSC wrote a USAP Instruction 5000.12-1: Incident Response and Management, which is presently at USAP for review and approval. This document provides tasking statements on how the USAP incident response program will be run to meet NSF and USAP policies. It describes the core incident response and extended incident response teams and includes an incident prioritization matrix, a notification matrix, an incident reporting form, a chain of custody log, and an NSF Management Review and Incident Summary (Report Format). USAP approval of this document constitutes formal agreement on how to proceed with incidents.

RPSC InfoSec wrote RPSC QSP 9121: Incident Response and Management, which provides more detailed guidance to RPSC personnel on how to respond in accordance with NSF and USAP guidance (USAPI 5000.12-1). This document has been entered into the formal IT document approval process for review by the senior managers. It directs the development of detailed checklists for incident response teams to use to

cover the four major types of computer incidents.

RPSC completion of these documents addresses the primary action. This item is considered closed.

Status: Closed

Completion Date: 16 January 2006

PEC Item 18: Season Tasking

Issue: "Neither summer nor winter [IT/Comms McMurdo Station] tasking was provided in a timely manner to the NSF."

Action: RPSC to secure an agreement with the NSF ABM on the level of detail required, the scope, the extent of integration with IMS and site/Denver HQ tasking, the nature of the deliverable, and how the final product will be managed (whether it should be tracked against plan to measure progress and the quality of the final product). RPSC will formalize the scheduling process and include NSF review points in an auditable environment.

Assignee [redacted]

Due: 31 March 2006

Response: RPSC IT prepared and submitted a seasonal tasking list in P3e/c to integrate the IMS and CDRL C7.5.1.1.5 (Antarctic Task Development). Seasonal tasking lists will be maintained according to the standards put forth by the RPSC PMO and IMS teams. IT will hold tasking reviews at the same times the PMO/IMS Team reviews tasking internally and with the NSF.

The tasking list details sustaining activities and project activities. Actual tasking hours will be logged continuously throughout the season. This data can be submitted by IT upon request from the NSF, outside of the standard review points designed by the PMO/IMS Team.

To maintain quality of data, each task is a line item on the labor allocation sheet (LAS), and actuals are reviewed weekly by supervisors before LAS's are submitted for entry into the IMS. IT's current project management process and the PMO's project status review cycle are also in effect to address project quality issues.

This effort has been integrated into the McMurdo and South Pole IMS. This item is considered closed.

Status: Closed

Completion Date: 26 January 2006

PEC Item 19: Area Directors on the Telephone

Issue: "McMurdo and South Pole Area Directors seem to spend excessive amounts of time on the telephone…. RPSC should examine this issue to determine whether the quantity and frequency of interaction could be reduced."

Action: RPSC to discuss this issue with the NSF ABM and secure specifics of concern. RPSC and the NSF will meet to discuss next 90 day expectations and missed expectations from the last 90 days. RPSC will reference this specific statement in the discussion.

Assignee: [redacted]

Due: 31 March 2006

Response: This topic has been addressed in four ways:

1. A meeting between the McMurdo Area Director and the NSF ABM clarified the concern: Multiple individuals from Denver HQ were requesting information from the AD, resulting resulted in excessive phone calls. The McMurdo AD is now stationed at Denver HQ for most of the austral summer, thereby eliminating most of these calls.
2. RPSC and the NSF have established weekly telecoms, thereby eliminating superfluous requests for the same information, as the COO is coordinating action items initiated by the NSF.
3. The McMurdo AD now coordinates directly with the COO and addresses action items assigned through that office. This single point of contact eliminates multiple data channels and provides continuity on issues.
4. Weekly telecons between McMurdo and Denver HQ are restricted to one hour, and Directors and other operations personnel

have been directed to address client concerns as priority one.

Status: Closed

Completion Date: 30 December 2005

PEC Item 20: South Pole Telephone Issue

Issue: "McMurdo and South Pole Area Directors seem to spend excessive amounts of time on the telephone…RPSC should examine this issue to determine whether the quantity and frequency of interaction could be reduced."

Action: RPSC to discuss this issue with the NSF ABM and secure specifics of concern. RPSC and the NSF will meet to discuss next 90 day expectations and missed expectations from the last 90 days. RPSC will reference this specific statement in the discussion.

Assignee: [redacted]

Due: 31 March 2006

Response: This topic has been addressed in four ways:

1. The South Pole AD held a discussion with the NSF ABM during a weekly, FY06 summer, on-site Operations meeting. The ABM's concern was that multiple individuals at Denver HQ were requesting information from the AD, resulting in excessive phone calls.
2. RPSC and the NSF have established weekly telecoms, thereby eliminating many superfluous requests for the same information, as the COO is coordinating action items initiated by the NSF.
3. The South Pole Area Director now responds directly to the COO and addresses action items assigned through that office. This single point of contact eliminates multiple data channels and allows everyone to be on the same page. This arrangement also allows the AD to serve as the single point of contact with the NSF Representative at South Pole.
4. Weekly telecons between McMurdo and Denver HQ are restricted to one hour, and Directors and other operations personnel have been directed to address client concerns as priority one.

Status: Closed

Completion Date: 29 December 2005

PEC Item 21: Station Services

Issue: "… Station Services has throughout the contract and in the current year poorly planned for the food and beverage requirements for McMurdo … "

Action: RPSC to provide a plan to the NSF ABM that aligns with the BDFA plan already submitted and includes beverage management. The plan should address the shortfalls in FY05 and Erick Chiang's concern that we are simply maintaining the status quo.

Assignee [redacted]

Due: 31 March 2006

Response: RPSC Station Services has aggressively implemented new procedures to manage food and beverage inventories. An internal food inventory tracking tool was applied to this year's inventory, and it immediately identified potential shortfalls in mainline proteins, such as beef and poultry. Armed with this information, kitchen staff were able to adjust the menu cycle and avoid shortages. Continued monitoring of the ebb and flow of inventory levels and development of more structured menu planning is paying dividends this year, and the situation will continue to improve as these new systems are developed.

RPSC believes it is necessary to purchase a menu planning software package in order to develop more structured menu plans. NANA personnel researched available software packages during the summer of 2005 and feel they will be prepared to make a recommendation after reviewing more products in 2006.

Beverage management at McMurdo has been successful in minimizing the impact of beverage shortfalls. Station Services has been effective in promoting responsible consumption on station. Some of the initiatives we implemented this season include:

- Training volunteer bartenders how to identify over-indulgence and how to manage problem drinkers.
- Eliminating an entire category of spirits typically consumed all at once (i.e., as "shots").
- Posting a Station Services Supervisor on duty in the evenings to monitor patrons in the three bars.

Going forward, Station Services will continue to create an environment that promotes responsible consumption and reduces inappropriate drinking behavior. In regard to inventory levels, with the adjusted budget, we feel confident that the beverage inventory will support demand. We will continue to monitor weekly product availability to keep the inventory balanced.

Status: Closed

Completion Date: 31 March 2006

PEC Item 22: Annual Resupply Cargo

Issue: "South Pole … inability to provide timely and accurate information on cargo on the annual resupply vessel that has to be flown to the station after the vessel arrives in McMurdo."

Action: RPSC to obtain specific direction from NSF ABM(s) on acceptable format, content, regularity, and distribution.

Assignee: [redacted]

Due: 31 March 2006

Response: RPSC has established and implemented two Logistics management reports:

1. The South Pole weekly SitRep now reports received weight versus planned weight (detailed by project specific category). The SitRep also delivers a weekly update on status, i.e., on target, shortfall, or ahead-of-plan. This format has proven effective, because McMurdo and South Pole are now working with the same data. This provides continuity and accuracy and allows for tracking cargo against original ROS dates.
2. RPSC had advised the NSF at the 2005 APC that a cargo prioritization form would be established and implemented during the FY06 summer season, with a submittal due date of 1 January 2006. The form was submitted to the NSF on 27 December 2005 and included spreadsheets for:
   - The required balance for the FY05 summer, based on the Logistics Planner and the current shortfall
   - Cargo from the FY06 vessel
   - A list unplanned changes, e.g., reduced the IceCube weight requirement and the fuel provided to the South Pole Traverse
   - A ranking of SPSM cargo priorities for the additional 1.3 million pounds to be delivered by the 50 extra flights planned by the NSF and the NYANG
   - The operational aspects of extending the season beyond 15 February 2006

We will coordinate continuously with McMurdo and provide updates.

Erick Chiang and Brian Stone have indicated that this report is acceptable and should be considered the format for future seasons.

Status: Closed

Completion Date: 16 January 2006

PEC Item 23: Copyrighted Media

Issue: "There was … insufficient action from all Area Directors to curtail the sharing of illicit or copyrighted media on the USAP LAN."

Action: RPSC to meet with the appropriate NSF ABMs, secure specific agreement on what actions are acceptable, implement a plan to comply, and establish a quantifiable tracking mechanism. RPSC will review progress with the NSF ABM regularly.

Assignee [redacted]

Due: 31 March 2006

Response: USAP Enterprise Rules of Behavior allow personal use of USAP resources as long as such use does not impact the USAP mission. Illegal sharing of copyrighted material is strictly forbidden, and this is emphasized in the USAP InfoSec Awareness Training given to each user. Developing technical methods to differentiate between legal and illegal file transfers is

extremely challenging, if it is even possible at all. IT continues to research efficient and cost effective methods for identifying illegal use.

