

7.0 RECOMMENDATIONS

The Panel offers 12 recommendations based on findings in Chapter 6 which, in the Panel's view, are in keeping with fundamental U. S. policy toward Antarctica and specifically address the charge given to the Panel.

7.1 PRESENCE

Antarctica today is a continent generally characterized by peaceful, environmentally friendly, human activity. High among the reasons for this situation is the role played by the U. S. over many years in helping create a system of treaties and international agreements governing the nature of human conduct on the continent. The presence of the U. S. in Antarctica is a key element of the continued stability of the region.

RECOMMENDATION I: The U. S., as a matter of national policy, should maintain a continued year-round presence in Antarctica, including at the South Pole.

7.2 SAFETY AND HEALTH

Various critical safety and health deficiencies exist at U. S. facilities in Antarctica, particularly at South Pole Station. The most urgent of these are currently being rectified using funds appropriated for this purpose in FY97. Additional concerns persist which, although not all of obvious imminent consequence, demand attention. Such concerns take on particular significance in an environment of extreme fire hazard due to dryness, remoteness and occasionally limited water supply.

RECOMMENDATION II: Promptly initiate steps to eliminate safety and health shortfalls at all U. S. facilities in Antarctica and, because of their magnitude, particularly at South Pole Station.

7.3 PROGRAM SCOPE

The USAP operates three major field sites (Palmer, Amundsen-Scott and McMurdo), two research ships (*Polar Duke* and *Nathaniel B. Palmer*) and numerous remote data collection sites which are either uninhabited or inhabited only on a temporary basis.

The three major stations play very different roles in the fabric of the USAP. Palmer Station provides a base for the study of marine biology in a climatic zone that

allows year-round access. Palmer Station also serves as a port for research vessels that undertake marine studies. McMurdo Station offers access for ships carrying supplies and serves as the logistics base for most inland operations, as well as offering excellent research facilities itself. McMurdo is critical in providing logistics for South Pole Station.

South Pole Station is strategically located from a geopolitical standpoint and provides a unique base for the conduct of certain types of science. It has a long and continuous observational record that is critical in such areas as documenting changes in atmospheric ozone, and is the base for astronomy projects that provide new insights into astrophysics. The existence of a continental-sized block of extraordinarily transparent ice provides an opportunity for the study of high-energy neutrinos.

Palmer is the least costly of the three stations to operate, is unique in the biology it supports, and is of geopolitical significance because of its location in a region of the continent characterized by overlapping claims. South Pole Station is in some respects the "crown jewel" of Antarctic presence — but cannot operate without logistics from McMurdo Station. The Panel thus concludes that facilities at all three locations should continue to be maintained. The level of activity at each is the subject of a later recommendation

RECOMMENDATION III: The U. S. should continue to maintain permanent, facilities in Antarctica at Palmer, McMurdo and the South Pole.

7.4 INTERNATIONAL COOPERATION

International research cooperation and shared support offer significant benefits to the U. S. in achieving its objectives in Antarctica and can help foster and advance Antarctic research and international understanding. Scientific results can be shared and redundancy reduced. However, the notion of reducing cost through international projects, although attractive in principle and realistic in some instances, particularly for larger projects, is in many cases obviated by the increased coordination and reduced efficiency associated with international endeavors.

The Panel also concludes that to internationalize the physical plant in Antarctica with foreign capital investment in fixed facilities at the U. S. stations raises ownership issues that, ultimately, work to the detriment of U. S. interests and, in the opinion of the Panel, worldwide interests. It is not, it would seem, illogical that a nation which shares the basic costs of the existence of a facility would seek a voice in the operation and governance of that facility — and ultimately in the title to that facility.

RECOMMENDATION IV: International cooperation in scientific research and logistics support should be encouraged, but permanent facilities and infrastructure at permanent U. S. sites in Antarctica should be provided by and maintained by the U. S.

