

South Pole Station Modernization (SPSM)

Project Description: South Pole Station Modernization (SPSM) provides a new station to replace the current U.S. station at the South Pole, built 30 years ago and inadequate in terms of capacity, efficiency, and safety. The new station is an elevated complex with two connected buildings, supporting 150 people in the summer and 50 people in the winter.

Principal Scientific Goals: Support science at the South Pole and maintain U.S. presence at the South Pole in accordance with U.S. policy.

Principal Education Goals: Support education associated with the research projects at the South Pole.

Connections to Industry: There are approximately 385 separate subcontractors for supplies and technical services. The U.S. Antarctic Program prime support contractor is Raytheon Polar Services Company (RPSC).

Management and Oversight: The Office of Polar Programs (OPP) has the overall oversight responsibility for SPSM, including development of the basic requirements, design, procurement, and construction. OPP has contracted for procurement and construction management for all phases of the project, including design reviews of all drawings and specifications; conformance of the designs and procurements with established standardization criteria; assistance in establishing functional interfaces; transition from the existing to the new facilities; and systems integration. Naval Facilities Engineering Command, Pacific Division (PACDIV) selects, monitors, and manages architectural and engineering firms for design, post-construction services, and construction inspection for the project. The project status, including cost expenditures and cost projections, is monitored on a periodic basis by OPP staff and the project's PAT. The NSF Deputy Director for Large Facility Projects regularly briefs the Chief Financial Officer and the NSF Director on project status.



Aurora Australis – the Southern lights, over the National Science Foundation's (NSF) Amundsen-Scott South Pole Station. This image shows the atmospheric phenomenon over a wing of the new station that NSF is building.
Credit: USAP

Current Project Status: The original estimate for SPSM was \$127.90 million. In 2001, the NSB approved a change in project scope, increasing station capacity from 110 people to 150 people, as well as a project schedule extension caused almost entirely by weather-imposed logistics delays, increasing the cost estimate to \$133.44 million. The estimated projection had been for conditional acceptance (i.e., occupation and operations) of the entire station by the end of FY 2007, with some work on punchlist items possibly occurring in FY 2008. Although no funds were requested for SPSM in the FY 2006 Budget Request to Congress, the update in the Request on SPSM indicated that the cost-to-complete at the time of budget submission was \$136.96 million. The Budget Request also indicated “an updated project cost and schedule review will be completed shortly after the end of the 2004/2005 operating season.” That review has now been completed and has been reviewed by the SPSM Project Advisory Team and OPP management. At the end of the 2004/2005 season, the delivery of project material was 4.3 million pounds behind schedule. This delay has resulted in the station's completion being moved at least to FY 2008, rather than FY 2007 as previously estimated. There is some possibility that final completion will be further delayed, perhaps in order to accommodate logistics support for high priority

Major Research Equipment and Facilities Construction

science projects at South Pole Station. Such delay would not impact full use of planned station facilities and is unlikely to cause significant cost increases. The new “cost to complete” total for the project is \$142.71 million. Total funding for SPSM through FY 2006 is \$133.51 million; the amount of additional funding required to complete the project is \$9.13 million.

These are the current milestones.

Activity	Procurement	Transport to Antarctica	Airlift to South Pole	Start Construction	Conditional Acceptance
Vertical Circular Tower	FY98	FY99	FY99/00	FY00	FY02
Quarters/Galley	FY98	FY99	FY00/FY01	FY01	FY03
Sewer Outfall	FY98	FY99	FY00	FY01	FY02
Fuel Storage (100K gallons)	FY98	FY98	FY99	FY99	FY99
Medical/Science	FY99	FY00	FY01/02	FY02	FY04
Communications/Administration	FY99	FY01	FY02/03	FY03	FY06
Dark Sector Lab	FY98	FY99	FY99/00	FY00	FY06
Water Well	FY00	FY01	FY01/02	FY02	FY07
Remote RF Building	FY99	FY00	FY01	FY01	FY01
Emergency Power/Quarters	FY99	FY01	FY02/03	FY03	FY05
Liquid nitrogen and helium facility	FY02	FY03	FY04	FY04	FY07
Quarters/Multipurpose	FY99	FY02	FY04	FY05	FY06
Electronic Systems and Communications	FY00/03	FY01/04	FY01/05	FY01	FY06
Warehousing, SEH and Waste Management	FY99	FY02/03	FY04/05/06	FY07	FY08
Station Equipment	FY02/03	FY03/04	FY04/05	N/A	FY08

Funding Profile: SPSM funding totals \$133.51 million through FY 2006, exceeding the most recent NSB-approved cost estimate of \$133.44 million. Based on an updated project cost and schedule review completed after the 2004/2005 operating season, the estimated total cost to complete SPSM is \$142.71 million.

Appropriated and Requested MREFC Funds for SPSM
(Dollars in Millions)

	FY 98	FY 99	FY 00	FY 01	FY 02	FY 03	FY 04	FY 05	FY 2007		
									Request	Total	
SPSM Appropriations	70.00	39.00	5.40	13.47	-	5.96	1.29	-	-	9.13	144.25
Reprogramming				-1.00	-0.50	-0.24			0.12		-1.62
	\$70.00	\$39.00	\$5.40	\$12.47	-\$0.50	\$5.73	\$1.29	-	\$0.12	\$9.13	\$142.64

NSF reprogrammed \$1.0 million in FY 2001 to the Polar Support Aircraft Upgrades, \$500,000 in FY 2002 to the South Pole Safety and Environment project, and \$235,000 in FY 2003 to HIAPER and LHC to cover final costs due to a rescission in that year. The FY 2004 appropriation for SPSM represents payback for the reprogrammings in FY 2001 and FY 2003. SPSM received \$120,000 of available funds in FY 2006 from the Polar Aircraft Support Upgrades upon completion of that project.