This procedure was submitted to the NSF. NSF/RPSC InfoSec personnel will work jointly to manage this effort on an ongoing basis.

Status: Closed

Completion Date: 20 April 2006

PEC Item 24: Transshipment of Organisms

Issue: "One area of concern was the handling of a transshipment of genetically modified organisms through New Zealand."

Action: RPSC to secure an agreement from the NSF ABM on acceptable procedures for managing future transshipment of organisms through New Zealand. RPSC will distribute the agreed-upon procedures to the grantee community before deployment. We will track progress on this issue through the deployment season.

Assignee [redacted]

Due: 31 March 2006

Response: A meeting was convened with RPSC staff and the Christchurch ABM (Art Brown) to discuss changes to POLAR ICE that would alert grantees to the procedures they must follow if they intend to transship genetically modified organisms through New Zealand. Art Brown agreed that the changes were acceptable. They were installed in POLAR ICE v3.5, which was operational on 31 March. In addition, Lynn Dormand (DSG) e-mailed a notice to all grantees (29 December 2005) that calls attention to this issue. Future grantee deployment packages will contain a letter covering the topic.

Status: Closed

Completion Date: 28 December 2005

PEC Item 25: Professional Management Plan

Issue: "…provide professional management plans; acceptable designs for engineering projects; … rate estimates; realistic and achievable schedules. …"

Action: RPSC to identify each specific area where the NSF views RPSC processes as inadequate, prepare corrective action plans, review these with the NSF, provide a list of deliverables and a schedule for completion, track progress against milestones and the deliverables schedule, develop a 90 day expectations list that includes noted items, and review progress monthly.

Assignee [redacted]

Due: 31 March 2006

Response: The NSF has tasked RPSC with improving project management plans, estimating processes, and project control, but these requirements are addressed primarily within the PMO and the FEMC 90 day expectations. This item is a duplicate of those requirements and is therefore closed.

Status: Closed

Completion Date: 27 March 2006

PEC Item 26: Timely Reports

Issue: "…timely reports to NSF and in responding to inquiries from NSF staff."

Action: RPSC to establish with the NSF an agreed upon list of annual submissions. When the NSF sends a request to RPSC, we will establish with the NSF an agreed upon date of submission. RPSC will review deliverables internally before sending them to the NSF.

Assignee: [redacted]

Due: 31 March 2006

Response: RPSC review of CDRLs and various other reports is ongoing. [redacted] sent an e-mail to Dr. Montopoli outlining RPSC's understanding of reporting requirements and requirements for communication within RPSC and the NSF (25 January 2006).

Status: Closed

Completion Date: 25 January 2006

PEC Item 27: Hazardous Waste Report

Issue: "…provide to NSF the annual Hazardous Materials/Radioactive Waste Report."

Action: RPSC to establish with the NSF an agreed upon list of annual submissions and specific dates for those submissions. RPSC and the NSF must also agree on format and content.

Assignee: [redacted]

Due: 31 March 2006

Response: There is only one hazardous waste report due to the NSF (the RAD Report); it's already in an agreed-upon format and we will continue to use it.

Reports due under contract:

- Annual Report to the USAP Master Permit. No due date specified; 15 June is typical.
- AOR Report. Due 15 March 2006.

Reports submitted to facilitate information transfer:

- Water and Wastewater Summary Report. No due date specified; sent 3 April 2006.
- Environmental Work Plan Summary Report (Includes Audit and Inspections). No due date specified; sent 31 March 2006.
- Radioactive Waste Report. Due date 1 July. (In the event final certificates-of-disposal have not been received, RPSC will notify the NSF and agree upon a revised submission date. The certificates-of-disposal are regulatory documents that verify the waste has reached its final destination. These constitute the final step in the "cradle to grave" tracking of waste.)

Status: Closed

Completion Date: 4 April 2006

PEC Item 28: Incomplete Requests for Information

Issue: "Requests for Information – typically do not include complete problem descriptions or comprehensive analyses and, many times, what is provided proves in the end to be inaccurate … include sound recommended solutions."

Action: [redacted] to review the existing RFI format with the NSF, update it to reflect areas not presently addressed, establish an agreed-upon formal method of transmittal with the NSF and other RPSC departments, establish formal administration and distribution processes, establish a formal RPSC/NSF review process, and address how to track RFIs through each step of completion (preparation, internal review, submission, approval, procurement, installation, verification of completion, acceptance, as-build drawings/configuration control, and closeout).

Assignee [redacted]

Due: 31 March 2006

Response: The PMO has established formal procedures for processing and distributing RFIs. The NSF has stated in general terms that the RFI process still needs improvement. Brian Stone has agreed to identify specific issues related to what the NSF considers to be poor RFI processes and quality. This issue is being tracked through the NSF-RPSC weekly telecon action items and is therefore closed.

Status: Closed

Completion Date: 11 April 2006

PEC Item 29: Estimating Process Improvement

Issue: "NSF expects immediate improvement in the estimating process, to include updating NSF as estimates become more mature, and providing timely notice to NSF. RPSC proposed a method to ensure notice to NSF (via change orders) yet, despite NSF's concurrence, RPSC has not implemented the change."

Action: The RFI process should be used to manage scope changes and cost increases or reductions. RPSC to prepare a complete process for managing estimates, from conceptual (the first estimate) through project completion.

Assignee: [redacted]

Due: 31 March 2006

Response: RPSC has prepared an estimating plan (see (I:\Collaboration\PMO\PMO Processes and Procedures\Cost Estimating). This plan addresses each of the NSF's concerns and is being used for all new estimates.

Status: Closed

Completion Date: 14 April 2006

PEC Item 30: Management to Approved Budget

Issue: "NSF also expects immediate improvement in RPSC's – not just FEMC's – management to the approved budget"

Action: RPSC Finance to notify Directors when they have spent 75% of their APP approved budget. Directors are responsible for verifying available funds. No changes to budget are allowed without forwarding an approval request to the NSF through the Finance Manager.

Assignee: [redacted]

Due: 31 March 2006

Response: Finance is already notifying the Directors. Finance personnel sent official e-mail notifications to the Directors, with copies to the Finance Manager and the COO, immediately after December month-end information was available. Directors were also notified if no WBSs for their Division had reached the 75% level.

Status: Closed

Completion Date: 20 January 2006

PEC Item 31: Ball-in-Court with NSF

Issue: "Reports were submitted showing "ball-in-court" with NSF …"

Action: [redacted] o start having weekly telecons with their NSF counterparts. There will be a set agenda and minutes will be taken and distributed (with actions attached). The weekly NSF-RPSC meeting format will serve as a guide. This will eliminate the issue of whose court a ball is in.

Assignee: [redacted]

Due: 31 March 2006

Response: Upon [redacted] redeployment in November 2005, FEMC continued the weekly teleconference with Sandy Singer and Pat Haggerty at the NSF. On 2 February 2006, RPSC adopted the PMO format for the agenda and minutes, and FEMC continues to use them on a weekly basis. Action items are tracked in the minutes, and after an action is closed it stays in the minutes for two weeks before it is dropped. If Sandy is traveling and unable to call in, the meeting is cancelled.

Status: Closed

Completion Date: 30 March 2006

PEC Item 32: CCRs

Issue: "Configuration Change Requests were submitted after equipment was installed …"

Action: [redacted] to review the present CCR process with the NSF, change it as needed and appropriate to address the NSF's concerns, and educate all organizations on the revised process through training and quarterly audit verification.

Assignee: [redacted]

Due: 31 M

Response: There is an existing process: EN-MPS-709. We have trained Division Directors and facility engineers at each station. The CCR process will also be incorporated into a Change Management Procedure currently in process.

Status: Closed

PEC Item 33: Plan Changes

Issue: "There is some concern that changes to plans were not always adequately conveyed to the field support personnel and that changes in personnel sometimes resulted in information being dropped."

Action: RPSC to review this issue with the NSF, develop a process for information management between the planning team and site/vessel personnel, review the proposed process with the NSF, and integrate the agreed-upon final result into training and new employee indoctrination.

Assignee [redacted]

Due: 31 March 2006

Response: The Science Support Director communicates regularly with appropriate NSF ABMs on this specific subject. A number of initiatives are now in place to address each of the issues raised.

Status: Closed

Completion Date: 31 March 2006

PEC Item 34: IR Soil Treatment Unit

Issue: "A serious example of improper environmental stewardship was the purchase, shipment and installation of the IR Soil Treatment Unit at McMurdo Station … without appropriate environmental assessment … based on U.S.-based … criteria and did not focus on risks relevant to the Antarctic."

Action: RPSC to establish project evaluation criteria and a checklist to use on all future projects. All EH&S projects, including environmental reviews, should follow PMO-identified project management criteria. RPSC will develop a review process with the EH&S ABM and provide updates on all projects during the weekly EIS telecon with the NSF.

Assignee: [redacted]

Due: 31 March 2006

Response: All projects are now directed through the PMO. EH&S requirements are reviewed before RPSC submits any project request to the NSF.

Status: Closed

Completion Date: 6 April 2006

PEC Item 35: Contaminated Soil Management

Issue: "Additionally, NSF noted that an overall plan for contaminated soils management (including tracking) was not in place; such a document should include options other than soil treatment such as in-place management, reuse and retrograde, and the means by which to determine the appropriate option."