7.5 SOUTH POLE FACILITIES

The estimated cumulative costs of the four options addressed by the Panel were summarized in Exhibit 65 (Section 6.6.2) for the construction funding period FY98 through FY02 and for the period FY98 through FY25.

Although the Rehabilitated Existing Station is the lowest cost option, it would be an imprudent choice because of the lack of fire suppression systems, the substandard space conditions in the utilidor, the need for improved exits from the dome and arches, and the disruption to operations caused as various systems fail due to aging.

The safety issues relating to the Rehabilitated Existing Station are addressed by the Safety Upgraded Station. However, compared with the Optimized Station, the cost tradeoff for this Upgraded Station is unattractive. The design, capability, reliability, maintainability, and building code compliance advantages of the Optimized Station are so compelling that it would be more cost effective to invest \$120M (FY97 dollars) in the latter new station than to invest \$88M (FY97 dollars) upgrading the existing 20-year old station. The life cycle cost tradeoff is even less attractive for the Safety Upgraded Station.

The Enhanced Station would provide additional capability and the opportunity for development of energy and environmental technologies. However, these additional capabilities are not mandatory and the additional cost is significant, making this option somewhat less attractive in a fiscally constrained budget environment.

The Optimized Station design, incorporating elevated modularity, provides the best foundation for dealing with future needs while reducing costs relative to the previously proposed Enhanced Station.

A sensitivity analysis with future costs and savings discounted was conducted and did not change the thrust of the above argument. Analyses also showed that delaying construction of a replacement station increased overall costs and raised the risk that components of the current facility would fail prior to replacement.

RECOMMENDATION V: The existing South Pole Station should be replaced with an Optimized Station. This construction can be accomplished by the year 2005 if the necessary budgetary steps are taken immediately (to initiate funding for the period FY98-FY02).

7.6. FUNDING

The USAP has over the years made the transformation from an expeditionary activity to the establishment of a presence to an operation dedicated to high-quality scientific research. Budget austerity and other changing conditions have necessitated the transition of management of the U. S. Antarctic interest from the Department of Defense to the NSF. The consequence of this change has been to place in a relatively small, research-oriented agency, normally dedicated to the support of science in an academic environment, the fiduciary responsibility for a major national undertaking in one of the world's most remote and demanding environments. Given the magnitude of this challenge, the Panel finds it remarkable that the NSF has been able to assume this responsibility with little or no apparent disruption to ongoing activities — and indeed with the realization of considerable efficiencies. Nonetheless, the USAP should be viewed as a national program, much like the space program, not merely as another NSF science project, and should therefore be scoped, funded, and judged as such. The NSF Antarctic budget is simply not adequate to fund in entirety the periodic major capital expenditures associated with maintaining an activity of the scale of the USAP. The consequence of seeking to function as if this were not the case is to suffer a continually eroding capital plant, as has indeed been the realization to date.

The Panel has devoted considerable attention to the issue of how much funding for construction of South Pole Station should come from reductions in Antarctic research. There is strong consensus that the quality of science should be maintained and, further, that the Panel should not seek to micromanage the detailed content of the science effort in Antarctica. Nonetheless, it is the Panel's position that the most equitable way to control the cost of science on the continent is to limit the number of scientists conducting research in Antarctica.

Traditionally, the Antarctic research program has been strongly field-oriented. This was to some extent a necessity because of the poor communications between Antarctica and the rest of the world; it was virtually impossible to transmit data to and from the Ice. Antarctic science is now entering a new era in which more science is being performed at university laboratories in the U. S. The NSF should continue to encourage these types of projects and limit the number of expeditions to the Ice — especially during the South Pole construction phase. This approach will lead to significant savings in the overall science budget, will have the least impact on Antarctic science, and will facilitate the development of remote operations and robotics. Obviously, however, some presence in the field is required for many types of Antarctic research.