Advance funding provided in the project’s early years made possible advance bulk buys of materials, which is ultimately more cost-efficient. However, this project’s overall outlay is relatively slow due to

the unusual logistics and the shortened Antarctic season. As a result, the project has carried over fairly significant amounts each year since FY 1998, resulting in obligations that are significantly lower than appropriated amounts.

The following funding profile chart includes actual obligations for past years and anticipated obligations for future years. SPSM obligations total \$120.41 million through FY 2005.

South Pole Station Modernization Funding Profile
(Obligated Dollars and Estimates in Millions)

	Concept/ Development		Implementation		Operations & Maintenance		Totals		Grand Total
	R&RA	MREFC	R&RA	MREFC	R&RA	MREFC	R&RA	MREFC	
FY 1997 & Earlier	16.40						\$16.40	-	\$16.40
FY 1998				24.93			-	\$24.93	\$24.93
FY 1999				4.28			-	\$4.28	\$4.28
FY 2000				15.49			-	\$15.49	\$15.49
FY 2001				10.14			-	\$10.14	\$10.14
FY 2002				15.03			-	\$15.03	\$15.03
FY 2003				12.65			-	\$12.65	\$12.65
FY 2004				21.02			-	\$21.02	\$21.02
FY 2005				16.86			-	\$16.86	\$16.86
FY 2006 Current Plan				8.59			-	\$8.59	\$8.59
FY 2007 Request				9.13	15.00		\$15.00	\$9.13	\$24.13
FY 2008 Estimate				4.51	15.38		\$15.38	\$4.51	\$19.89
FY 2009 Estimate					15.76		\$15.76	-	\$15.76
FY 2010 Estimate					16.14		\$16.14	-	\$16.14
FY 2011 Estimate					16.53		\$16.53	-	\$16.53
FY 2012 Estimate					16.94		\$16.94	-	\$16.94
Subtotal, R&RA	\$16.40		-		\$95.74		\$112.14		
Subtotal, MREFC		-		\$142.64		-		\$142.64	
Total, Each Stage		\$16.40		\$142.64		\$95.74			\$254.78

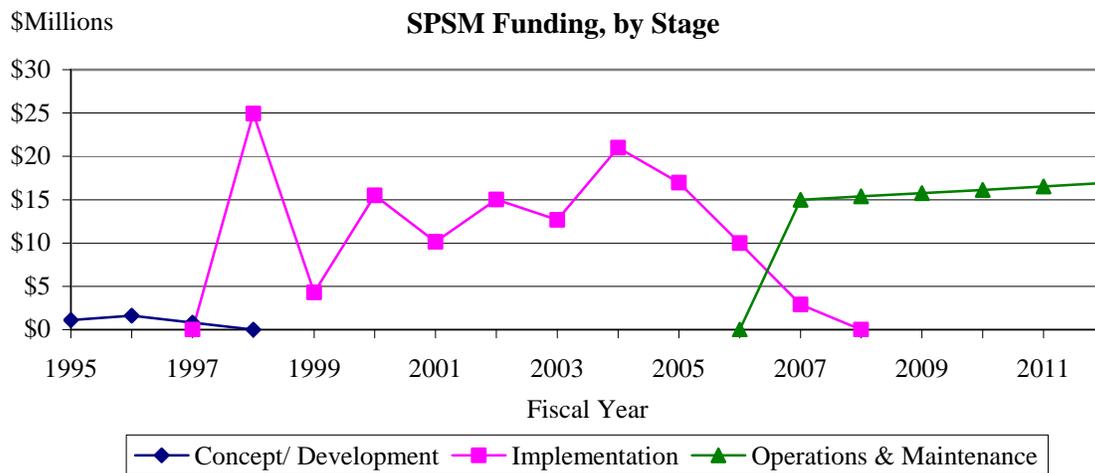
NOTE: A steady state of operational support is anticipated at about \$15 million by FY 2008, slightly higher than the current operational costs. The expected lifespan of the modernized station is 25 years, through FY 2031. Operations estimates for FY 2008 and beyond are developed strictly for planning purposes and are based on current cost profiles. They will be updated as new information becomes available.

Information on the data in the table is provided below.

- **Concept/Development:** Design, development, planning, and closely related activities in support of this project included preparation of more than 40 engineering studies and reports. The documents ranged widely in subject matter including subjects such as snowdrift minimization modeling, detailed analysis of power and heating requirements, preparation of a draft Environmental Impact Statement, energy conservation measures, efficiency and maintainability of diesel generators, fuel storage support system evaluation, design code criteria matrix, concept for signal/communication systems, gray-water system evaluation, minimization of ventilation requirements, control of diesel engine exhaust emissions, and jacking plan and concept.
- **Implementation:** Funding supports construction of an elevated station complex with two connected buildings, supporting 150 science and support personnel in the austral summer, and 50 science and

support personnel in the winter. Costs include materials, labor, logistics for transportation of all material and personnel to the South Pole, construction support, inspection, and equipment, as well as demolition and disposal of the existing station.

- **Operations and Maintenance:** This support represents the continued presence of a U.S. station at South Pole rather than new funds. Operational costs of the modernized station are expected to be higher than operational costs of the current station, with some lower costs due to efficiencies gained, and some higher costs due to increased station size and increases in Science Support and Information Systems. A steady state of operational support is anticipated at \$15.0 million by FY 2007. The expected lifetime of the modernized station is 25 years, through FY 2031. These estimates are currently being reviewed to improve accuracy, taking into account estimated station population and cargo loads.



Future Science Support: Along with direct operations and maintenance support for South Pole Station, NSF will support science and engineering research through ongoing research and education programs. The annual support for such activities is currently estimated to be approximately \$8.0 million.