Action: RPSC to prepare criteria for a continent-wide management plan to be followed by all divisions. RPSC will provide awareness training to appropriate organizations and individuals as part of the annual training program for deploying personnel.

Assignee: [redacted]

Due: 31 March 2006

Response: Consistent with the requirements of the IEE, an overall plan for contaminated soils management has been generated. This continent-wide plan is now part of Waste Management procedures, which include the use of the IR Soil Treatment Unit. Standard practices for contaminated site assessment are also under development for the McMurdo area. Target completion date: 10 August 2006.

RPSC is committed to ensuring adequate training is provided for all stations. Four ongoing projects are expected to improve the quality of education and awareness training:

1. Updating the annual Waste Management/ Environmental video (expected completion date: June 2006)
2. Proposing a change of venue to improve audience capture (expected completion date: August 2006)
3. Assessing education needs for Palmer and South Pole (expected completion date: August 2006)
4. Completing videos for improved DV ASMA education (four total videos will be complete by August 2007)

Status: Closed

Completion Date: 28 February 2006

PEC Item 36: EIS/RORR Activity

Issue: "… Environmental not … involved early enough in the project development process …. RPSC needs to do a better job of integrating Environmental into the Company's activities. NSF challenges RPSC to institute processes to eliminate this as an area of concern in the future."

Action: EH&S to work with [redacted] n to include EIS/RORR activities into pre-estimate project checklists, assign teams to and conduct regular reviews for each project.

Assignee: [redacted]

Due: 31 March 2006

Response: All projects are now funneled through the PMO. The PMO requires EH&S review of all projects, beginning with the conceptual stage. This process is in place and functioning well.

Status: Closed

Completion Date: 4 April 2006

PEC Item 37: Communications Protocol

Issue: "RPSC – without involving or advising NSF – made certain agreements with AntNZ …"

Action: RPSC to develop a communication protocol that maintains an adequate information flow between the NSF, RPSC, and other agencies. RFIs, approval requests, and change orders, for example, should be incorporated into this protocol. The protocol will recognizes that the NSF retains approval authority.

Assignee [redacted]

Due: 31 March 2006

Response: RPSC has prepared a detailed communication protocol and forwarded it to the NSF. At NSF request, the requirements of this protocol will be managed internally by appropriate RPSC Directors and by the Program Manager.

Status: Closed

Completion Date: 28 March 2006

PEC Item 38: Proper Levels of On-Site Inventory

Issue: "NSF has also repeatedly requested, but not yet received, a re-evaluation of the assumptions used to set the proper level of the on-site inventory in order to maximize its effectiveness and efficiency."

Action: McMurdo Station is the primary driver for this request. RPSC to establish the scope, outline, and deliverable for a plan and set a date to issue the report.

Assignee: [redacted]

Due: 28 April 2006

Response: Four years ago the Supply Manager assumed re-order responsibility for the Stock Keeping Units (SKUs). At that time there was no stated policy for setting levels of on-hand stock, nor one describing the number of month's worth of material to be ordered for vessel resupply.

At McMurdo, we established a system whereby we order a 13-month inventory each season. We determine quantities by analyzing 36 months of usage history and using the Average Monthly Usage (AMU) as the quantity multiplier. This results in one year's supply of product for normal consumption, plus one extra month's supply to give Supply personnel time to locate and receive items.

This ordering process currently covers only Central Supply at McMurdo. A draft plan for decoupling South Pole is in progress. To date, progress on this plan has been addressed in the weekly NSF-RPSC meeting deliverables. RPSC will provide a status at the Partnering session on 25 April.

This item is considered closed, since the primary deliverables are complete and remaining actions have been assigned to the supply chain IPT.

Status: Closed

Completion Date: 11 April 2006

KY06 EXPECTATIONS & ACTIONS

Q1 & Q2

General Management

EH&S

Issue: Brief the NSF on differences between Raytheon and OSHA.

Response: Met with the NSF in Arlington on 17 Nov 2005 and submitted written report outlining OSHA and Raytheon requirements relating to 40lb/4 ft rule.

Status: Closed

Operations

Area Directorate – McMurdo

Issue: Provide the NSF with a justification for two additional shuttle drivers to support the ANDRILL project.

Response: Justification provided. Added two positions to contract Vehicle Operator staffing budget, and budget was approved.

Status: Closed

Issue: Coordinate with NSF to identify best option for McMurdo sea ice runway location and setup.

Response: [redacted]t stated that details will become known during WINFLY 05.

Status: Closed

Issue: 1) Draft missing sections of the Comprehensive Emergency Mgmt Plan, 2) Send Erick Chiang a description of the Mass Casualty Drill scenario and provide regular progress updates.

Response (1): Missing sections of CEMP have not been completed. A proposal is with NSF to either outsource the task or provide RPSC with additional resources to accomplish this as a project.

Status: Open

Response (2): Accomplished in an e-mail dated 26 Oct 2005.

Status: Closed

Issue: Provide Dave Bresnahan with the alcohol use guideline/policy and post at McMurdo Station.

Response: This action was addressed through a series of e-mails and then finally in a three-part report composed of 1) a Community Letter and 2) a beverage management policy. These were sent to Erick Chiang from [redacted] on 21 Oct 2005.

Status: Closed

Area Directorate – South Pole

Issue: Oil contamination of the waste heat loop.

Response: Laboratory data results showed particulate matter and slight variance in concentration. Recommendations included filtering the glycol and monitoring specific gravity. Filtration with the centrifuge is ongoing and incorporated in the Power Plant PM procedures. No residual oil contamination is present in the glycol at present.

Status: Closed

Issue: EXH (heat exchange) tube failures. One heat exchanger failed during the KY06 summer, resulting in recommendation to replace units with material less susceptible to corrosion.

Response: We contacted a supplier for a quote on the stainless steel units. Because of cost, we decided to delay purchase of the units until a complete analysis on a failed unit from South Pole could be performed. This unit was removed and shipped to Denver for analysis. An appropri-

ate vendor is being selected and analysis should be completed by July 2006.

Status: Open

Issue: Repair of heat exchanger is awkward due to positioning. Removal put building and personnel at risk.

Response: We identified a high rise lift with portability kit to facilitate safe removal/installation of units. We requested and received approval to reprogram labor under-runs and purchase lift for delivery vessel 2006. The lift was delivered to station and utilized to replace the failed unit.

Status: Closed

Issue: The cargo Elevator had maintenance issues and failed a required drop-test of the emergency brake assembly.

Response: We ordered an emergency brake for vessel delivery but did not arrive in time for shipment. The parts will be shipped Kilo air for installation early season KY07. We re-surveyed track alignment and found no faults. Elevator is restricted to no personnel and loads lighter than 1000 pounds (under 25% of rated load). The working brake for the system is tested and functioning normally. Only the emergency brake is faulty.

Status: Open

Issue: The deck hoist is inoperable at colder temperatures (under –60F).

Response: We selected a vendor that specialized in materials conveyance in Arctic conditions. We selected and purchased a replacement hoist. The unit was delivered to South Pole during the extended season and installed before sunset. Testing will proceed during the winter to determine whether this new design will alleviate problems with extreme cold operations. Costs were included in the SPSM ETC.

Status: Open

Issue: Food storage as currently configured is inadequate to maintain proper separation of potentially hazardous foods with prepared foods.

Response: RPSC submitted recommendations for modifications to existing food storage areas to minimize risks of cross contamination. The refrigerator previously used for “leftover” storage was re-allocated to dairy items, and food for personnel eating between mealtimes was moved to smaller units located in the bar area. No problems with food contamination were encountered during the summer.

Status: Closed

Issue: NYANG schedules need to be established to ensure adequate LC-130 fire training for South Pole emergency response team.

Response: Winter personnel for FY06 were trained. Requirements and scheduling need to be determined for training the FY07 crew. Discussion with the NYANG will occur at the Annual Planning Conference.

Status: Open

Issue: Meeting NSF support expectations and desire for increased coordination with University of Arizona re: Food Growth Chamber.

Response: RPSC hired a U of A candidate for support of the McMurdo Greenhouse and South Pole FGC operations for summer. A U of A graduate student was identified and hired for fulltime support of FGC during winter. Weekly meetings are occurring with U of A, South Pole, and Denver personnel. Goals for winter include development of operational procedures, definition of productivity capability, and creation of tracking system and cost analysis for crop production.

Status: Closed

Issue: ARFF capabilities at South Pole do not meet requirements for MOG of 1 aircraft.

Response: The CAFS unit was shipped to South Pole for use during the summer flight season. It arrived later than planned due to problems ship-

ping the sled from Alaska. Due to temperature restrictions and lack of DNF storage at the South Pole, the unit was shipped back to McMurdo to winter-over. A new project proposal has been drafted to update ARFF capabilities at South Pole.

Status: Open

Logistics

Issue: NSF was finalizing contract with the *Krasin* for icebreaking support and requested RPSC assistance to identify cargo to take enroute to/from Antarctic to eliminate VAT (comment by Al Sutherland).

Response: We loaded six boxes of tinned baby corn at Pusan, South Korea for discharge at McMurdo for the southbound voyage. For the northbound voyage, we loaded six boxes of tinned baby corn and 12 calendar books (13 pounds) for discharge at Pusan, South Korea.