Given the imperative to replace the existing facility at the South Pole and the lack of any current budget plan for doing so, the Panel concludes that five funding sources must be drawn upon (values shown are in then-year dollars):

- 1) A moderate cut-back in research activity during the period the new facility is being constructed (\$20M cumulative over the period FY98-FY02).
- 2) Reduction in the capability initially planned for a new South Pole facility to the level of the Optimized Station (approximately \$31M savings in then-year dollars).
- 3) Application of the \$25M already appropriated in FY97 to resolve urgent safety, health and environmental concerns in a fashion which is compatible with the Optimized Station.
- 4) Generation of cost reductions associated with the transition from Navy functions of \$30M.
- 5) Provision of additional funds to assist in the construction of the recommended facility — \$95M then-year dollars over the five-year period FY98-FY02.

RECOMMENDATION VI: After having taken all prudent steps to reduce the cost of a new facility at South Pole Station and to seek other cost reductions to fund such a station, there remains a funding shortfall; therefore, additional funds in the amount of \$95M (then-year dollars) over the five-year period FY98-FY02 should be added to the NSF budget to permit the phased replacement of the existing South Pole Station.

7.7. PLANNING AND BUDGETING

As has been noted, the lack of a continuing long-range Antarctic integrated capital plan (and supporting budget) makes it virtually impossible to maintain an efficient and modern set of facilities. The draft Long Range Development Plan must integrate the science, support and capital facility needs, and become the model for budget justification.

RECOMMENDATION VII: The NSF should prepare, and annually update, a long-range plan that coordinates science, support and facility needs to carry out the U. S. Antarctic Program. Implementation funds should be provided to support the long range plan.

7.8 MANAGEMENT

U. S. operations in Antarctica present an enormous management challenge because of their diversity (research, ground transportation, food supply, construction, air operations, ship activities, medical care, maintenance...) and because of the length of the “pipeline” involved in supporting Antarctic operations (7,100 miles from Los Angeles to Christchurch, 2,400 miles from Christchurch to McMurdo; 840 miles from McMurdo to the South Pole). Two management tenets which apply in such situations are to have a single overall manager for support activities and to establish an organization under this manager which minimizes the number of interfaces required. For various reasons, it has not been possible for these principles to be fully embraced in the design of the USAP management structure to date, but they should be a key goal of the evolving structure. In this regard, the Panel recognizes the value of competition in assuring a high level of performance by the operating contractor, but it also recognizes the value of continuity. These sometimes conflicting objectives can generally be satisfied by immediately competing the role of poorly-performing contractors and continuing the role of well-performing contractors. The existence of such a policy in itself forms a powerful incentive and is consistent with evolving practice in Japan, the U. S., and elsewhere.

Recommendation VIII: To the greatest extent possible, all support activities in Antarctica should be placed under a single prime contractor — with oversight by a single individual/office designated by the NSF. Subsidiary organizational elements should be restructured to minimize overlap, duplication and interfaces.

7.9 PROGRAM INTEGRATION

While the infrastructure required to support science in Antarctica may in an accounting sense be similar to that of other facilities (such as astronomical observatories, ships, accelerators, and aircraft) whose costs are not readily attributable to individual projects, many of the direct science support functions needed for Antarctic research (such as technical support, transportation, energy costs, etc.) can in fact be related to particular projects. Evaluation of such costs should constitute an important part of the research proposal review and approval process, particularly where activities with substantial support costs are concerned. Explicit allocation of these costs will also help motivate researchers to achieve efficiencies on their own.

The approval process for scientific proposals to all divisions in the NSF consists of a critical peer review by mail, by panels, or both. The cost of proposed research at many large facilities (such as astronomical observatories) is often reviewed by panels in order to help provide cost containment. The research program in Antarctica could benefit from a similar approach.

It is recognized that evaluation of total project costs as part of the mail review process (which today principally focuses on the merits of the proposed science) could add significant administrative cost and reduce efficiency since many proposals fail based upon scientific grounds alone. One mechanism that the NSF could consider adopting would be to have a panel review the overall Antarctic program in a fashion whereby scientific merit would be considered together with approximate total costs (including support) for projects receiving favorable preliminary mail reviews. Such an approach could help to better balance cost with scientific benefit in the selection criteria and could be expected to produce significant savings within the science program. Further, such a process would allow the scientific community to participate in the design of the overall program and the decision-making process that will be needed to undertake such pursuits as the modernization of the South Pole Station.