Status: Closed 2 Feb 2006

Issue: Provide Erick Chiang with a summary of substituted materials after receipt of 2006 Resupply Vessel cargo (ref TR #12). (Capture items that have been substituted from the material delivered on the resupply vessel and provide a summary report.)

Response: McMurdo resupply vessel receiving is in progress and is not expected to be completed before mid-May. Following completion of receiving, the report will be provided.

Status: Open

PMO

Issue: Initiate providing the NSF with standardized cost estimates, including a basis of estimate (assumptions) and all factors in the form of the new PMO template (including costs of logistics, final inspections, science instrument/equipment installation/extraction, demolition, waste disposal) for all project estimates (ref TR #23).

Response: The new format is being used for all new project estimates. The actions herein are being implemented or have been requested in the KY06Q3 actions. This item is therefore overtaken by other requests and is therefore closed. In progress: topic at NSF/RPSC Partnering session.

Status: Closed

Science Support

Issue: Provide the NSF (Al Sutherland) with list of further due diligence re: negotiation with ECO on NBP stability issues (ref TR # 48).

Response: 1) Telecon on 7 Feb 2006 (Brian Stone, Al Sutherland, [redacted] summarized the negotiations from 2005 to present. 2) Letter sent from Fred Lehn to NSF, 3 Apr 2006, summarized the recommended negotiation between ECO and RPSC (on the behalf of the NSF) and the NSF CO concurred, 6 Apr 2006.

Status: Closed

Issue: Provide Brian Stone with one page summary of cargo movement tracking spreadsheet to inland sites (e.g., field camps and South Pole) (ref TR # 20).

[redacted] developed and distributed the Cargo Movement template to the USAP stakeholders (all appropriate agencies and personnel, beginning the week of 24 Oct 2005) and it was received well. NSF has indicated that this report fulfills the requirements of this action item.

Status: Closed

Issue: Ensure that all user committee charters, proceedings, and actions conform to one standard (including the ARVOC) (ref TR #13).

Response [redacted]ompleted an R6σ project, including revision of RPSC Procedure (SC-D-008) "USAP Station and Vessel User Committee Meetings," to ensure that this is achieved on an ongoing basis.

Status: Closed

Issue: Proposal for a fulltime R6σ Expert (ref TR #3).

Response: Telecom completed 8 Nov 2005 between NSF and RPSC with the following NSF direction: 1) RPSC to proceed with recruiting for FT Expert, 2) RPSC to detail USAP projects to be led by FT Expert and estimated cost savings for NSF review, 3) NSF and RPSC to reconvene to discuss items #1 and 2 before job formally offered to FT Expert candidate. A revision of the FT Expert proposal is underway.

Status: Open

Q3

General Management

EH&S

Expectation: Submit plan to streamline waste collection and minimize number of collection points.

Response: A plan was submitted to Dr. Montopoli on 24 Mar 2006.

Status: Closed

KY06-Q3-ME3:EH&S - Safety & Health Policy Implementation

Expectation: This has been previously addressed with RPSC during the quarter, but NSF feels that the 40-pound lifting rule and the 4-foot fall protection guidelines were extremely poorly implemented.

Response: RPSC EH&S held meetings with the NSF, presented the issues raised, identified where the policies originate, and plotted our path forward. The RTSC site audit was forwarded to the NSF in March 2006. FEMC and EH&S have developed plans for safety improvements and prepared a number of action items that RPSC will implement on a scheduled plan.

Status: Closed

KY06-Q3-ME4: EH&S - Safety Issue for Bldgs. 191 and 136

Expectation: Expectation was that two years ago these buildings would have a plan to mitigate each of the safety findings issued by the government audit team. There is still no plan and there has been no consistent PM to carry this through to completion.

Response: A plan is drafted and under review. The hiring of a PM is in process.

KY06-Q3-ME5: EH&S/FEMC - McMurdo Painting

Expectation: NSF expected Bldg. 155 to be painted this summer. However, late discovery of asbestos and paint degradation has caused significant delays. NSF feels that RPSC should have conducted building condition inspections in advance to avoid this. Prepare asbestos resolution plan.

Response (a): RPSC prepared a comprehensive asbestos resolution action plan and provided it to the NSF.

Status: Closed

Response (b): An EH&S/FEMC/PMO integration program is in development. The program will coordinate interrelated activities, including the duration and phased schedule requirements for different types of maintenance and construction activities. Due: 30 June 2006.

Status: Open

Operations

Area Directorate – McMurdo

KY06-Q3-ME1: McMurdo AD - McMurdo Area Management

Expectation: The McMurdo Area Manager does not appear to be completely connected with all activities going on at the station. NSF acknowledges that the seasonal manager position (contract) is due to its request for the Area Managers to spend less than the entire season on the ice. However, RPSC should look at ways to better integrate this position into the pre-season planning.

Response: The McMurdo Station Manager [redacted] works with the Operations team o[redacted] daily basis to ensure all key operational requirements and NSF concerns are properly addressed. She will provide a turnover t[redacted] upon his return to the office the first week of June. This will allow sufficient time for the Area Manager to become fully involved in the planning process and understand proposed direction.

Status: Closed

Area Directorate – South Pole

KY06-Q3-I/CA6

Expectation: Prepare a plan for NSF review that supports using the additional 50 flights schedule for SP during FY06 summer.

Response: A plan was prepared and submitted. That plan was accepted by the NSF. As a result, RPSC was able to maximize ACL and flight operations.

Status: Closed

KY06-Q3-I/CA8

Expectation: Emergency Response Training occurs on "personal time." RPSC recommends increasing time allotted in schedule for emergency response training from 3 hours per month to 6 hours per month.

Response: This issue has been moved to the NSF-RPSC weekly telecom as an action item.

Status: Closed

FEMC

KY06-Q3-ME6: FEMC/South Pole AD - Power Plant Arch Heat Buildup

Expectation: Expectation was that RPSC should have reacted sooner, and had a plan in place to open the bulkheads and add ventilation at the first sign of melting snow from the top of the Power Plant arch. This was due to continuous excess heat in the arch, which is a long-standing known condition, combined with high temps outside.

Response: This issue was resolved in discussions with the NSF on 3 Feb 2006.

Status: Closed

KY06-Q3-ME7: FEMC McMurdo Day Tanks

Expectation: Insufficient preparation was conducted to ensure that the tanks would not settle in warm weather. RPSC does not appear to have conducted a thorough review of the civil engineering aspects of this work or the implementation work on the ice did not receive the appropriate level of oversight. This is of concern in that geotechnical and civil engineering appear to be absent in the skill sets within FEMC or are not applied where and when needed.

Response: RPSC developed a foundation procedure and provided day tank analysis, design, and repair procedures to NSF.

Status: Closed

KY06-Q3-ME8: FEMC - Long Duration Balloon Facilities

Expectation: NSF feels it was misinformed about the true status of this project. Additionally, self-inspections that had been agreed to were not performed, and there were issues with respect to the quality of the work performed over the winter. NSF feels that this project did not receive the appropriate level of quality assurance oversight it should have, but also that the project staff failed to meet satisfactory self-inspection standards resulting in high levels of frustration, and delays to inspection, completion, and occupation.

Response: RPSC provided an initial response to the NSF on 15 Dec 2005. Additional actions are in process.

Status: Open

KY06-Q3-ME9: FEMC - McMurdo Power Plant

Expectation: NSF feels that many of the problems associated with the Power Plant project are the result of ineffective project management and oversight. NSF feels that the current project management team is working well to address the problems discovered, but that the initial problems could have been avoided with better oversight and management.

Response: RPSC responded thoroughly to this issue as part of the Q3 quarterly review. The initial problems referenced have been addressed by retaining a new Project Manager and through PMO oversight of project progress.

Status: Closed

KY06-Q3-ME10: FEMC - Notify NSF on Project Staffing Changes

Expectation: NSF is concerned that ABMs have not been notified of changes to individual project management. NSF would like to ensure that ABMs are notified when there will be changes to projects or personnel that could potentially affect cost, schedule, and program completion. NSF is also concerned about the qualifications of personnel being asked to lead certain projects.

Response: RPSC is promptly notifying NSF ABMs whenever there is a change in project management (loss or gain). PMO will be establishing a three-tiered training program for RPSC project managers.

Status: Open

PMO

KY06-Q3-ME17: PMO - FY06 Project Management Office Formal Proposal

Expectation: NSF has still not received a formal proposal from RPSC for the implementation of the project management office function.

Response: RPSC made a presentation to the NSF ABM. Review and comments are in process.

Status: Open

Science Support

KY06-Q3-ME2: Subcontracts/Science Support - Research Vessel Issues

Expectation: NSF is concerned about the recent mechanical issues with the LMG and NBP. While some information has been provided on the contractual resolution of the issues with ECO, NSF would like a briefing on the resolution and settlements with [redacted] to include resolution of the stability issue associated with SHALDRIL).

Response: A letter sent from [redacted] o NSF on 3 April 2006 summarized the recommended negotiation between [redacted] and RPSC (on the behalf of the NSF), and the NSF CO concurred on 6 April 2006.

Status: Closed

SPSM

KY06-Q3-ME11: FEMC/SPSM - Dark Sector Laboratory Occupancy

Expectation: NSF feels that RPSC exhibited poor judgment in allowing tenant occupancy of the DSL facilities prior to engineering acceptance.

Response: This issue was closed as part of the Q3 VTC review.

Status: Closed

KY06-Q3-ME12: FEMC/SPSM - DSL/10 Meter/ BICEP

Expectation: NSF expected RPSC to produce a set of integrated, coordinated requirements, plans and requirements for the facility. The plans came very late. NSF also feels that RPSC did not undertake sufficient internal reviews on the designs and therefore a large number of problems were detected by the NSF reviewer.

Response: Senior NSF and RPSC leadership discuss this issue in weekly telecom meetings. Integrated drawings are due June 2006.

Status: Open

KY06-Q3-ME13: SPSM - Reliance on Title II Inspectors

Expectation: NSF feels that RPSC is overly reliant on NSF-provided Title II inspectors to QA and answer technical questions associated with the SPSM project at South Pole. NSF feels that some of this may be due to insufficient or untimely advice from the engineering staff in Denver.

Response: RPSC is developing a proposal for sharing Title II information.

Status: Open

KY06-Q3-ME14: SPSM - Cryo Facility Construction

Expectation: The NSF expectation is that changes in the field are not executed without approval, and that construction is executed according to the drawings. There is an RFI for trenches below the cryogenics facility. NSF has said “no” to deleting them, yet three pieces of the cryogenics facility are in place and there are no trenches.

Response: The trenches will be constructed. This issue is resolved, per PEC response and discussion with the NSF.

Status: Closed

KY06-Q3-ME15:SPSM/FEMC - As-Built Drawings

Expectation: The NSF expectation is that all as-built plans are timely and accurate, and that all changes recorded on a drawing are supported by an RFI. Considerable time and effort was expended attempting to resolve the issue related to the station chamfers and the vapor barrier issue. NSF feels that RPSC has been less-than-cooperative in resolving the issue.

Response: RPSC has implemented changes to the RFI/CR procedure and has taken a more active role in resolving the station chamfer and vapor barrier issue.

Status: Closed

KY06-Q3-ME16: SPSM - SOC Transition

Expectation: The NSF expectation was that the SOC mock-up in Denver, which cost $100K, would be the clearing house for testing and integrating all IT equipment before shipment, and thus avoiding unnecessary on-site difficulties with startup.

Response: RPSC is working closely with the NSF to identify on-site difficulties and develop an improvement plan.

Status: Open

Q4

General Management

Business Architect

1. Initiate Enterprise Preparedness Committee.

   Status: Complete

2. Complete Enterprise Preparedness Self Assessments for remaining primary sites.

   Status: Complete

3. Open dialog with NSF on how to expand effort to USAP preparedness (not just RPSC preparedness).

   Status: Complete

Communications

1. Complete EOS tasking for Antarctic Sun.

   Status: Complete

DSG

1. APC 2006 Preparation: registration website, trinket purchases, location logistics.

   Status: Complete

EH&S - Environmental

1. Assist Science Support in completing remaining environmental assessments for potential science projects; identify projects requiring environmental assessment.

   Status: Complete

2. Prepare a schedule of environmental assessments for the 06/07 season (needs input from ADs, FEMC, Logistics and Science Support).

   Status: Complete

3. Complete after season reports (camp audits, AOR, etc.). Corrective Actions for deficiencies noted in Camp Audit Report must be included, coordinate with Science Support.

   Status: Complete

4. Support Polly Penhale on Antarctic Treaty business (potential information papers submitted to the ATCM).

   Status: Complete

EH&S - Health and Safety

1. Develop and submit an Asbestos abatement/removal plan for McMurdo Station.

   Status: Complete

2. Prepare a plan for NSF review that includes Grantees in Health & Safety Program (injury and illness data, Safety and Health rules and policies, training, reporting requirements, etc.).

   Status: Complete

3. Start collecting and reporting on epidemiology of "Off-Duty" injuries and illnesses.

   Status: Complete

Finance

1. Begin use of new budgeting software for reporting in March 2006, while still using POFMS to generate reports.

   Status: Completion extended by 30 days through April 30th

2. Begin roll-out for FY07 budgeting and APP development in March 2006 to Finance Budget Analysts and to other users in following quarter.

   Status: Complete

3. Identify $1 million in labor/fringe under runs in FY06 APP to support NSF budget overruns and other challenges by end of March or identify other funds to cover $1 million.

   Action: More than $1 million identified.

   Status: Complete

Human Resources

1. Initiate morale improvements program – ongoing but started as planned.

   Status: Complete

2. Start HR improvements notification section in *P.S. News*.

   Status: Complete

3. Fill 75% of open key positions - HR, PMs, Medical Director and McMurdo Operations Director positions.

   Action: Filled 75% of open positions during the 90 day period.

   Status: Complete

Medical

1. PQ Personnel for winter over - on-ice dental, psyche, etc.

   Status: Complete

2. Review McMurdo and South Pole medical procedures.

   Status: Complete

PA/QA

1. Integrate new Construction Project Quality Control and Inspection Documentation Plan.

   Status: Complete

2. Integrate Eight Quality Sequence Steps for quality assurance in project management.

   Status: Complete

3. Formally manage/improve self-inspection at McMurdo, in particular to construction and maintenance projects, as evidenced by reporting and documenting non-compliances.

   Status: Complete

4. Provide comprehensive response to Action Item 12-2-5 Item 15: NSF request for Performance QA value examples/intended improvements.

   Status: Complete

Procurement

1. Start food services IPT to secure new vendors with improved capability (improve inventory, improved food quality, reduce handling, reduced weight and reduced hard-to-handle packaging, etc.).

   Action: Ongoing

   Status: Complete

2. Secure 10 meter shield, moon door, and tent vendors.

   Action: Vendors identified – competitive bid process in progress.

   Status: Complete

3. Start IPT on acquisition planning.

   Action: Initial meetings completed; resources being identified for continued effort.

   Status: Complete

Operations

Chief of Operations

1. Complete end of season reporting requirements; Prepare AOR.

   Status: In progress - final documents due at NSF on April 30, 2006

Area Directorate – Christchurch

1. Develop and submit a procedure for vehicle access to the USAP ramp to CIAL that meets the requirements of the CIAL Exclusive Area Agreement and National Aviation Security Program.

   Status: Complete

2. Identify projects for FY07, to include tenant agency requests.

   Status: Complete

3. Ensure the new version of POLAR ICE includes permitting requirements for genetically modified organisms (GMOs) transiting New Zealand.

   Status: Complete

4. Coordinate with the US military on the inspection of parachute equipment in Christchurch.

   Status: Complete

5. Arrange for the disposal of surplus U.S. military gymnasium equipment currently stored in Christchurch.

   Status: In progress

Area Directorate – McMurdo

1. Provide the building close out schedule.

   Status: Complete

2. Provide NSF Rep with winter tasking schedule.

   Status: Complete

3. Provide NSF with snow road and PAX transportation plan.

   Status: Complete

4. Review Marble Point traverse route options/ provide NSF a traverse plan.

   Status: Complete

5. Support the South Pole extended season.

   Status: Complete

6. Confirm station-wide snow maintenance strategy with NSF Operations ABM.

   Status: Complete

7. Move into winter operations on station.

   Status: Complete

8. Provide NSF with 06-07 sea ice runway plan.

   Status: In progress

Area Directorate – South Pole/SPSM Project Manager

1. Complete draft of South Pole Long Range Plan FY07-FY10 (1st draft due April). Initial review in March.

   Status: Complete

2. Transition all administrative functions to Elevated Station.

   Status: Complete 15 Feb 2006

3. Deliver fuel required on hand for station close prior to Feb 1: Delivery of fuel was scheduled to support projects; winter requirements met by Feb 2; prestage of FY07 fuel started at that time.

   Status: Complete 2 Feb 2006

4. Confirm station wide snow maintenance strategy with NSF Operations ABM.

   Status: Complete

5. Move into winter operations on station.

   Status: Complete 28 Feb 2006

6. Complete SPSM work in Elevated Station and DSL to gain conditional occupancy.

   Status: Complete 29 Jan 2006

7. Obtain conditional occupancy for BICEP to support FY07 science requirements for winter observations.

   Status: Complete

8. Complete SPT FY07 construction of foundation steel, control room, and walkway to DSL.

   Status: Complete

9. Complete raise of Bio-Med arch and construction of bulkheads.

   Status: Complete 11 Feb 2006

10. Complete relocation of IceCube seasonal drill camp.

    Status: Complete 11 Feb 2006

11. Complete IceCube laboratory construction in support of FY06 winter work and FY07 conditional occupancy Dec 4.

    Status: Complete 11 Feb 2006

12. Deliver initial vessel cargo prioritization plan to McMurdo ATO.

    Status: Complete 4 Jan 2006

13. Develop staffing and cargo plan for extended season support.

    Status: Complete

Area Directorate – Palmer

1. Complete ISO 9001 Internal Quality Audit.

   Status: Complete

2. Collect background information for Palmer Station long-range plan.

   Status: Complete

3. Continue excellent support of science and tour operations.

   Status: Ongoing; considered complete

4. Complete hiring, training and deployment of winter crew.

   Status: Complete

5. Complete draft AOR input.

   Status: Complete

6. Refuel station in late March.

   Status: Complete

7. Meet at NSF in February to review summer season and station priorities.

   Action: This meeting was postponed due to overlapping priorities. Telecoms and Partnering meeting planning dealt with the issues.