The administrative problem of allocating support costs to a specific end-project is, of course, not unique to the Antarctic research program. Nonetheless, the situation which exists today is one wherein a support contractor is specifically incentivized (in this case with an “award fee”) to be highly responsive to the demands of researchers; yet those same researchers have little insight into the cost implications of their demands — or of alternatives that might be available. Such circumstances almost inevitably generate unnecessary costs. Examples of activities that could be adversely impacted through such a practice are the use of helicopters, manifesting of fixed-wing aircraft, use of air versus surface transportation, the number of persons visiting Antarctica (some for very short periods of time and for repeat visits), and the delivery to Antarctica of scientific equipment which is incomplete or inadequately tested.

Recommendation IX: The NSF should implement mechanisms to include science support costs as an explicit rather than implicit portion of the evaluation of proposed scientific projects that make up the USAP.

7.10 TRANSITION

As has been noted, it is the Panel’s view that all support functions should be integrated under the management

of a single prime support contractor. By so doing, additional efficiencies are obtainable. This and certain ongoing transitions of management responsibilities offer particularly attractive opportunities to “reinvent” U. S. operations in Antarctica and to consolidate like-functions and eliminate unneeded functions.

RECOMMENDATION X: The NSF and its contractor, Antarctic Support Associates, should review those functions no longer to be performed by the DOD to ensure that those functions are transferred to the recipient organization in the most efficient possible manner...or, where possible, eliminated. Similarly, the U. S. Coast Guard’s operating budget should continue to absorb the level of fixed icebreaker costs that exceed reimbursement.

7.11 TELECOMMUNICATIONS

Telecommunications capabilities in Antarctica have been improved substantially in recent years but remain substandard. Further improvement is a means to lower operating expenses while maintaining the quality of the research program. Emerging technologies such as those based on large constellations of low Earth-orbiting satellites may become commercially operational and alleviate current communications shortcomings. Until that time, effort must be expended to ensure the continued gains made for South Pole Station utilizing inclined “geosynchronous” satellites which have exceeded their useful commercial life.

RECOMMENDATION XI: The NSF should seek advance arrangements with governmental and commercial geostationary satellite operators to make such satellites systematically available as they near the end of their economic commercial life.

7.12 TOURISM

Tourism in Antarctica is increasing rapidly and is an inevitable facet of a more affluent, globally mobile world. There is no logic to argue that Antarctica should be reserved solely for a limited number of researchers; hence, visitations by the general public should in general be welcomed. On the other hand, a greater presence of humans in so brittle an environment will require development of mechanisms for visit management, just as our nation’s parks require a management structure that depends upon the volume and nature of usage. Now is the time to work with other nations and

agencies to proactively plan for the accommodation of increasing numbers of visitors in a manner which permits the magnificence of Antarctica to be widely enjoyed but is not harmful to the environment or disruptive to the research being performed there. Additionally, peripheral issues arise in connection with the growth of tourism that are best resolved prior to their occurrence, such as who is to fund the cost of search and rescue operations; what nations shall have directive air traffic management authority over non-sovereign territory; and so forth.

RECOMMENDATION XII: The U. S. Government, presumably the Department of State, should convene those U. S. Government organizations having interests in Antarctica and develop a policy regarding the increased tourism to be expected in Antarctica in the years ahead and, further, should work with other interested governments to address this issue in a proactive and cooperative manner.

*Report of the
U.S. Antarctic
Program
External
Panel*

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“The efficiency of a polar expedition varies on the whole according to the adequacy of its preparations, the worth of its equipment and scientific gear, the services of its personnel and staff of scientists and the length of its stay in the field.”

Richard E. Byrd, Little America, 1930