   Status: This item is considered complete

8. Deliver draft 3-year material lifecycle projection plan for Palmer.

   Status: In progress - will take through the next 90 day period to complete

FEMC

1. Sign off the punch list on SSC and LDB.

   Status: In progress – remaining items to be closed during FY07 summer

2. Prepare an approved baseline winter McMurdo schedule with resource loading and a resource matrix before the start of winter season.

   Status: Complete

3. Initiate a project monthly status report.

   Status: Complete

4. Develop a monthly IMS schedule submittal.

   Status: In progress

5. Establish an FEMC Monthly Resource Reporting process.

   Status: Complete

6. Provide formal notification of project resource variances over/under 10% of plan.

   Status: Complete

7. Notify NSF in writing when a project reaches its 75% spent point.

   Status: Complete

8. Establish a corrective action plan program, with associated action plans, that notifies the NSF and appropriate RPSC personnel. CAPARS is used for corrective action tracking; SharePoint tracks other action items through to completion.

   Status: Complete

9. Generate a plan to address the quality of construction, internal quality control, and punch list management.

   Status: Complete

10. Develop a BOA for FPE services and general A/E services, to be used for independent peer reviews and PE signoffs, where appropriate.

    Status: Complete

11. Prepare Palmer project closeout documentation for IMS and other projects completed since 2002.

    Status: In progress

IT/Comms

1. Continue IT Transformation.
   - Determine final organizational structure
   - Fill key leadership positions
   - Continue leadership training

   Status: Complete

2. Begin IT strategic planning process with USAP.
   - Determine focus and methods of strategic planning
   - Determine type and frequency of meetings
   - Implement jointly approved recommendations

   Status: Draft report delivered to Pat Smith

3. Deploy South Pole webcam.

   Status: Complete

4. Investigate South Pole TDRS Relay (SPTR) backup capabilities.

   Status: Complete

5. Improve USAP ABM and RPSC IT project planning processes.
   - Determine how to improve ABM participation in IT project process
   - Implement jointly approved recommendations

   Status: Complete

6. Assist the NSF and the USAP with the annual OIG Information Security Audit.

   Status: In progress

7. Improve operational reporting of USAP Enterprise activities and outages.
   - Determine gaps in operation reporting processes
   - Implement activities to improve reporting, analysis and tracking of outages

   Status: Complete

Logistics

1. Provide a driftable cargo summary report for the end of the 05-06 Season and a forecast for the beginning of the 06-07 season.

   Status: Complete 17 March 2006

2. Publish a Summary of Passengers and Cargo

   Status: Progressing toward a 15 May 2006 completion

3. Prepare a USAP 463L Pallet Management Plan.

   Status: Complete 14 April 2006

4. Submit a proposal for a new airlift schedule to improve the use and cost effectiveness of C-17 and C-130 assets

   Status: Complete 14 April 2006

5. Create MAPCON requisitions for 2,400 additional line items for delivery on the 2007 vessel. These are the lines moved from other divisions to Supply. This represents the remainder of the material owned and ordered under this initiative, for a total of 2,660 line items. These are demand-based items that will be replenished based on usage and division forecasted changes in demand.

   Status: In progress

6. Provide a summary report on bringing the Fuels Department shop stock inventory back under MAPCON inventory control.

   Status: Progressing toward a 22 August 2006 completion

7. Submit a report on the relocation of Safety and Medical inventories out of Bldg. 174 to reduce traffic to the hazardous and flammable goods storage.

   Status: Progressing toward a 22 August 2006 completion

8. Submit a proposal for using Bldg. 159 to take advantage of additional storeroom space.

   Status: Complete 15 April 2006

9. Reconcile South Pole Cargo weights to an official record of cargo movement.

   Status: Complete

10. Provide a summary report on the retrograde of 1,055 spare parts for two-stroke boat motors.

    Status: Complete

11. Provided a summary report for the retrograde of 92 Maytag Washer/Dryer spare parts.

    Status: Complete

12. Provide the final planned disposition of unused IMS/TerraLab materials remaining in Punta Arenas Warehouse, to include a schedule and means for disposal, if applicable.

    Status: In progress

13. Provide a summary report on the repatriation of PHI Helicopters.

    Status: Complete 21 April 2006

14. Provide a plan for tracking and reporting cargo receipt for the resupply vessel, to allow for an earlier assessment of what will not make the vessel.

    Status: In progress

15. Provide an ARB Summary Report to Dave Bresnahan.

    Status: In progress

PMO

1. Submit Revised PMO Staffing Plan to NSF.

   Status: Complete

2. Prepare and present the next installment of PMO Procedures at the Annual Partnering Meeting.

   Action: Procedures complete; partnering meeting presentation complete; partnering meeting is scheduled for April 22-25.

   Status: This item considered complete

3. Develop a standard RPSC wide Project WBS.

   Status: Complete

4. Establish a standard RPSC/NSF Project Reporting Format.

   Status: Complete

5. Develop a plan for implementing a standard monthly Resource Usage Report.

   Status: Complete

6. Implement an RPSC/NSF Communications Protocol.

   Status: Complete

7. Provide NSF Access to the Integrated Master Schedule (IMS).

   Status: Complete

8. Develop PMO Procedure for a standard RPSC wide Project Change Management.

   Status: Complete

9. Work with FEMC, Science Support, and IT to develop a Support Resources loading plan for input into IMS.

   Status: Complete

10. Implement an RPSC/NSF Actions and Deliverables Tracking System.

    Status: Complete

11. Implement an NSF Area Directorates Action Tracking System.

    Status: Complete

Science Support

1. Adopt PMO Project Management standard processes for all FY06 approved Science Support projects.

   Status: In progress

2. Continue development of POLAR ICE database and reporting tools with POLAR ICE team.

   Status: In progress

3. Partner with EHS to develop recommendations on USAP fuel containment policy for field camps.

   Status: Complete

4. Develop a "Permits Handbook" that details and clarifies permit requirements and processes for grantees.

   Status: In progress

5. Develop an HTML interactive permit guide for incorporation into POLAR ICE.

   Status: In progress

6. Determine alternatives to USAF pallets for field camp use during the 06-07 season.

   Status: In progress

7. Partner with Operations to research and recommend vehicle(s) to replace Haaglunds retrograded on 2006 Vessel.

   Status: In progress

8. Develop a design for replacement of cabinetry in Old Aquarium (Bldg. 187).

   Status: In progress

9. Partner with FEMC to develop a design recommendation for upgrading the McMurdo Dive Locker.

   Status: In progress

10. Develop with FEMC a design for a new workbench in the Field Party Staging Area (Crary Lab).

    Status: In progress

11. Determine long-term solutions for all EHS safety waiver activity in 05-06 season.

    Status: In progress

12. Partner with EHS to develop a recommendation for the NSF regarding a policy wherein grantees conform and are trained to RPSC safety guidelines (associated with Safety action item).

    Status: To be discussed at Partnering Session

Science Support - Marine

1. Prepare for biology cruises on LMG 06-02 and LMG 06-03.

   Status: Complete

2. Continue planning for ARVOC Meeting in April 06 (including AAIC participation for the first time).

   Status: In progress

3. ARSV Project begins (Feb 06).

   Status: In progress

4. Use lessons learned to develop and implement new drilling strategies for SHALDRIL II (NBP06-03).

   Status: Complete

SPSM

1. Obtain conditional occupancy of SPSM, Wings B3, B4, A4, and DSL.

   Status: Complete

2. Review and Revise SPSM Estimate to Complete.

   Status: Complete

3. Implement Weekly Field Status Reports for the SPSM Project.

   Status: Complete

4. Initiate FY07 Summer Construction Season Preparations.

   Action: In progress – initial schedules already in draft form – this effort will move through KY07 Q1 and Q2.

   Status: Complete.

5. Complete first phase of Leading Edge Issue Closure.

   Status: Complete

6. Submit a Chamfer Panel Correction Plan Progression.

   Status: Complete

7. Install Emergency Power Transfer Switch.

   Status: In progress – to be installed summer FY07

8. Review As-Built Drawings from Completed Construction Season.

   Status: In progress – to be completed during Q1

9. Complete After Action Review and Report from Completed Construction Season.

   Status: In progress – complete April 30, 2006

OVERARCHING EXPECTATIONS FOR KY07

General Management

Communications

1. Continue refining the way we coordinate requests for information about the USAP, using a variety of publications, presentation tools, venues, and contacts.
2. Play a significant role in IPY activities.

DSG

1. Review and revise all procedures, forms, policies.
2. Post 100% of deployment forms to the Internet by start of season.
3. Select the site for APC 2007.

EH&S

1. Work in concert with the NSF to develop the USAP Health and Safety Manual.
2. Continue developing the training program. Support the NSF in its effort to provide additional training to other USAP participants, including grantees.
3. Implement the Waste Management streamlining proposal recently delivered to the NSF.

Finance

1. Submit the FY07 APP budget using the new budget software.
2. Begin rolling-out new budget software to end-users for FY07 budgeting and APP development.
3. Submit a finalized procedure on transferring construction-in-progress to real property by May 1.

Human Resources

1. [redacted]
2. Increase managers' and supervisors' skills through training and development programs.
3. Continue improvement in identifying qualified candidates, streamlining hiring processes, and meeting staffing metrics.

Medical

1. Review and revise all procedures, forms, policies.
2. Review PQ screening process – initiate paperless deployment kit distribution.
3. Form IPTs as required.

PA/QA/Mission Assurance

1. Include McMurdo and vessel operations on the ISO 9001:2000 RPSC Corporate Certificate.
2. Create and implement a USAP Performance Measures interactive database on McMurdo's common network drive to collect data daily and provide real-time USAP performance reports.
3. Implement a distributed quality program for our project-managed environment.

Procurement

1. Develop an effective team to provide timely and accurate procurements.
2. Coordinate with RTSC to increase our use of corporate buying agreements.

Operations

Area Directorate – Christchurch

1. Upgrade physical security to comply with Christchurch International Airport Limited directive.

Area Directorate – McMurdo

1. Develop a draft outline to address warm storage facilities.

2. Present a proposal to the NSF regarding enterprise-wide contingency planning.
3. Develop an Energy Management Plan for the USAP.

Area Directorate – South Pole

1. Fine-tune the SOC over the winter and next season, especially as the scope, duties and responsibility of the SOC increase with the addition of several new systems.
2. Include drift planning for both early- and late-season cargo deliveries as part of the KY07 flight schedule.
3. Continue planning for new South Pole Station dedication.

Area Directorate – Palmer

1. Develop a long range plan to eliminate the use of shipping containers for storage on station and improve overall warehousing operations.

FEMC

1. Achieve conditional occupancy of the South Pole 10 Meter Telescope.
2. Achieve conditional occupancy of the new McMurdo Water Plant.
3. Achieve conditional occupancy of the MOGAS Facilities and receive fuel across temporary road crossings in February 2007.

IT/Comms

1. Create an Enterprise Architecture and Strategy Group focused on long-term IT planning and architecture. Restructure the Systems and Services group to be more responsive to changing IT challenges facing the USAP.
2. Focus IT resources on developing and implementing bandwidth improvement options in support of the growing demand for information transfer from the scientific community.
3. Adopt industry best-practices for Technical Operations management of the USAP Enterprise.

Logistics

1. Develop and implement a plan to decouple South Pole Station dependence on resupply vessel materials.
2. Implement the South Pole Retrograde Project, removing all waste, excess, and obsolete materials from the station by SPSM completion.
3. Develop a new intercontinental airlift plan, with the focus on reducing overall airlift cost, especially by making full use of USAP aircraft cargo capacity.

PMO

1. Complete a Project Manager's Manual.
2. Complete a Change Management Procedure.
3. Continue to improve Project Performance Tracking and Reporting.

Science Support

1. Continue working with the NSF to define criteria for allocating science support and project costs. Develop and refine a reporting mechanism to track project-based science support costs that exceed established baseline for operations and maintenance.
2. Continue refining the cargo-reporting-and-tracking template for on-continent airlift. Improve estimating, tracking, and accountability for science cargo bound for the deep field and all cargo that goes to the South Pole.
3. Continue developing and extending Project Management techniques within Science Support.

SPSM

1. Achieve conditional occupancy of the new Cryogen Facility.
2. Construct the main storage platform and building for the new Cargo Facility, thereby completing the last major component of SPSM.
3. Develop and organize all closeout documentation to formally close the project.

APPENDIX

INNOVATIONS, INITIATIVES AND ACHIEVEMENTS

2000

- Replaced military airfield management with fulltime Airfield Operations Manager/ Management position.
- Established Chief Medical Officer position. Ended reliance on subcontract physicians and laypeople with regard to medical practices.
- Implemented performance-based completion bonus system for contract employees, including a rigorous evaluation process. Attracts more highly-skilled and competent employees.
- Performance-based Contract (75% Quantitative, 25% Qualitative).
- Created a Master List of procedures and forms and posted it to LANs at Denver HQ, Christchurch, McMurdo, South Pole, and Palmer Stations. Replaces the Station Management Manuals and ensures employees have access to current documents.
- Established Performance Measurement Databases (contract year and USAP) to store accurate performance data. Used for contract Quarterly and Annual Technical Briefings and Reports and to report annual and multi-year trends at the APC.

2001

- The DSG wins best-practice award for contiguous process, single point accountability.
- R6σ Specialist Training: Raytheon Global Health Sciences, NSF, and RPSC.
- Relocated deployment orientations to Christchurch from Denver HQ. Reduced cost ($1.2 million to date) and improved morale.
- Implemented agreement with American/ Qantas Airlines in lieu of United for CONUS-to-Christchurch flights. Savings of $5.2 million to date.
- All RPSC ticketed program participants have 24x7x365 coverage during travel. Ensures timely movement and, if movement is not possible, ensures the safety of participants by providing a hotel at their interim location.
- Created travel waiver process that requires justification and approval for late travel requests by senior management. Tracks causes of late TRW submittals.
- Established annual on-Ice crane training and certification program, including heavy equipment and forklift "train the trainer" training.
- Effective Crisis Management: first historic South Pole winter rescue with no injuries.
- Corrective Action and Preventive Action Response System (CAPARS) Procedure and Access Database. Documents sources of non-conformances/potential non-conformances and associated corrective/ preventive actions to effect closure. Recognized as an RTSC Quality Best Practice.

- Developed new process at the Water Intake Pump House to thaw frozen intake. Reduced downtime and impact to station from two days to a half day.
- Implemented centralized, professional recruiting team to attract more highly-skilled, competent and diverse employees.
- Consolidated inbriefs for science groups, reducing the time invested by NSF and RPSC managers from several hours to less than one hour. Developed a new inbrief checklist that consolidates grantee requirements in one easy-to-read document.
- Appointed a Diversity Champion to focus on increased minority participation. To date, minority participation has more than doubled since contract takeover.
- Created multiple "band-aids" to enhance performance of legacy software systems (On-line Requisition Tracking, Material Status Report, Cargo Waiver) (2001-2004).
- Established Budget Analyst group reporting to the Finance Manager to support directorates in all budget activity while providing oversight for RPSC leadership.

2002

- Developed Quality Management Systems and Third-Party Assessment of compliance to the ISO 9001:2000 Standard. Resulted in Denver HQ's registration. Subsequent registration of Christchurch (March 2004), Port Hueneme (August 2004), and Palmer Station (October 2004), all of which are a Program first.
- R6σ Specialists Training and Science Planning/Partnering Workshop with NSF/OPP. Resulted in the formation of the Science Planning Group.
- R6σ implementation (client, supplier participation, cost savings ITD = $12.53 million, 2002 Raytheon Chairman's Award for the USAP Health and Safety Improvement Project.
- Implemented anonymous Employee Suggestion Box for improved communication and morale.
- Revised luggage processing at Los Angeles Airport to identify participants. Program-specific luggage tags created, with unique colors for each season. LAX luggage personnel can easily view participants' luggage and ensure timely movement. As a result, RPSC's incidents of misrouted luggage are well below industry averages.
- Achieved American Institute of Steel Construction (AISC) Certification.
- All APCs now managed by RPSC. Website created for posting documents, requesting hotel accommodations, etc. DSG contracts vendors for hotel properties, food and beverage, audio-visual, trinkets, etc., utilizing best practices and cost-effective vendors and suppliers.
- USAP Participant Tracking worksheets (UPTs) created to support PTS information flow to RPSC end-users (another legacy software systems "band-aid").
- Created Employee Communication Procedure and annual employee survey to improve communication and morale.
- Implemented web-enabled Digital Photo Library to simplify public and media access to Antarctic photos.
- Implemented robust Telemedicine capabilities, including 24x7 specialist consultation available through the UTMB.
- Implemented new process for major overhauls of Power Plant generators that utilizes expertise from other departments. Minimizes downtime and improves the quality of the rebuilds.
- Significant improvements in SPSM management (EVMS 2002, Change Control 2002, IMP 2003, IMS 2003-2004).
- Implemented contract supervisor training program to better prepare supervisors for their leadership role on the Ice. Significantly reduced harassment and discrimination claims.

- Implemented background checks for all new personnel. Ensures new employees meet specified criteria for personal conduct and responsibility.
- Used the ITASE traverse platform to support six science groups and retrograde six tons of equipment out of AGO 4. Allowed ITASE project to collect valuable data by piggybacking off TAMSEIS recovery. Freed over 20 Twin Otter days and six LC-130 flights for other projects at very little cost.
- In addition to the many small renewable energy systems deployed to the field, six permanent camps were transitioned, operating entirely on alternative energy systems. Virtually eliminates the use of fossil fuels for power production in the Dry Valleys, sea ice camps, and Lower Erebus Hut.
- Implemented the Polar Education and Polar Internship Programs, two significant initiatives recommended by the Science Support Advisory Board (SSAB).
- Implemented Quarterly video teleconference (VTC) in lieu of written technical reports. Improved RPSC/NSF interaction/communication/partnering.
- Started the Logistics Retrograde Project as a Beta Test to determine feasibility. This project has been funded by NSF and to date Logistics has removed 3.5 million pounds of excess cargo from Antarctica, reducing the supply line foot print significantly.
- Relocated approximately 300 employees into RPSC's Denver HQ facility. Improved efficiency, a cost savings of at least $3.8 million over the life of the lease, with a capital cost avoidance of approximately $1.5 million.
- RPSC/NSF Partnering (annual event attended by direct reports of RPSC and OPP/PRSS).
- Successfully negotiated with Navy Base at Port Hueneme to host the USAP Annual Property Auction on-base versus off-base, for an annual $30K savings.

2003

- Created Program's first Integrated/resource-loaded Master Schedule for the South Pole.
- Established estimating/MTO group within FEMC to provide a uniform approach to estimating and procuring standardized project materials.
- Proposed alternate snow management procedures at the South Pole, defining specifications for a dump trailer for snow removal on station. Estimated $195K in annual savings.
- Implemented first Program Blanket Purchase Agreements (BPA) (food, plumbing resupply, engineering services, medical surgical supplies, waste management, training).
- Used Jeppesen as a secondary communications control center during the second South Pole MEDEVAC.
- Created Corporate Agreements to reduce the cost of shuttle services by 30% (June 2004), hotels by 50% (December 2003), and rental cars by 21% (December 2003).
- Imported hazardous waste to California, instead of Washington State, for yearly savings of more than $300K.
- [redacted]
- Supported and coordinated a Norwegian MEDEVAC through McMurdo.
- Implemented ORT reports and accompanying processes to improve procurement tracking at the department/ supervisor level.
- Instituted zone approach to facility maintenance in McMurdo. At least two people are assigned to each of the six maintenance zones, providing “ownership” and a higher quality of service to each zone.
- Significantly enhanced Supplier Diversity, winning a Raytheon award for Leadership.

- Streamlined the dental PQ process. Reduced onerous requirements for short or summer deployments when a dentist is available.
- Worked with vendors to develop new sample-handling containers and replace improper eutectics in use for years on the program. Insulation values on the shipping containers increased by over 700%.

[redacted]

- Proposed 24x7 wideband communications at South Pole utilizing the Iridium constellation (not funded).

[redacted]

- Effective Crisis Management: Fuel tanker off-load, winter rescue with no injuries, highly successful SAR for Helicopter Crash.
- Developed new process for submitting the Plans and Modifications to the Antarctic Treaty Report, resulting in virtually no rework by the NSF webmaster before posting to the U.S. Antarctic Treaty Report website.
- Implemented web-based Expedition Software. The South Pole has access to punch lists and easy access to RFIs and CRs.
- Expanded McMurdo taxi service. Person-trips increased from 2000 in 2002/2003 to 9000 in 2005/2006. Reduces vehicle allocations required to transport personnel at McMurdo.

[redacted]

- Logistics revised the employee position descriptions to create a better career path for employees. Employee retention rate increased approximate 35% for ATO and Supply.

2004

- Implemented the employee eFoot Plan, a routinely-updated LAN site for personnel to reference for information on outdoor recreational activities in McMurdo.
- Implemented a comprehensive Emergency Management Plan that outlines the roles and responsibilities of station personnel involved in emergency activities and the coordination required to obtain external assistance, such as assets from other national programs.
- Performed South Pole aerial photography, resulting in cost savings and a continuously improved product. Used Twin Otter aircraft for more flexibility.

[redacted]

- Implemented web-based real-time remote waste tracking for all stations. Improved data and documentation accuracy and processing efficiency.
- Proposed replacement for legacy Material Management Systems with SAP Systems via a VECP (pending).
- Enabled SPSM data distribution via the web in lieu of paper.
- Tested and evaluated the Microwave Landing System Project (MLS) at McMurdo airfield. Projected savings approximately $14 million.
- Scott Base Transition Project. Proactive move by RPSC to move transition road and enable normal airfield operations.
- “BLITZ” McMurdo town cleanup. Resulted in positive comments from NSF Station Manager Erick Chiang.
- International support and coordination to extract Russian AN-3 aircraft.
- International support and coordination to MEDEVAC a Chinese patient from Dome A.

- [redacted]
- Provided extensive support to the *Krasin* from McMurdo, including 210,000 gallons of potable water.
- Transported Logistics cargo (Christchurch) on icebreaker *Krasin* to save over $600K.
- Negotiated timely ARFF procurements and delivery to McMurdo to enable dual-field operations.
- Implemented new procedures for evacuating personnel from airfields before major storms. Increases safety through reduced SAR extractions and saves road surfaces, which in turn allows quicker resumption of normal operations.
- Expanded shuttle and taxi services to include "on-call" 24x7 services. Helped reduce hours and miles on the "assigned" light vehicle fleet while simultaneously reducing the number of allocated vehicles on station.
- Response to sea ice fuel spill was nearly instantaneous and innovative. Fleet Ops arrived on scene within minutes and initiated plan to surround spill with a moat for containment of surface movement.
- The unprecedented failure of the sea ice runway due to warm temperatures forced a quick evacuation of the facility. Within four hours, Williams Field was operational.
- Implemented a process at Marble Point in which grey water (wastewater) is boiled off using heating elements. Serves as a load bank for the site generator, which was under-utilized. Saves fuel by reducing use of a fuel-fired boiler to accomplish the task.
- Introduced infrared soil treatment technology that has the potential of revolutionizing how the USAP manages contaminated soil, thus avoiding significant future retrograde expenditures.
- Established a Facility Management Group within FEMC to focus on maintenance activities and facility assessments. The group is responsible for maintenance of all USAP facilities.
- Proposed a T-event for Jeppesen to prototype CONUS flight following and weather forecasting.
- Created cargo waiver process that requires justification and approval for late requisitions by senior management. Tracks the causes of late requisitions.
- Developed continual improvement to program-wide welding program.
- Implemented single-channel Iridium link between McMurdo and the South Pole. Reduces reliance on HF RTTY transmissions (subject to HF blackouts) for critical information such as weather and load plans.

2005

- [redacted]

AWARDS

2002

- Raytheon Six Sigma Chairman's Award, 2002 (USAP Health and Safety Improvement Project)
- 2002 Raytheon Hero Award (South Pole Rescue)
- Raytheon 2002 EH&S Leadership Award – Innovation: Transforming the USAP Safety Culture
- Raytheon 2002 Gold Communication Award (Crisis Communications during South Pole rescue)
- LAN Chile Airlines Elite Award – Large Business Partner and Support

2003

- Raytheon 2002 EH&S Leadership Award – Innovation: Saving the Season (Fuel Tanker off-load)
- LAN Chile Airlines Elite Award – Large Business Partner and Support

2004

- Raytheon Quality Excellence Award (Fuel Tanker off-load)
- "Special Achievement Award" for our 2004 submittal of the McMurdo Research Station WWTP to Illinois ACEC
- Raytheon Supplier Diversity Award for Leadership
- Support Force Antarctica Appreciation Award to McMurdo Station Services

2005

- CIO Excellence Award Nomination – Team Award for Iridium Multi-Channel System
- Support Force Antarctica Appreciation Award to the McMurdo Fire Department for quick response to an aircraft fuel spill

NSF AWARDS

The National Science Foundation, Office of Polar Programs, Outstanding Service and Dedication Award for:

2002

- Outstanding Management of Long Duration Ballooning Activities
- Tour Ship Visitor Assistance
- Successful completion of the Pegasus White Ice Runway
- Successful completion of the South Pole Tunneling Project
- Unfailing support to special Marine projects
- Outstanding Global Ecosystem Dynamics southern ocean cruises

2003

- Helicopter Crash SAR
- Successful Fuel Offload despite ice conditions and challenging logistics

2004

- McMurdo Retrograde Project
- Palmer Landfill Remediation Project
- Light Ground Traverse Project
- South Pole Winter MEDEVAC and McMurdo Winter MEDEVAC

2005

- Relocation of the McMurdo Data and Network Operations Center
- SHALDRIL Support Team
- IceCube Project Team
- South Pole Integrated Master Schedule Project Team
- POLAR ICE

BEST PRACTICES

2000

- (Award Winning) Raytheon R6σ Implementation (Client, Vendor participation)
- Performance-Based Contract (75% Quantitative, 25% Qualitative)

2001

- Crisis Management – Historic Rescue Flight to South Pole (winter rescue of South Pole Physician)
- Pegasus White Ice Runway (construction of the world's first snow compacted runway certified by the USAF for wheeled flight operations)
- DSG (Contiguous Process, Single Point Accountability)
- Remote Airfield Operations Management
- Corrective Action Preventive Action Response System (CAPARS) Procedure and Access Database
- Self-performing World-Class Construction

2002

- Telemedicine – first ever telemedicine surgery performed at the South Pole
- R6σ Specialists Training and Planning Workshops with NSF/OPP (Science)
- ISO 9001:2000 Registration of Denver Headquarters (within two years of contract award)
- Aircraft "rescue" – AGE Department supported and participated in the extraction of two separate LC-130s from crevasses (2002, 2003)
- RPSC/NSF Partnering (Annual Event attended by Direct Reports of RPSC and OPP/PRSS)
- Polar Education Program
- Polar Internship Program

2003

- South Pole Traverse Proof-of-Concept (first heavy equipment crossing of the "Shear Zone")
- Innovation – Fuel Tanker Offload (from approximately four miles out on the pack Ice.

"This is one for the history books."

Erick Chiang

2004

- Disciplined Project Management, Employing IPDS and EVMA

2005

- CIO Excellence Award Nomination – Team Award for Iridium Multi-Channel
- Support Force Antarctica Appreciation Award to the McMurdo Fire Dept for quick response to an aircraft fuel spill